health outcome indicators

FRACTURED PROXIMAL FEMUR

Report of a working group
to the Department of Health

FOREWORD

The Government consultation document "A First Class Service - Quality in the new NHS", published in 1998, emphasised three essential aspects of ensuring delivery of high quality of care by the National Health Service: setting, delivering and monitoring standards. It also discussed the importance of partnership between the Government and the clinical professions and patients in achieving such quality.

This series of 10 reports concerns the third aspect - monitoring standards. It represents the culmination of work that was started several years ago under the auspices of the Clinical Outcomes Group, chaired jointly by the then Chief Medical Officer, Sir Kenneth Calman, and the Chief Nursing Officer, Dame Yvonne Moores. The work was commissioned by the former Central Health Outcomes Unit of the Department of Health. The Unit has since moved and is now called the National Centre for Health Outcomes Development (NCHOD), based jointly at the Institute of Health Sciences, University of Oxford and the London School of Hygiene and Tropical Medicine, University of London.

The background to the work was the need to ensure that the NHS is driven by considerations of quality and outcome. The Department wanted to build on an earlier set of Population Health Outcome indicators, which had been limited by the constraints of existing routine data. It therefore commissioned systematic work on ten clinical topics, to be undertaken by a Working Group on each, tasked to make recommendations on 'ideal indicators' for each condition. 'Ideal indicators' were defined as statistical measures of what should be known, and realistically could be known, about the outcomes of the condition in routine clinical practice. The Groups were asked to consider a wide spectrum of possible uses of outcome indicators, from national monitoring of NHS performance by government to the periodic assessment of local services by clinicians and users.

The work of the Working Groups was coordinated by Michael Goldacre, University of Oxford. A particular feature of the work is that the Groups have recommended definitions and technical specifications for each indicator. It is hoped that people interested in monitoring the topic covered by each indicator will use the same definitions so that comparisons can be facilitated. Moreover, the methodology adopted by the Working Groups is applicable to developing health outcome indicators for many other conditions.

The publication of these reports, however, is only one further step on a long road of quality assessment in health care. The reports present 'menus' of suggestions for ways in which outcomes might be monitored in a variety of settings, by a variety of organisations and people. It goes without saying that NCHOD will welcome feedback on the reports and on the development and use of outcome indicators.

I believe that the work described here shows the value and potential of partnerships between various parties. Each working group had members who brought together perspectives of all the relevant clinical professions plus patients, NHS managers, policy makers, researchers and others as appropriate. The recommendations of the Working groups show quite clearly how these various perspectives may contribute to a broader and more balanced monitoring of standards. I would personally like to congratulate and thank everyone who has worked so hard and well to bring this initiative to fruition.

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OUTCOME INDICATORS FOR FRACTURED PROXIMAL FEMUR

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SUMMARY OF RECOMMENDATIONS

Using a variety of check lists including a health outcome model, the Group identified outcome indicators which were specified in a standard format and included in this Report. Outcome indicators, whose numbers correspond to the specifications in Section 4, were grouped under four headings relating to the aims of the interventions.

Recommendations for implementation were made for each indicator using the following categories:

A. To be implemented generally on a routine basis.
B. To be implemented generally by periodic survey.
C. To be implemented where local circumstances allow on a routine basis.
D. To be implemented where local circumstances allow by periodic survey.
E. To be implemented following IT development on a routine basis.
F. To be further developed because link with effectiveness is not clear or the indicator specification is incomplete.

Category	Page	
		Indicators related to reduction/avoidance of risk of fractured proximal femur (FPF)
A	**18**	**1A.** Hospitalised incidence of FPF per 10,000 population.
E	**20**	**1B.** Hospitalised incidence of a second (contralateral) FPF per 10,000 population.
F	**23**	**2.** Rate of accident and emergency (A&E) attendance for fractured distal radius per 10,000 population.
		Indicators related to reduction of mortality rate from fractured proximal femur
C	**26**	**3.** Population-based mortality rates for patients admitted to hospital with FPF.
C	**29**	**4.** Case fatality rates for patients admitted to hospital with FPF.
		Indicators related to avoidance/reduction of complications of fractured proximal femur
F	**31**	**5.** Thromboprophylaxis rate within a provider unit population of patients with FPF.
F	**33**	**6.** Percentage of patients with a pre-operative length of stay of greater than two days, within a provider unit population undergoing surgical treatment for FPF.
A	**36**	**7.** Incidence of pressure sores during the in-patient stay within a provider unit population admitted for care of FPF.
D	**39**	**8.** Rate of ipsilateral hip surgery within a provider unit population which has undergone surgical treatment for FPF within the previous 120 days.
F	**41**	**9.** Rate of emergency re-admissions (for any reason) within 30 days of discharge within a provider unit population which has undergone surgical treatment for FPF.

Indicators related to restoration of function and well-being after fractured proximal femur

1. INTRODUCTION TO THE REPORT

Health outcome indicators

1.1 This Report is one of a series containing the recommendations of working groups set up to develop 'ideal' indicators of the health outcomes of specific conditions. The background to the work, commissioned by the Department of Health, is summarised in Appendix A.

1.2 Health outcomes have been defined as changes in health, health related status or risk factors affecting health, or lack of change when change is expected. They may be the result of the natural history of the condition or may be the effect of interventions to prevent or treat it. The particular concern of the working groups has been to make recommendations about outcomes which may be attributable to interventions or the lack of them.

1.3 The term indicator has been defined as an aggregated statistical measure, describing a group of patients or a whole population, compiled from measures or assessments made on people in the group or the population. An indicator may not necessarily provide answers to whether care has been 'good' or 'bad'; but well chosen indicators, as the term implies, should at least provide pointers to circumstances which may be worth further investigation.

1.4 An 'ideal' indicator has been taken to mean what should be known, and realistically could be known, about the outcomes of the prevention and care of specific conditions. The development of the recommendations has, of course, been tempered by considerations of the likely cost and availability of information. However, the working groups have tried to be reasonably far-sighted in their views about future advances in information systems.

1.5 For each condition the working group has developed a menu of indicators which can be used by different groups of people for a variety of purposes. In particular, an attempt has been made to recommend, within each set, indicators which reflect a population, clinical, patient, and in relevant cases, a carer perspective.

Fractured Proximal Femur Working Group

1.6 The terms of reference and membership of the Group are shown in Appendix B. The Group included representatives of professional, managerial and patient groups involved with the prevention and treatment of fractured proximal femur (FPF).

1.7 The work of the Group had three main components:

- development of check lists, including a health outcome model for fractured proximal femur, to assist members to choose candidate indicators, by which is meant potential indicators worth detailed consideration
- specification of candidate indicators
- recommendations about implementation and further development.

1.8 In this Report:

- the health outcome model is described in Section 2
- work commissioned to support the model is included in Appendix C
- check lists for choosing candidate indicators are outlined in Appendix D
- guidelines for specifying candidate indicators are described in Appendix E
- candidate indicators chosen for specification are listed in Section 3
- candidate indicator specifications are included in Section 4
- recommendations about implementation and development are made in Section 5
- references to all sections and appendices are in Appendix F.

Recommendations

1.9 The recommendations made by the Group were categorised as those which:

- can be implemented generally throughout the NHS as there are systems available which can provide the requisite data
- could be implemented now where local circumstances allow, and more generally in the near future once expected developments are in place
- will not be possible to implement in the near future but, because of their desirability, they should be considered in the future development of clinical and management information systems
- require further work before a recommendation can be made.

1.10 The recommendations have been further categorised as to whether the requisite indicators should be available:

- routinely on a universal and continuous basis
- from periodic surveys and/or sampling, either at different points in time nationally or in geographical areas when there is a particular need or interest.

2. HEALTH OUTCOME MODEL FOR FRACTURED PROXIMAL FEMUR

Scope of the work

2.1 The Group decided that the scope of the work should comprise fracture of the proximal femur including;

- undisplaced intracapsular fracture
- displaced intracapsular fracture
- per-trochanteric fracture
- sub-trochanteric fracture.

People below age 65 have not been included in the scope as their general health and the common causes of their fractures are different from older age groups.

Developing a health outcome model

2.2 Although some original work was commissioned by the Group, the greater part of the input to the development of the outcomes model came from already published national work including:

- *Screening for osteoporosis to prevent fractures*, an Effective Health Care Bulletin, produced by University of Leeds, University of York and the Royal College of Physicians (Effective Health Care 1992)
- *United they stand*, published by the Audit Commission (1995)
- *Developing measurable indicators for the quality of care of hip fracture patients*, a report to the Department of Health by researchers at the University of Cambridge and Lifespan Healthcare NHS Trust (Sutton et al. 1996).

2.3 The health outcome model was developed as an aid to help Group members to identify potential indicators. The model contains four elements:

- an overview of the epidemiology of the disease
- a review of causes and risk factors
- a review of the clinical course, complications and consequences
- a review of relevant interventions.

Overview of epidemiology

2.4 In England in 1993/4, 58,970 people were admitted to hospital with fracture of the neck of femur (Department of Health 1995). This number is rising and the crude incidence could double by the year 2015, reflecting the ageing population rather than a change in the age related incidence. The mean age of those with a hip fracture is 75 years but the risk rises with increasing age. Hip fracture is considerably more common in elderly women than men.

2.5 Although there is approximately only one patient admitted with a hip fracture per day to each hospital in England, patients with hip fracture occupy 20% of orthopaedic beds. This is because their average length of stay is 30 days, which is longer than for many other orthopaedic conditions (Sutton et al. 1996).

2.6 Mortality within one year of hip fracture is 20% to 25% which is 12% to 20% above that expected when adjusted for age and sex and most of this excess occurs within the first four months of the incident (Sutton et al. 1996).

2.7 It has been estimated that in 1991/2 the direct costs of treating patients with fractured hips in the hospital sector in England was £288m (Hollingworth et al. 1995).

Causes and risk factors

2.8 A bone will fracture when the stress applied to it exceeds its strength. It therefore follows that the two mechanisms of FPF are excessive mechanical stress and weakened bone.

2.9 The most important cause of excessive stress on bone is an accident. Many accidents in older people stem from increased physical frailty and falls are particularly common. It is estimated that up to 60% of falls in this age group occur in the home and an association (Department of Health 1993b; Dargent-Molina et al. 1996) has been found between falls and risk factors such as:

- a decline in vision
- balance
- sensory perception
- strength
- neuromuscular function.

Outside of the home, older people are particularly vulnerable as pedestrians.

2.10 The common and most important cause of bone weakening in older people is osteoporosis, which results in the loss of bone mineral and matrix. After reaching a peak before the age of 40 years, bone mass decreases with age, but this effect is particularly marked in women after the menopause and is associated with declining levels of oestrogen. Important risk factors for osteoporosis (Effective Health Care 1992) are:

- increasing age
- early menopause
- poor nutrition in earlier life
- smoking
- lack of physical exercise.

Clinical course, complications and consequences

2.11 Fractured proximal femur (FPF) is a serious condition causing pain and immobility. Mortality is high with approximately one in five patients with a fracture being dead within one year. The immediate threat to health from the fracture itself may be much less of a problem than the complications arising from surgery, poor mobility and institutionalisation in the weeks and months following the event. Many survivors never regain their previous level of physical function and may not return to their own homes.

2.12 The common complications and consequences of FPF and the associated surgery are summarised in Exhibit 1 (Sutton et al. 1996).

Relevant interventions

2.13 The Group reviewed the relevant interventions for fracture of the proximal femur using the following classification of types of interventions aimed to:

- reduce or avoid risk of fracture
- reduce or avoid risk of death
- reduce or avoid risk of complications
- restore function and well-being including reducing impairment, disability and handicap.

2.14 The Group commissioned three literature reviews from Ms. Alison Eastwood of the NHS Centre for Reviews and Dissemination (at Appendix C) related to:

- the effects of admission to operation interval on outcome
- pre-operative thromboprophylaxis
- the organisational framework of services.

2.15 Measures to **reduce the risk of fracture** may be aimed at the whole population or at high risk groups. Examples of a population approach (Effective Health Care 1992) would be measures to:

- reduce smoking rates
- promote healthy levels of activity
- ensure the adequate nutrition of children.

2.16 The targeted approach to prevention is to identify those at high risk of fracture and to concentrate efforts at reducing this risk. People may be at risk from weak bones or likelihood of accidents or a combination of both.

2.17 Some people have weak bones for a specific reason such as premature menopause, surgical removal of the ovaries or metabolic bone disease. The largest group of those at increased risk are older people, particularly elderly women, and those with evidence of established osteoporosis. It has been suggested that this population might be screened to identify osteoporosis by use of radiological techniques.

2.18 Bone density screening to identify those at risk of osteoporotic fracture is still the subject of considerable debate. The Effective Health Care Bulletin concluded that it is likely that a screening programme based on this technique would prevent no more than 5% of fractures in older women (Effective Health Care 1992). The overlap in radiological bone density between normal and high risk populations is large and would lead to a high false positive rate in such a screening programme.

2.19 Hormone replacement therapy is effective in delaying bone loss and osteoporosis in post-menopausal women. However, the ages at which hormone replacement therapy are given and when osteoporotic fractures occur are different by one to two decades. Hormone replacement therapy is conventionally recommended for a maximum of ten years, and there is currently much debate (Effective Health Care 1992) whether the protective effect of hormone replacement therapy in normal women extends into the later decades of life or is lost before the age of increased risk of fracture.

2.20 It is possible to identify people at an increased risk of accidents, by taking into account a range of contributory factors (Department of Health 1993b). Measures, such as attention to medication, home safety, offering mobility aids and padded clothing to reduce the risk of accidents and fractures have been advocated to reduce the risk of fracture. More research is needed to evaluate how effective these approaches would be when used as the basis of a screening programme, say in conjunction with the yearly health checks already offered to the elderly by general practitioners.

EXHIBIT 1: MAIN SEQUELAE OF FPF SURGERY (Sutton et al. 1996)

Sequelae	Timescale	Literature based rate (%)
General complications		
Pneumonia	0-3 months	9
Pulmonary embolism	0-3 months	3
Myocardial infarction	0-3 months	2
Wound infection	0-3 months	2
Pressure sores:	0-3 months	12
Skin ulcers (1)	0-3 months	9
Deeper tissue sores (11-IV)	0-3 months	3
Intracapsular post-operative complications		
Mechanical failure of internal fixation	@ 3 months	17
Dislocation of hemiarthroplasty	@ 6 months	4
Re-operation with hip arthroplasty	@ 6 months	18
Extracapsular post-operative complications		
Failure of internal fixation	@ 3 months	3
Re-operation and later extraction of device	@ 3 months	3
Mortality		
Overall (intracapsular and extracapsular)	@ 3 months	12
Overall (intracapsular and extracapsular)	@ 6 months	16
Overall (intracapsular and extracapsular)	@ 12 months	24
Physical and social function		
Pain free	@ 6 months	70
Social isolation	@ 6 months	15
Return to pre-fracture level of ADL	@ 3 months	31
Return to pre-fracture level of IADL	@ 4 months	19
Return to pre-fracture level of walking outdoors	@ 4 months	41
Return to pre-fracture accommodation	@ 3 months	61

2.21 With regard to **avoiding risk of death**, the preferred treatment for FPF is normally surgery involving either internal fixation of the fracture or replacement of the head of the femur (Sutton et al. 1996).

2.22 The Audit Commission (1995) identified hospital delays in casualty departments and before surgery as an area for concern. As well as discomfort, prolonged periods of immobility on hard casualty trolleys may increase the risk of pressure sores. Delays of several days between hip fracture and operation may predispose to complications of immobility such as pneumonia and pulmonary embolism but some time period between diagnosis and surgery may be necessary to prepare and stabilise the patient. A review of the literature about the effect of admission to operation time on outcome is shown in Appendix C.

2.23 Common complications are referred to in Exhibit 1. The optimal management of general complications may involve doctors from many specialties as well as other members of the hospital team. Elderly patients often have multiple co-existing medical and social problems that are more appropriately the province of physicians specialising in elderly care medicine. Poor co-ordination between services has been highlighted as a problem in some areas (Audit Commission 1995). Effective health service interventions are available to prevent, diagnose or treat pneumonia, deep vein thrombosis, pulmonary embolism, myocardial infarction and pressure sores. It is likely that many post -operative complications are related to the skill of the surgical team and the quality of post-operative care.

2.24 A review of the literature on the effectiveness of measures to prevent deep vein thrombosis and pulmonary embolism is included in Appendix C. Thromboprophylaxis may be effective but the most successful methods have not yet been identified. A number of important studies to investigate this issue are currently in progress.

2.25 Good rehabilitation to **reduce impairment, disability and handicap** requires effective assessment and planning as well as a team of professionals with the correct skills and equipment to enable people to recover their confidence and independence (Audit Commission 1995). The effectiveness of therapists and the equipment they use to aid patients' return to mobility and their ability at activities of daily living is assumed but has seldom been subject to traditional scientific trials.

2.26 Many patients with FPF live alone and will not regain the level of mobility and function they had before their fracture. For this reason good discharge planning, home assessment and co-ordination between hospital and community care are required. The effects of health and social care to aid rehabilitation in a community setting are again assumed, though systematic evidence is hard to find.

2.27 A review of the literature on the effectiveness of different ways of organising services is included in Appendix C. There is not yet enough evidence to identify precisely the specific organisational forms of care which are more effective in providing better outcomes than others.

3. CHOICE OF CANDIDATE INDICATORS

3.1 In choosing candidate indicators the Group took into account work from:

- East Anglian Hip Fracture Audit
- Royal College of Surgeon's Audit
- Scottish Hip Fracture Audit
- Standardised Hip Fracture Audit in Europe.

3.2 To ensure that all potentially useful aspects of outcomes were considered the matrix in Exhibit 2 was drawn up using the following dimensions:

- aim of interventions (see paragraph 2.13)
- perspectives of measurement (see paragraph D6).

3.3. For each part of the matrix consideration was given to possible indicators. Using the information in the health outcomes model, candidate indicators were identified as shown in the paragraphs which follow. The numbers in the text relate to the Exhibit and to the indicator specifications in the next Section.

3.4 One factor, accidents, was considered for indicators related to the reduction or avoidance of **risk of FPF** and the occurrence of fractured distal radius was chosen as a proxy measure. The success of risk reduction can be measured by the occurrence of FPF and of a second fracture within a specified period. The following candidate indicators were specified:

1A: hospitalised incidence of FPF per 10,000 population
1B: hospitalised incidence of a second (contralateral) FPF per 10,000 pop.
2: rate of accident and emergency (A&E) attendance for fractured distal radius per 10,000 population.

EXHIBIT 2: MATRIX FOR FPF OUTCOME INDICATORS

	Primary measurement perspective		
Aim of health intervention	**Population**	**Clinical**	**Patient**
* Avoid or reduce risk of fractured proximal femur	**1A, 1B, 2**		
* Reduce mortality rate from fractured proximal femur	**3**	**4**	
* Avoid or reduce complications of fractured proximal femur		**5,6,7,8,9**	
* Restore function and well-being after fractured proximal femur			**10,11,12, 13, 14,15**

3.5 Having reviewed the evidence in the outcome model it was decided not to develop any indicators related to osteoporosis and its prevention.

3.6 Two candidate indicators were specified related to the reduction or avoidance of **death from FPF:**

3: population-based mortality rates for patients admitted to hospital with FPF
4: case fatality rates for patients admitted to hospital with FPF.

3.7 The key **complications of FPF** were considered to be thrombotic and embolic events, pressure sores, further surgery on the same hip and future hospital admissions for any cause. Despite the difficulties associated with interpreting data about time to operation it was decided to develop a candidate indicator associated with it. Two candidate indicators related to the prevention of complications were specified:

5: thromboprophylaxis rate within a provider unit population of patients with FPF
6: percentage of patients with a pre-operative length of stay of greater than two days, within a provider unit population undergoing surgical treatment for FPF.

3.8 The indicators about the occurrence of complications which were specified were:

7: incidence of pressure sores during the in-patient stay within a provider unit population admitted for care of FPF
8: rate of ipsilateral hip surgery within a provider unit population which has undergone surgical treatment for FPF within the previous 120 days
9: rate of emergency re-admissions (for any reason) within 30 days of discharge within a provider unit population which has undergone surgical treatment for FPF.

3.9 It was decided not to develop indicators related to:

- occurrence of deep vein thrombosis and pulmonary embolism because of the difficulties of diagnosing sub-clinical incidents
- total complications rate because a high proportion of these are thrombotic incidents
- length of stay because of the difficulties of presenting and interpreting the data which are, however, routinely available.

3.10 Measures which were considered to be relevant to the **restoration of function and well-being** were those related to impairment, disability and handicap, changes in accommodation and measures of patient satisfaction. The following candidate indicators were specified:

10: summary of a measure of post-operative pain, within a provider unit population which has undergone surgical treatment for FPF

11: summary of a measure of a return to pre-fracture level of social integration, within a provider unit population which has undergone treatment for FPF

12: summary of a measure of a return to pre-fracture level of Activities of Daily Living (ADL), within a provider unit population which has undergone treatment for FPF

13: summary of a measure of a return to pre-fracture level of mobility, within a provider unit population which has undergone treatment for FPF

14: summary of a measure of the attainment of patient specified outcome goals, within a provider unit population which has undergone treatment for FPF

15: percentage of patients admitted with a fractured proximal femur who are living in their pre-fracture category of accommodation, 120 days after admission to hospital.

3.11 Although the importance of carers in post-discharge care was recognised it was decided not to develop any specific outcome indicators related to them. However, the issue has been addressed in detail by the Stroke Health Outcomes Group and the indicators specified are included in their Report (Working Group on Outcome Indicators for Stroke 1997).

4. CANDIDATE INDICATOR SPECIFICATIONS

4.1 This section contains the detailed specifications of the candidate indicators chosen by the Group. They have been grouped together by their association with the types of health intervention as shown in Exhibit 2.

4.2 Guidance notes which explain the attributes used in the specifications are included in Appendix E.

4.3 The detailed work of the specifications was carried out by Moyra Amess and Robert Cleary of CASPE Research.

4.4 It should be noted that in accordance with paragraph 2.1, the denominator in the indicators relates only to patients aged 65 and older.

Candidate indicator 1A

Characteristics

Specificity: Generic
Perspective: Population
Timeframe: Cross-sectional
Outcome relationship: Indirect

Title

Hospitalised incidence of fractured proximal femur per 10,000 population

Intervention aim

Avoid or reduce risk of fractured proximal femur.

Definition

For a given resident population and year: *the number of in-patient discharges in the given year from the resident population (regardless of where treated), associated with one or more consultant episodes with fractured neck of femur as a primary or secondary diagnosis, divided by the size of the given resident population*. The resulting fraction, expressed as a rate per 10,000 people, should be reported with its numerators both as a crude, and age standardised (≥ 65 years) figure separated by sex, and by five-year age-groups and sex. In addition, as the other indicators in this set exclude those cases where the fracture occurred in hospital, those sustained as an in-patient should be reported separately.

Rationale

The prevention of morbidity and mortality resulting from fractures of femur is a major public health concern. In England in 1993/94, approximately 58,970 people were admitted to hospital with a fracture of the neck of femur (Department of Health 1995). Mortality within one year of hip fracture is 20% to 25%, which is 12% to 20% above that expected when adjusted for age and sex. A review by Sutton et al. (1996) found that most of this excess occurs within the first four months of the incident. Many survivors never regain their previous level of physical function (Sainsbury 1991). Hospitalised incidence of fractured proximal femur serves as a general indicator for 'failure to prevent', and aims to reflect the role which a range of factors (e.g. the physical environment and polypharmacy in the elderly) have in the aetiology of such fractures, but which would be impractical to monitor.

Potential uses

Trends over time nationally and geographical comparisons.

Potential users

Policy makers, health care commissioners and providers.

Possible confounders

Age; because the incidence of fractured proximal femur rises sharply with advancing age. This has been allowed for by presenting the indicator in five-year age groups.

Data sources

The numerator will be the number of provider spells in the CMDS of the given year, which include one or more consultant episodes with a primary or secondary diagnosis of fractured neck of femur (ICD 10: S72.0 - Fractured neck of femur, not otherwise specified; S72.1 - Pertrochanteric fracture; S72.2 - Subtrochanteric fracture; and S72.9 - fracture of femur, part unspecified). In identifying relevant spells, no distinction is made between primary and secondary diagnoses. The sub-set of in-patient fractures can be estimated as the total number of provider spells identified for the indicator, minus those spells where the diagnosis of fractured neck of femur is on the admission episode (i.e. those likely to have been admitted with the fracture). The denominator may be obtained from population estimates held by health authorities.

Data quality

The validity of the indicator will depend on the quality of the CMDS diagnoses, both primary and secondary, which is unlikely to be uniformly high. Due to lax coding it is acknowledged that occasionally a fractured neck of femur may be coded as 'fracture of femur, part unspecified' - S72.9 instead of the more specific alternatives. This has therefore been included to identify such cases. It should be noted that this may also mean that there is an over inclusion of some fractures, potentially exaggerating the size of the numerator. Use of diagnosis codes only to identify cases ensures that all fractures, with or without surgical intervention, are included.

Comments

No specific points.

Further work required

None recommended.

Conclusions & priority

A - To be implemented generally on a routine basis.

References

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Candidate indicator 1B

Characteristics	
Specificity:	Condition-specific
Perspective:	Population
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Hospitalised incidence of second (contralateral) fractured proximal femur per 10,000 population

Intervention aim

Avoid or reduce risk of fractured proximal femur.

Definition

For a given resident population and year: *the number of people undergoing surgical treatment of fractured neck of femur in the given year, who have undergone in the previous five years, a procedure for the treatment of fractured neck of femur of the opposite side, divided by the size of the given resident population.* The resulting fraction expressed as a rate per 10,000 population, should be reported with associated numerators as an overall crude and age-standardised (≥ 65) figure separated by sex, and by five-year age-groups and sex. In addition, as the other indicators in this set exclude those cases where the fracture occurred in hospital, second fractures which are sustained as an in-patient should also be reported separately.

Rationale

Patients who have suffered one fractured neck of femur have a greater risk (approximately 10%) of a second such fracture (Parker et al. 1992). Monitoring of second fractures provides an indication of the effectiveness of the interventions which are aimed at reducing second fractures in this high risk group. The focus on fractures of the opposite leg avoids confusion with revisions of previous procedures which are a consequence of other factors.

Potential uses

Trends over time nationally and geographical comparisons.

Potential users

Policy makers, health care commissioners and providers.

Possible confounders

As for Indicator 1A.

Data sources

Data may be obtained from a health authority's copy of the CMDS for their resident population. The numerator is given by the number of episodes with both a diagnosis of fractured neck of femur (ICD 10 codes - S72.0, S72.1,S72.2, S72.9) and a relevant procedure (see Exhibit 3) dated within the given year, which are linked by a patient identifier to previous episodes with both a diagnosis of fractured neck of femur and a relevant procedure on the opposite side (OPCS4 coded: right-sided z94.2, left-sided z94.3), which is dated within the previous five years. In identifying relevant episodes, no distinction is made between primary and secondary diagnoses. The sub-set of in-patient second contralateral fractures, may be estimated as the total number of episodes identified as the numerator for the indicator, minus those episodes where the start date is the same as the admission episode start date (i.e. those cases likely to have been admitted with the fracture). Linkage of first and second procedures undertaken at different hospitals would be best obtained with full use of the new NHS number. The denominator may be obtained from population estimates held by health authorities.

Data quality

The validity of the indicator will depend on the quality of the CMDS clinical coding which is unlikely to be uniformly high. In particular, this indicator relies on the coding of the side of the operation which may be missing. Although the indicator is concerned with the incidence of second fractures, the procedure codes are required to identify laterality - not coded by ICD codes. Equally, procedure codes alone would risk inclusion of elective hip surgery episodes.

Comments

Due to the use of procedure codes to identify second femur fractures, a small proportion of patients who do not receive surgical treatment for their fractures, will not be identified using this indicator as specified. Although the indicator may be compiled on the basis of records linked by a local patient identifier, linkage of operations undertaken at different units would require full use of the NHS number over a five year period.

Further work required

Study to identify the extent of coding of laterality.

Conclusions & priority

E - To be implemented following IT development on a routine basis. In this case the indicator relies on the universal use of the new NHS number.

References

Parker, M.J., Pryor, G.A., Anand, J.K., Lodwick, R., and Myles, J.W. (1992). A comparison of presenting characteristics of patients with intracapsular and extracapsular proximal femoral fractures. *Journal of the Royal Society of Medicine,* **85**, 152-155.

EXHIBIT 3: PROCEDURE CODES

Description	Codes
Primary open reduction of fractured neck of femur	W19.1
Closed reduction of intracapsular fractured neck of femur and fixation using nail or screw	W24.1
Neck of femur + Primary open reduction of fracture of long bone and fixation using rigid nail	z76.2 + W19.2
Neck of femur + Primary open reduction of long bone and fixation using flexible nail	z76.2 + W19.3
Neck of femur + Closed reduction of fracture of long bone and rigid internal fixation	z76.2 + W24.2
Trochanter of femur + Primary open reduction of fracture of long bone and fixation using rigid nail	z76.3 + W19.2
Trochanter of femur + Primary open reduction of long bone and fixation using flexible nail	z76.3 + W19.3
Trochanter of femur + Closed reduction of fracture of long bone and rigid internal fixation	z76.3 + W24.2
Primary total prosthetic replacement of hip joint using cement	W37.1
Primary total prosthetic replacement of hip joint not using cement	W38.1
Primary prosthetic replacement of head of femur not using cement	W47.1
Conversion to prosthetic replacement of head of femur not using cement	W47.2
Primary prosthetic replacement of head of femur	NEC W48.1

Candidate indicator 2

Characteristics	
Specificity:	Condition-specific
Perspective:	Population
Timeframe:	Cross-sectional
Outcome relationship:	Indirect

Title

Rate of accident and emergency (A&E) attendance for fractured distal radius per 10,000 population

Intervention aim

Avoid or reduce fractured proximal femur.

Definition

For a given resident population over 55 years old and year: *the number of A&E attendances for fractured distal radius divided by the size of the given population*. The resulting fraction, expressed as a rate per 10,000 population, should be reported with associated numerators as an overall crude figure and by patient age-group (>55yrs) and sex.

Rationale

Falls are a major cause of fractured femurs among the elderly and an association has been found between falls and quantifiable risk factors such as decline in vision, balance, sensory perception, strength and neuromuscular function (Audit Commission 1995). Risk of death has been found to increase following falls among men (Campbell et al. 1990). Monitoring falls in the population would offer an indication of the success of interventions which attempt to reduce these risk factors. Due to the impracticality of capturing data to monitor falls directly, this indicator, by monitoring common fractures of the distal radius, provides a proxy measure for falls. Incidence rates for fracture to the distal radius have been found to be between 8 and 12 per 10,000 men, and between 44 and 58 per 10,000 women in the over 55 years old age group (Knowelden et al. 1964). Following a fracture of the distal radius, there is a two to three fold increase in the likelihood of sustaining a fractured proximal femur (Lauritzen et al. 1993; Finsen and Benum 1986).

Potential uses

Monitoring national trends over time and possibly geographical comparisons.

Potential users

Policy makers, and commissioners.

Possible confounders

A mediating factor in the relationship between falls and fractures is a loss of bone density. Osteoporosis, which is associated with ageing (particularly among women), will increase the risk of fracture following a fall (Effective Health Care Bulletin 1992).

Data sources

Where collected, the numerator could be obtained from the accident & emergency service data set (IMG 1996) with A&E diagnosis codes of 05 (fracture), 2 (closed fracture), 15 (wrist). However, the A&E diagnosis data set does not provide coding for the exact type of wrist fracture. ICD-10 diagnoses codes used in the CMDS allow specification of a fracture to the lower end of radius using a separate code (S52.6), but this would only be recorded if the patient was admitted as an in-patient. The denominator may be obtained from population estimates held by health authorities and other agencies.

An approximation of this indicator could be derived from the results of the RCGP National Morbidity Study 4 (OPCS 1995a). This study collects data on fractures of the radius and ulna across all age groups and by sex. Other GP data bases e.g. Royal College of General Practitioners Weekly Returns Service (Fleming et al. 1995), and the OPCS General Practice Research Database (OPCS 1995b) may also provide alternative sources. The prevalence rates however are based on the number of consultations within general practices and it is likely therefore that they would over represent the incidence of fractures.

Data quality

If computer systems are in place within accident & emergency departments, the A&E data set is likely to be collected although currently this is not compulsory. The quality of data will depend on that yielded by these systems and should be the subject of further investigation. Use of RCGP data would have limitations in that it is based on consultations.

Comments

It is assumed that the majority of people with fractures would present to hospital via the A&E department as very few health centres or GP practices would be equipped to treat fractures.

Further work required

Further work is required to determine whether fractured distal radius rates are useful predictors of future fractured proximal femur rates.

Conclusion & priority

F - To be further developed because link with effectiveness is not clear.

References

Audit Commission (1995). *United they stand: co-ordinating care for elderly patients with hip fracture.* HMSO, London.

Campbell, A.J., Borrie, M.J., Spears, G.F., Jackson, S.L., Brown, J.S., and Fitzgerald, J.L. (1990). Circumstances and consequences of falls experienced by a community population 70 years and over during a prospective study. *Age and Ageing,* **19**, 136-141.

Effective Health Care Bulletin (1992). *Screening for osteoporosis to prevent fractures.* University of Leeds, University of York.

Finsen,V., and Benum, P. (1986). Past fractures indicate increased risk at hip fracture. *Acta Orthopaedica Scandinavica,* **57**, 337-339.

Fleming, D.M., Crombie, D.L., and Ross, A.M. (1995). *Weekly returns: service-report for 1994.* Birmingham Research Unit of the Royal College of General Practitioners.

Information Management Group (1996). *The data manual: technical module.* Information Management Group, NHSE.

Knowelden, J., Bahr, A.J., and Dunbar, O. (1964). Incidence of fractures in persons over 35 years of age: a report to the M.R.C. working party for fractures in the elderly. *British Journal of Preventative and Social Medicine,* **18**, 130-141.

Lauritzen, J.B., Schwartz, P., McNair, P., Lund, B., and Transbol, I. (1993). Radial and humeral fractures as predictors of subsequent hip, radial or humeral fractures in women, and their seasonal variation. *Osteoporosis International,* **3**, 133-137.

OPCS (1995a). *Morbidity statistics from general practice 1991/92 (MSGP4).* HMSO, London.

OPCS (1995b). *The General Practice Research Database. Information for researchers.* Office for Population Censuses and Surveys, London.

Candidate indicator 3

Characteristics	
Specificity:	Generic
Perspective:	Population
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Population-based mortality rates for patients admitted to hospital with fractured proximal femur.

Intervention aim

Reduce mortality from fractured proximal femur.

Definition

For a given resident population, year and specified time period: *the number of patients registered as having died (for any reason), within a specified time period following an admission to hospital with a primary diagnosis of fractured neck of femur, divided by the size of the given population*. The resulting fraction, expressed as a rate per 10,000 resident population, should be reported with associated numerators as an overall crude and age-standardised figure, and by age-group and sex.

The suggested follow-up time periods are a) 30 days or, b) 120 days.

a) 30 days is the time period consistent with the accepted definition of a perioperative death (NCEPOD 1996) and therefore used in many studies.

b) 120 days is the follow up period used in the European Standardised Audit (Parker et al. 1998), and also the convention for a range of patient specific indicators given later in this document.

Rationale

A review by Sutton et al. (1996) found that mortality within one year of hip fracture is 20% to 25% - that is, 12% to 20% above that expected when adjusted for age and sex. Monitoring trends in deaths linked with a previous admission for fractured neck of femur will identify the mortality associated with fractured neck of femur and provide a population-based measure of the burden of the disease. It is recognised that the quality of information yielded from death certificates is not uniformly high due to various factors. For example: the doctor certifying the death may not consider the condition to be sufficiently relevant to merit recording on the death certificate; or the doctor is disinclined to record certain conditions on death certificates (Goldacre 1993). Studies have revealed that approximately only 25% of deaths resulting from fractured neck of femur (as stated in hospital records) were recorded as such on the death certificate (Goldacre 1993; Calder et al.1996). Acknowledging the unreliability of these data, the indicator is specified to count deaths from any cause, rather than from only fractured neck of femur.

Potential uses

National population based comparisons of the effectiveness of health advice and care.

Potential users

Policy makers, commissioners.

Possible confounders

Comparisons should be made in the context of case-mix information covering the severity and co-morbidity of the patient populations. Secondary diagnoses on the current admission record provide one source although the completeness of these data may be variable. Alternatively, with general linkage of hospital activity and death certificate data, previous admissions for defined groups of relevant morbidities, could be used as a basis for standardisation. This method was used by the Scottish Clinical Outcomes Group in their report on Clinical Outcome Indicators (Clinical Outcomes Working Group 1995).

Data sources

The data should be obtained from the CMDS of a given purchaser's population for the given year, and related death certificates. The numerator may be obtained from death certificates linked by a personal identifier to previous hospital spells with a primary diagnosis of fractured neck of femur on admission (ICD 10 codes - S72.0, S72.1,S72.2 and S72.9), with an admission date within the specified time period before death. The denominator may be obtained from population estimates held by health authorities.

Data quality

The validity of the indicator will depend on the quality of the CMDS diagnoses which is unlikely to be uniformly high. Due to lax coding it is acknowledged that a fractured neck of femur may be coded as 'fracture of femur, part unspecified - S72.9' instead of the more specific alternatives. This has therefore been included to identify such cases. It should be noted that this may mean there is an over inclusion of some fractures, potentially exaggerating the size of the numerator. Use of the diagnosis codes only to identify cases ensures that all relevant fractures, with or without surgical intervention are included.

Comments

To summarise these statistics, one may wish to present these data as standardised mortality ratios. While one year reporting may be appropriate for regional or national figures, five yearly rates may allow more meaningful comparisons across smaller residential populations.

Although two time periods (30 and 120 days) are specified here, once the data collection mechanisms are in place, there is always the possibility of follow-ups at other time intervals.

Further work required

None recommended.

Conclusion & priority

C - To be implemented where local circumstances allow on a routine basis.

References

Calder, S.J., Anderson, G.H., and Gregg, P.J. (1996). Certification of cause of death in patients dying soon after proximal femoral fracture. *British Medical Journal,* **312**, 1515.

Clinical Outcomes Working Group of the Clinical Resource and Audit Group (1995). *Clinical outcome indicators.* The Scottish Office - NHS in Scotland.

Goldacre, M.J. (1993). Cause-specific mortality: understanding uncertain tips of the disease iceberg. *Journal of Epidemiology and Community Health,* **47**, 491-496.

NCEPOD (1996). *The Report of the National Confidential Enquiry into Perioperative Deaths (1993/1994).* National Confidential Enquiry into Perioperative Deaths.

Sutton, G., Foan, J., Hyndman, S., Todd, C., Rushton, N., and Palmer, R. (1996). *Developing measurable indicators for the quality of care of hip fracture patients.* Institute of Public Health, University of Cambridge.

Parker, M.J., Currie, C.T., Mountain, J.A., and Thorngren, K.G. (1998). Standardisation audit of hip fracture in Europe (SAHFE). *Hip International,* **8**, 10-15.

Candidate indicator 4

Characteristics	
Specificity:	Generic
Perspective:	Clinical
Timeframe:	Longitudinal
Outcome relationship:	Direct

Title

Case fatality rates for patients admitted to hospital with fractured proximal femur

Intervention aim

Reduce mortality from fractured proximal femur.

Definition

For a provider unit population, year and specified time period: *the number of patients registered as having died (for any reason), within a specified time period of a hospital admission to the given unit in the given year with a primary diagnosis of fractured neck of femur, divided by the number of admissions to the given unit in the given year with a primary diagnosis of fractured neck of femur.* The resulting fraction should be expressed as a percentage, and reported with its numerator, as an overall figure and by age-group and sex.

The suggested follow-up time periods are a) 30 days or, b) 120 days.

a) 30 days is the time period consistent with the accepted definition of a perioperative death (NCEPOD 1996) and therefore used in many studies.

b) 120 days is the follow up period used in the European Standardised Audit (Parker et al. 1998), and also the convention for a range of patient specific indicators given later in this document.

Rationale

Mortality during or following an in-patient admission may in part represent an adverse outcome of antecedent care. Where Indicator 3 provides a measure of the mortality from the disease in the population, the number of deaths from fractured neck of femur as a fraction of those admitted will reflect the quality of care specific to that hospital.

Potential uses

Provider based comparisons of the effectiveness of acute care and clinical audit within the provider unit.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

Comparisons should be made in the context of case-mix information covering the severity and co-morbidity of the patient populations. Secondary diagnoses on the current admission record provide one source although the completeness of these data may be variable. Alternatively, with general linkage of hospital activity and death certificate data, previous admissions for defined groups of relevant morbidities, could be used as a basis for standardisation. This method was used by the Scottish Clinical Outcomes Group in their report on Clinical Outcome Indicators (Clinical Outcomes Working Group 1995).

Data sources

The data should be obtained from the CMDS of the given unit for the given year, and related death certificates. The numerator may be obtained from death certificates linked by a personal identifier to previous hospital spells with a primary diagnosis of fractured neck of femur on admission (ICD 10 codes - S72.0, S72.1, S72.2 and S72.9), with an admission date within the specified time period before death. The denominator is given by the number of hospital spells with a primary diagnosis of fractured neck of femur on admission.

Data quality

Potential problems lie with the accuracy of CMDS data with respect to diagnostic information (especially co-morbidity and severity), and those fields shared with death certificates which are required for linkage with them.

Comments

Although two time periods (30 and 120 days) are suggested here, once the data collection mechanisms are in place, there is always the possibility of follow-ups at other time intervals.

Further work required

None recommended.

Conclusion & priority

C - To be implemented where local circumstances allow on a routine basis.

References

Clinical Outcomes Working Group of the Clinical Resource and Audit Group (1995). *Clinical outcome indicators*. The Scottish Office - NHS in Scotland.

NCEPOD (1996). *The Report of the National Confidential Enquiry into Perioperative Deaths (1993/1994)*. National Confidential Enquiry into Perioperative Deaths.

Parker, M.J., Currie, C.T., Mountain, J.A., and Thorngren, K.G. (1998). Standardisation audit of hip fracture in Europe (SAHFE). *Hip International,* **8**, 10-15.

Candidate indicator 5

Characteristics	
Specificity:	Condition-specific
Perspective:	Clinical
Timeframe:	Cross-sectional
Outcome relationship:	Indirect

Title

Thromboprophylaxis rate within a provider unit population of patients with fractured proximal femur

Intervention aim

Avoid or reduce complications of fractured proximal femur.

Definition

For a given provider unit and year: *the number of patients admitted with a primary diagnosis of fractured proximal femur who received thromboprophylaxis during their hospital stay, divided by the number of patients admitted with a primary diagnosis of fractured neck of femur in the given year and unit*. The resulting fraction should be expressed as a percentage and reported with its associated numerators by age-group. Of this group, separate figures and percentages should be given for those treated surgically (the majority) and those conservatively, for their fracture. For further detail, the thromboprophylaxis for the surgical cases should also be reported by time of administration i.e. pre or post-operatively. Finally, the reporting by type of prophylaxis, whether pharmaceutical or mechanical may provide additional insight.

Rationale

Complications such as pulmonary embolisms or deep vein thromboses may be perceived as poor outcomes of antecedent health care. Thromboembolic complications vary from 1% to 8% (Jalovarra and Vivjunnen 1991; Zuckerman et al. 1992) and pulmonary embolism itself varies from 1% to 7% (Jalovarra and Vivjunnen 1991; Zuckerman et al. 1992). A review of the evidence (reproduced in Appendix C) supports the use of pharmaceutical thromboprophylaxis as an effective therapy in the prevention of these complications.

Potential uses

Clinical audit and provider based comparisons.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

Some patients within the population of interest may have conditions where the use of either chemical or mechanical thromboprophylaxis is contraindicated. It may be appropriate to exclude this group from the analysis of this indicator. The indicator assumes adherence to certain prophylaxis protocol.

Data sources

Denominator data are obtainable from CMDS data with a primary diagnosis of fractured neck of femur on admission (e.g. ICD 10 codes - S72.0, S72.1, S72.2 and S72.9, either with or without associated procedures relating to fractured neck of femur (as listed in Exhibit 3 in indicator 1B). To identify the numerator, these cases can then be linked by a patient identifier to relevant prescription (i.e. chemical thrombolytics e.g. heparin) and other therapy data to identify the administration of prophylaxis therapy. To distinguish between pre- and post-operative administration of therapy, an audit of notes, pharmacy cards and/or request forms for relevant equipment (for mechanical thromboprophylaxis) is required.

Data quality

The validity of the data relies on the quality of both diagnosis and procedure coding, and should thus be the subject of further investigation. The accuracy of prescription data may be quite high but will depend on the nature of the information system. As the indicator relies on surveying the notes manually, this may enhance its accuracy.

Comments

To avoid further complexity, the indicator is specified to include only those cases who are admitted due to their fractured femur and not the few patients who may suffer a fracture during an unrelated hospital admission.

Further work required

Studies to assess the balance of benefits and risks of pharmacological methods and the effectiveness of non-pharmacological methods. Pilot study to evaluate utility of data and feasibility of its collection.

Conclusion & priority

F - To be further developed because link with effectiveness is not clear, in that future work is needed on clinical approaches to thromboprophylaxis.

References

Jalovarra, P., and Virjunnen, H. (1991). Quality of life after primary hemiarthroplasty for femoral neck fracture: 6 year follow-up of 185 patients. *Acta Orthopaedica Scandinavica,* **62**, 208-217.

Zuckerman, J.D., Sakales, S.R., Fabian, D.B.R., and Frankel, V.H. (1992). Hip fractures in geriatric patients: results of an interdisciplinary hospital care program. *Clinical Orthopaedics,* **274**, 213-225.

Candidate indicator 6

Characteristics	
Specificity:	Condition-specific
Perspective:	Clinical
Timeframe:	Cross-sectional
Outcome relationship:	Indirect

Title

Percentage of patients with a pre-operative length of stay of greater than two days, within a provider unit population undergoing surgical treatment for fractured proximal femur

Intervention aim

Avoid or reduce complications of fractured proximal femur.

Definition

For a given provider unit and year: *the number of patients undergoing surgical treatment for fractured proximal femur, who were admitted (with a primary diagnosis of fractured proximal femur) more than two days before the operation, divided by the number of patients who received surgical treatment for fractured proximal femur in the given year (having been admitted with a primary diagnosis of fractured proximal femur).* The resulting fraction should be expressed as a percentage and reported with the associated numerators by age-group and sex.

Rationale

Observational studies of surgical outcomes associated with fractured neck of femur have suggested that where there is a significant delay from admission to surgery, there is an increased risk of mortality (Zuckerman et al. 1995), complications (Holmberg et al. 1987) and poor rehabilitation (Villar et al. 1986). Guidelines from the Royal College of Physicians specify that operations (for fractured proximal femur) should normally occur within 24 hours of admission (Royal College of Physicians 1989). However, there are significant concerns that other factors, in particular the health of the patient in terms of pre-existing conditions at the time of the fracture, could be confounded in the pre-operative delay. Patients experiencing delays are more likely to have concomitant illness, which may influence their survival. Based on the evidence available (reviewed in Appendix C), the value of this indicator as a proxy for post-operative outcomes may be limited.

To ensure that cases where the fracture occurs in hospital during an unrelated in-patient episode are excluded, i.e. where time from the original admission to hip surgery is not significant, this indicator is specified to count only patients *admitted* with a primary diagnosis of fractured proximal femur.

Potential uses

Clinical management of patients and clinical audit.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

Co-existing morbidities and delay for clinical reasons.

Data sources

The numerator is given by the number of CMDS hospital provider spells which include a procedure for the treatment of fractured neck of femur (see Exhibit 3 in Indicator 1B), a primary diagnosis on the admission episode of fractured neck of femur (ICD10- S72.0, S72.1, S72.2, S72.9) and an admission date (i.e. start date of the hospital provider spell) which is more than two days before the operation date. The denominator will be all CMDS hospital provider spells in the given year with a procedure for the treatment of fractured neck of femur (see Exhibit 3 for relevant OPCS4 codes) and a primary diagnosis on the admission episode of fractured neck of femur (ICD10- S72.0, S72.1, S72.2, S72.9).

Data quality

The validity of the data will depend on the quality of the CMDS diagnoses and procedure details which is unlikely to be uniformly high. Errors in admission diagnosis are likely to exclude patients with a complex presentation.

Comments

An alternative measure may be 'time between arrival in the accident & emergency department, and surgery'. Information regarding the specific arrival time at the accident & emergency department could be obtained from the accident and emergency minimum data set where it is collected. However, the procedure time if using CMDS data would still only specify the date of operation, thus limiting any added value to the indicator as currently specified. Procedure time would only be available by manual extraction from theatre notes. Time from arrival to discharge from A&E may provide an alternative indicator to identify prolonged delays at this earlier stage of care.

An assessment of physical status would allow identification of those whose delay was due to their poor physical condition and not other factors. An American Society of Anaesthesiologists' classification of physical status (ASA grading) may be a useful simple method for grading this (Frostick and Hunter 1993).

Further work required

To determine whether delay affects outcomes and to identify time bands for classifying clinically important delays.

Conclusion & priority

F - To be further developed as the link with effectiveness is not clear. However it can be used as a process indicator of quality.

References

Frostick, S., and Hunter, J.B. (1993). Complications. In *Outcome measures in orthopaedics* (ed. P. Pynsent, J. Fairbank, A. Carr), pp.81-93. Butterworth-Heinemann, Oxford.

Holmberg, S., Kalen, R., and Throngren, K.G. (1987). Treatment and outcome of femoral neck fractures: an analysis of 2418 patients admitted from their own homes. *Clinical Orthopaedics & Related Research,* **218**, 42-52.

Royal College of Physicians (1989). *Fractured neck of femur: prevention and management.* Royal College of Physicians, London.

Villar, R.N., Allen, S.M., and Barnes, S.J. (1986). Hip fractures in healthy patients: operative delay versus prognosis. *British Medical Journal,* **293**, 1203-1204.

Zukerman, J.D., Skorron, M.L., Koval, K.J., Aharonoff, G., and Frankel, V.H. (1995). Post-operative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *Journal of Bone and Joint Surgery,* **77-A**, 1551-1556

Candidate indicator 7

Characteristics	
Specificity:	Condition-specific
Perspective:	Clinical
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Incidence of pressure sores during the in-patient stay within a provider unit population admitted for care of fractured proximal femur

Intervention aim

Avoid or reduce complications of fractured proximal femur.

Definition

For a given provider unit population and year: *the number of patients admitted with a primary diagnosis of fractured proximal femur who acquire one or more pressure sores during a hospital provider spell which ends in the given year, divided by the total number of patients admitted with a fractured proximal femur who were discharged in the given year.* For the purposes of this indicator, only pressure sores of grade two or above (see Data sources below) should be counted. The resulting fraction should be expressed as a percentage and reported as an overall figure and by age-group.

Rationale

Pressure sores are common in hospital settings, represent a significant burden of suffering for patients and their carers and are costly to the NHS (Effective Health Care Bulletin 1995). Pressure sore rates among patients with hip fractures are shown to be very variable from 2% to 66% (Todd 1996). Health authorities received guidance from the NHS Management Executive encouraging them to set targets for an overall reduction in prevalence of at least 5% (NHSME 1993). Evidence and experience suggest that prevalence rates, because they are affected by incidence rates, healing rates, admission and discharge policies, are very difficult to interpret (Effective Health Care Bulletin 1995). Comparison of incidence rates are therefore proposed but will only reflect the effect of prevention policies if suitable adjustment is made for differences in risk status of patients admitted (Effective Health Care Bulletin 1995).

The indicator is specified as the incidence of acquired pressure sores of grade two and above so as to avoid the difficulties of reliable assessment of stage one pressure sores, consisting of non-blanchable erythema with intact skin.

Potential uses

Clinical management of patients and clinical audit. Provider comparisons.

Potential users

Clinicians, commissioners, provider management.

Possible confounders

To control for relevant patient risk factors, the indicator data should ideally be analysed per 'at risk' group. Comparisons across units with this indicator should consider the fact that inappropriate early discharge could lead to an apparently low acquired pressure sore rate.

Data sources

Many provider units are monitoring pressure sore rates; most by weekly data collection of assessment proforma completed by ward staff; or where facilities are in place, entering them onto a ward nursing system alongside other patients details. Whether a paper or computerised data collection system is in place, the minimum information required would be: patient's identification details, patient diagnosis, and an assessment of pressure sore status on admission (to identify pressure sores acquired during the in-patient stay). Several pressure sore grading systems are in use nationally (Healey 1996), which generally describe four ulcer stages (Smith 1995). To allow data comparison, grading systems which define a grade/stage two pressure sore as 'partial thickness skin loss or damage involving epidermis and/or dermis' (Smith 1995) should be used. This staging is from an ulcer scale developed and generally used for reporting the prevalence of pressure sores, and guiding therapy (National Pressure Ulcer Advisory Panel 1989).

Currently, retrospective monitoring of CMDS data would allow identification of pressure sores (Decubitus ulcer, ICD 10 - L89) within patients who also had a primary diagnosis of fractured proximal femur (ICD 10— S72.0, S72.1, S72.2, S72.9). This would allow calculation of *prevalence* rates. ICD -10 coding does not identify *acquired* sores or the grading of sores. The introduction of an additional sub-division of L89 would allow this discrimination. Use of Read codes (currently optional) would allow some additional information to be recorded in relation to grade of sore but these codes are still under development.

Data quality

The quality of the data would depend on the system in place and the existence of quality control checks on data entry. The data quality may also be affected by poor inter-rater reliability. This may be addressed by suitable training for all ward staff in the use of both risk and pressure sore assessment tools.

Comments

The *prevalence* of pressure sores can be recorded now in line with the NHSME targets. An adjustment to current clinical coding would allow *newly acquired* pressure sores to be recorded routinely. Supporting information on the risk factors of individuals with pressure sores would require more sophisticated systems. Ideally, assessments of pressure sores and risk should be made at various points in the treatment e.g. A&E, ward and discharge. This would allow identification of particular aspects of care, or types of care delivery, where the risk of pressure sores is increased, and thus the need for increased provision of pressure area care.

Further work required

Development/piloting of an additional code to allow distinction of acquired pressure sores within the ICD-10 coding structure is recommended. To aid interpretation, the development of 'at risk' assessment tools should be undertaken, such as the Waterlow or Norton scales (Smith 1989).

Conclusion & priority

A - To be implemented generally on a routine basis.

References

Effective Health Care Bulletin (1995). *The prevention and treatment of pressure sores.* University of Leeds, University of York.

Healey, F. (1996). Using incidence data to improve risk assessment. *Journal of Tissue Viability,* **6**, 3-9.

NHS Management Executive (1993). *Priorities and planning guidance 1994-95. EL(93)54.* Department of Health.

National Pressure Ulcer Advisory Panel (1989). Pressure ulcer prevalence, cost and risk assessment: consensus statement. *Decubitus,* **2**, 24-28.

Smith, D.M. (1995). Pressure ulcers in the nursing home. *Annals of Internal Medicine,* **123**, 433-442.

Smith, I. (1989). Waterlow/Norton scoring system: a ward view. *CARE - Science and Practice,* **7**, 93-95.

Todd, C. (1996). Measuring outcomes of hip fracture. In *Advanced outcome measurement in health care of elderly people* (ed. I. Philp, A. Warnes). Ferrand Press, London.

Candidate indicator 8

Characteristics	
Specificity:	Condition-specific
Perspective:	Clinical
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Rate of ipsilateral hip surgery within a provider unit population which has undergone surgical treatment for fractured proximal femur within the previous 120 days

Intervention aim

Avoid or reduce complications of fractured proximal femur.

Definition

For a given provider unit and year: *the number of emergency admissions (to any unit) for the surgical treatment of a fractured neck of femur associated with patients who have undergone, in the last 120 days, a surgical procedure for fractured neck of femur on the same side (having been admitted with a fractured neck of femur) in the given year, divided by the total number of first admissions for the surgical treatment of a fractured neck of femur in the given year and unit.* The resulting fraction should be expressed as a percentage and reported with its numerator, by patient age-group and sex.

Rationale

The occurrence of general and specific post-operative complications were identified as an important target area in a large 'hip fracture target setting project' commissioned by the Department of Health (Sutton et al. 1996). Specific target rates for reduction were set for re-operation with hip arthroplasty at 2.7% for intracapsular post-operative complications and re-operation, and late extraction of device following extracapsular post-operative complications at 2.5%. The rate of re-operation on the same hip, within a 120 day period, will identify the number of infections and other early failures which require such an intervention, and thus in part reflect the quality of the primary surgical procedure, and associated care.

Potential uses

Clinical audit, provider based comparisons.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

No specific ones identified.

Data sources

The denominator is defined, within the CMDS for the given unit, by the number of admissions with a primary diagnosis of fractured neck of femur (ICD10- S72.0, S72.1, S72.2, & S72.9) which include one or more episodes with a relevant surgical procedure (see Exhibit 3 in Indicator 1B) in the given year and unit.

Records relevant to the numerator will be included among hospital admissions (to any provider unit) recording a surgical hip procedure and an emergency admission method. The subset of records that relate to re-operation on the same side within 120 days (defined using OPCS4 laterality codes: right-sided z94.2, left-sided z94.3), may be identified by means of the NHS number and the difference between the original procedure date and the second operation date.

Linkage of first and second procedures undertaken at different hospitals would be most easily obtained with reference to the new NHS number.

Data quality

The validity of the data will depend on the quality of the CMDS which is unlikely to be uniformly high. In particular, this indicator relies on the coding of the side of the operation which may be missing.

An alternative method of identifying re-operations may be to identify emergency admissions with specific diagnosis codes such as 'Complications of internal orthopaedic prosthetic devices, implants and grafts' (ICD10- T84), or 'fracture of bone following insertion of orthopaedic implant, joint prosthesis, or bone plate (ICD10-M96.6). This would require identification of all possible diagnosis codes used in such circumstances and knowledge of the extent to which such diagnoses are made.

Comments

Re-operation rates can depend on both the policy and resources available and may thus reflect the process of care rather than being a clear outcome of the care offered.

Although the indicator is specified to count re-operations within 120 days (in line with the European hip fracture audit) (Parker et al. 1998), 30 days or two years may also be considered as equally relevant time periods.

Further work required

Further studies into the use of laterality and complication coding within orthopaedics.

Conclusion & priority

D - To be implemented where local circumstances allow by periodic survey.

References

Sutton, G., Foan, J., Hyndman, S., Todd, C., Rushton, N., and Palmer, R. (1996). *Developing measurable indicators for the quality of care of hip fracture patients.* Institute of Public Health, University of Cambridge.

Parker, M.J., Currie, C.T., Mountain, J.A., and Thorngren, K.G. (1998). Standardisation audit of hip fracture in Europe (SAHFE). *Hip International,* **8**, 10-15.

Candidate indicator 9

Characteristics	
Specificity:	Generic
Perspective:	Clinical
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Rate of emergency re-admissions (for any reason) within 30 days of discharge within a provider unit population which has undergone surgical treatment for fractured proximal femur

Intervention aim

Avoid or reduce complications of fractured proximal femur.

Definition

For a given provider unit, and year: *the number of emergency admissions (to any unit and for any reason) occurring not more than 30 days after discharge from an in-patient stay for surgical treatment of fractured proximal femur at the given unit, and which ended in the given year, divided by the number of in-patient stays for surgical treatment for fractured proximal femur at the given unit and ending in the given year.* The resulting fraction should be expressed as a percentage and reported with its associated numerators as an overall figure and by age-group and sex.

Rationale

Unplanned re-admissions may reflect an adverse outcome of antecedent health care and/or the development of complications of fractured proximal femur. With appropriate consideration of patient risk factors re-admission rates may draw attention to aspects of the planning, organisation and delivery of care which may require review.

Due to acknowledged problems with diagnostic coding, it is recognised that not all information, which would allow us to distinguish between relevant and irrelevant re-admissions, is available. Equally, the diagnostic uncertainty during such emergency admissions will also impact on the relevance of diagnosis codes for these episodes. To be inclusive, therefore, this indicator counts all re-admissions for any reason.

Potential uses

Clinical audit and provider based comparisons.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

No specific ones identified.

Data sources

The denominator is defined, within the CMDS, by the number of hospital spells recording a primary diagnosis of fractured neck of femur on admission (ICD10-S72.0, S72.1, S72.2, S72.9), together with a relevant OPCS-4 procedure code, (see Exhibit 3 in Indicator 1B) ending in the given year.

Records relevant to the numerator will be included among hospital admissions (from any provider unit) for any cause, with an emergency admission method. The subset of these records that relate to re-admissions within 30 days, may be identified by means of the NHS number and the difference between the original discharge date and the new admission date. Re-admissions to other hospitals or specialities would be most easily identified using the new NHS number.

Data quality

The validity of the indicator would rely on the quality of the CMDS diagnosis which is unlikely to be uniformly high. Interpretation of the results of this indicator should be undertaken with some consideration of the potential perverse incentives to score well on this indicator (Milne and Clarke 1990). Key methodological issues relating to re-admission rates are discussed in Henderson et al. (1989).

Comments

Although 30 days is commonly used, data sets may allow analysis at a number of different time intervals.

As specified, this indicator does not exclude in-patient deaths or those patients who died within the 30 day follow-up period. Ideally, it should be compiled excluding the deaths within 30 days. This could be done with systems linking hospital and death records.

Re-admission rates can depend on both the policy and resources available and may thus reflect the process of care rather than a clear outcome of the care offered.

Further work required

Further investigation of the frequency of re-admissions, the interpretation of these events, and the variability of re-admission rate across trusts.

Conclusion & priority

F - To be further developed because link with effectiveness is not clear.

References

Henderson, J., Goldacre, M.J., Graveney, M.J., and Simmons, H.M. (1989). Use of medical record linkage to study re-admission rates. *British Medical Journal,* **299**, 709-713.

Milne, R., and Clarke, A. (1990). Can re-admission rates be used as an outcome indicator? *British Medical Journal,* **301**, 1139-1140.

Candidate indicator 10

Characteristics	
Specificity:	Condition-specific
Perspective:	Patient
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Summary of a measure of post-operative pain, within a provider unit population which has undergone surgical treatment for fractured proximal femur

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

For a given provider unit population and year: *aggregate scores from patients' assessments of pain using the Pain Score of the Charnley Hip Score (Charnley 1972), as administered at 120 days after discharge from hospital following surgical treatment for fractured proximal femur.* The summary statistics, which have not been specified, will describe the distribution of scores for the instrument and overall figures, broken down by age-band and sex.

Charnley Hip Score - Pain scale.

1. The pain in my hip is severe and spontaneous. I experience it even when I am not moving.
2. The pain in my hip is severe when I attempt to walk and prevents all activity.
3. The pain in my hip is tolerable, permitting limited activity.
4. The pain in my hip occurs only after some activity and disappears quickly with rest.
5. The pain in my hip is slight and intermittent. I experience pain when starting to walk but the pain gets less with normal activity.
6. I experience no pain in my hip.

The patient is asked to tick one of the six boxes indicating the level of pain.

Rationale

Pain control is one of the main priorities of patient management in orthopaedic care. The assessment of pain as an outcome measure is therefore a valuable component within an evaluation of the quality of care. The Charnley Hip Score (pain scale component) is widely used following hip surgery and acknowledged in the literature as a valuable pain assessment tool (Murray 1993). It has a straightforward scoring system which correlates highly with the degree of mobility and ability to walk (Sutton et al. 1996). There are other more sophisticated schemes such as the McGill Pain Questionnaire (Melzack 1975) but these are longer and greater time for administration is required. A time period of 120 days is selected to standardise with data collected for the European audit.

Potential uses

Clinical audit and provider based comparisons.

Potential users

Clinicians, provider management, commissioners.

Possible confounders

Individual patient pain thresholds.

Data sources

The indicator may be collected by self-completion postal questionnaires sent to patients at 120 days following discharge. A GP may be best placed to organise this assessment, being aware of patients who may have died in the interim period. Such a mailing will be facilitated if the general practice has a computerised register of the practice population. This would also allow identification of the particular sub-set of patients of interest. Alternatively, the assessment could be administered during a hospital follow-up appointment at 120 days.

Data quality

A recent study collecting the Charnley pain score using self-completion postal questionnaire achieved a 96% response rate (Sutton et al. 1996). However, these patients were pre-selected as capable and willing to be interviewed, and therefore the response rate may not represent that which is achievable from a complete sample of post-hip fracture patients.

Comments

Assessment of levels of pain may be undertaken at various post-operative time periods, for example at discharge, 30 days and or 90 days, as well as 120 days as suggested here (in line with the European audit). Analysis of changes between these periods may provide additional valuable information.

Alternative pain scales may be considered such as the Oxford Scale (Dawson et al. 1996). Units with a particular interest in post-operative pain may wish to obtain a 'pre-fracture baseline' by administering a pain score shortly before admission.

Further work required

None recommended.

Conclusion & priority

D - To be implemented where local circumstances allow by periodic survey.

References

Charnley, J. (1972). The long term results of low friction arthroplasty of the hip performed as a primary intervention. *Journal of the Bone and Surgery,* **54**, 61-76.

Dawson, J., Fitzpatrick, R., Carr, A., and Murray, D. (1996). Questionnaire on the perception of patients about THR. *Journal of Bone and Joint Surgery,* **78**, 185-190.

Melzack, R. (1975). The McGill Pain Questionnaire: major properties and scoring methods. *Pain,* **1**, 277-299.

Murray, D. (1993). The hip. In *Outcome measures in orthopaedics* (ed. P. Pynsent, J. Fairbank, A. Carr). Butterworth-Heinemann, Oxford.

Sutton, G., Foan, J., Hyndman, S., Todd, C., Rushton, N., and Palmer, R. (1996). *Developing measurable indicators for the quality of care of hip fracture patients.* Institute of Public Health, University of Cambridge.

Candidate indicator 11

Characteristics	
Specificity:	Generic
Perspective:	Patient
Timeframe:	Longitudinal
Outcome relationship:	Direct

Title

Summary of a measure of a return to pre-fracture level of social integration, within a provider unit population which has undergone treatment for fractured proximal femur

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

For a given provider unit population admitted with a fractured proximal femur, and year: *a summary of the distribution of changes as measured in individual patients from pre-fracture baseline to follow-up at 120 days following discharge in an index of social isolation (adapted NHP scale);(Sutton et al. 1996).* The pre-fracture baseline would be obtained through a retrospective assessment during the hospital admission. The summary statistics might include mean (or median) absolute difference, or mean (or median) proportional improvement relative to baseline. These averages, might be expressed as unitary values within each grouping of patient age-group and sex, or might be further broken down by some categorisation of baseline score (e.g. low, medium).

The adapted, unweighted Social Isolation Scale from the Nottingham Health Profile (NHP) (Hunt et al. 1989) (by Sutton et al. 1996)

As questions 1 & 7 are distracter questions, the responses of these questions should be discarded and the final score tallied from questions 2 to 6. Each 'yes' response should be scored with a '1' and no responses with '0'; the total score being between 0 and 5.

Some questions about how you felt in the last seven days.
Please tick yes or no:

1. I still enjoy the things I used to enjoy	Yes	No
2. I feel lonely	Yes	No
3. I am finding it hard to make contact with people	Yes	No
4. I feel there is nobody I am close to	Yes	No
5. I feel I am a burden to people	Yes	No
6. I'm finding it hard to get on with people	Yes	No
7. I still enjoy a good book, radio or TV programme	Yes	No

Rationale

For some individuals, the change in lifestyle following hip fracture may significantly affect their social integration (Downton 1993). Fear of further falls and fracture can have long term effects on patients, limiting their activities up to 15 months after fracture (Ungar and Warne 1986). The NHP has been used to identify significant psycho-social problems among hip fracture patients (Todd 1996). Monitoring social isolation as an outcome of care following fractured neck of femur may provide direction for the development of services, as well as an evaluation of existing rehabilitation programmes.

Potential uses Clinical audit and provider based comparisons.

Potential users Clinicians, commissioners, provider management.

Possible confounders Social factors in the population may influence the degree to which hip problems may be compensated for.

Data sources While social assessment is a normal component within hospital and community care, the data required for this indicator are not currently recorded in any formal way. As such the use of this indicator would require additional data collection both during admission and at follow-up. Reliance on additional data collection would probably restrict this indicator's use to periodic audit. The baseline assessment would be obtained through a retrospective assessment by the patient of their pre-fracture status and administered on, or as near as possible, to admission. In cases where the patient is not able to provide such an assessment, a carer's response may serve as a useful proxy. The second measurement is obtained at 120 days either at a follow-up appointment by a clinician or through the post using a questionnaire. The assessment may be made by self-completion postal survey or given to the patient during a follow-up appointment consultation.

Data quality The quality of the data will depend on the response rates for both the pre-fracture assessment and the follow-up postal survey. The indicator relies on the ability of the patient to provide a retrospective assessment, which in this group of patients may not be straightforward with a high rate of frail elderly and dependent individuals. In the Cambridge study (Sutton et al. 1996), of 100 patients, only 59 were considered sufficiently 'clear-minded' to be interviewed.

Presentation of the longitudinal indicator should take potential problems of complete follow-up into account by giving a count of those lost to follow-up and details of the distribution of their pre-operative scores (in a format that allows comparison with the corresponding distributions for those where follow-up was possible). The use of a relative or other carer may be possible as a proxy respondent. However, the possibility of bias and invalid responses are greater in such a subjective assessment, particularly a retrospective one.

The NHP has been used widely in postal surveys requiring self-completion by patients, with high response rates being reported (e.g. Bardsley and Cleary 1994). It has also been employed in a number of hip surgery studies and its discriminate validity documented before and after arthroplasty (McKenna et al. 1984). The suggested measure detailed here is an adapted version of the Nottingham Health Profile (NHP)- social isolation section. Although this serves as a good example of the type of measure required, other measures such as the social functioning dimension questions from the Short Form 36 (Ware et al., 1992) are also suitable.

Comments No specific points.

Further work required Further work to validate the use of the NHP scale in retrospective assessments of this population of patients would be valuable. The use of normative population data as an alternative data source to individual pre-fracture assessments, should also be evaluated.

Conclusion & priority **D - To be implemented where local circumstances allow by periodic survey.**

References

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Ungar, D.M., and Warne, R.W. (1986). Morbidity following successful treatment of proximal femoral fractures. *Australian Family Physician,* **15**, 1157-1158.

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Candidate indicator 12

Characteristics	
Specificity:	Generic
Perspective:	Patient
Timeframe:	Longitudinal
Outcome relationship:	Direct

Title

Summary of a measure of a return to pre-fracture level of Activities of Daily Living (ADL), within a provider unit population which has undergone treatment for fractured proximal femur

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

For a given provider unit population admitted with a fractured proximal femur and year: *a summary of the distribution of changes measured in individual patients from pre-fracture base-line to follow-up at 120 days following discharge, in an index of functional dependency* (Barthel Index; Mahoney and Barthel 1965). The pre-fracture baseline would be obtained through a retrospective assessment during the hospital admission. The summary statistics might include mean (or median) absolute difference, or mean (or median) proportional improvement relative to baseline. These averages, might be expressed as unitary values within each grouping of patient age-group and sex, or might be further broken down by some categorisation of baseline score (e.g. low, medium, high). Weighting of the different components of the Barthel Index in terms of the contribution of each to overall dependency, might also enhance the interpretability of this indicator (Finch et al. 1995).

Rationale

Hip fracture causes significant disability to the sufferer. Rehabilitation to reduce impairment, disability and handicap require effective assessment and planning as well as a team of professionals with the correct skills and equipment to enable people to recover their confidence and independence (Audit Commission 1995). While cross-sectional measures of post-fracture function will in part reflect the success of surgery and rehabilitation, longitudinal measures will better quantify the benefit of the intervention in terms of modified disability. A recent study (Sutton et al. 1996) set and achieved target rates of 36% returning to pre-fracture levels of ADL.

Potential uses

Comparisons between different rehabilitation programmes, evaluation of rehabilitation programmes.

Potential users

Clinicians, provider management, and commissioners.

Possible confounders

Private provision of additional aids etc. may influence the interpretation of this indicator.

Data sources

This longitudinal indicator relies on assessments of the Barthel Index of Activities of Daily Living (ADL) at two points in time. The baseline assessment should be obtained through a retrospective assessment by the patient of their pre-fracture status, administered during the hospital admission. In cases, where the patient is not able to provide such an assessment, a carer's response may serve as a suitable proxy. The second measurement is obtained at 120 days either at a follow-up appointment by a clinician or through a postal questionnaire with the format changed for self-completion, using simple, unambiguous questions with mutually exclusive response sets (Fowler 1993)). There are also some examples where an assessment of ADL has been administered over the telephone. In one study, proxy-respondents provided information for those unable to respond themselves and there was a high agreement between the scores on the telephone and on the home interview controls (Korner-Bitensky et al. 1995).

Data quality

The Barthel index, although predominantly used as a measure of outcome following stroke (Gompertz et al.1993), has also been employed in other areas including proximal femoral fracture (Cameron et al. 1993).

Longitudinal indicators can encounter difficulty in achieving complete follow-up. Presentation of the longitudinal indicator should take this into account by giving a count of those lost to follow-up and details of the distribution of their pre-fracture scores (in a format that allows comparison with the corresponding distributions for those where follow-up was possible). While carer assessments will be useful in obtaining more complete data, the possibility for bias should be recognised, and all assessments should include a record of their source.

Comments

No specific points.

Further work required

Further piloting of retrospective assessments of ADL in patients with proximal femur fractures.

Conclusion & priority

F - To be further developed because link with effectiveness is not clear and the indicator specification is incomplete

References

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Candidate indicator 13

Characteristics	
Specificity:	Condition-specific
Perspective:	Patient
Timeframe:	Longitudinal
Outcome relationship:	Direct

Title

Summary of a measure of a return to pre-fracture level of mobility, within a provider unit population which has undergone treatment for fractured proximal femur

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

The definition of the indicator specifies the use of two ordinal scales (below) which assess walking ability and walking aid requirements (Parker et al. 1998).

Walking

1. Could walk alone out of doors
2. Could walk out of doors only if accompanied
3. Could walk alone indoors but not out of doors
4. Could walk indoors only if accompanied
5. Unable to walk.

Walking aids

1. Can walk without aids
2. One aid (stick, crutch, tripod or hemi-walker)
3. Two aids (stick, crutch, tripod or hemi-walker
4. Frame (walking frame or rollator)
5. Wheelchair/bedbound.

The indicator requires a patient assessment using these scales on two occasions - a retrospective assessment of pre-fracture ability undertaken during the hospital stay, prior to discharge and, a follow-up assessment at 120 days after discharge. The indicator is defined as:

For a given provider unit population admitted with a fractured proximal femur, and year: *a summary of the distribution of changes measured in individual patients from pre-fracture base-line to follow-up at 120 days following discharge, on ordinal scales of walking ability and walking aid requirements.* The summary statistics should include the percentage of patients whose scores are the same or better at 120 days compared to their pre-fracture score for each scale. This, alongside the overall figures should also be reported by patient age-group and sex. To provide additional background information, the distribution of scores from both the pre-fracture, and 120 days assessments should be given.

Rationale	Although Indicator 12 provides an assessment of recovery of overall function following the fracture, this indicator focuses specifically on recovery of mobility, with additional detail regarding any change in the need for walking aids. Studies have suggested that independent mobility continues to improve beyond 60 days after surgery, up until one year, although with fewer changes after 120 days (Barnes and Donovan 1987; Thorngren et al. 1998). This indicator should therefore reflect the success of rehabilitation in terms of a return to previous level of mobility.
Potential uses	Clinical audit and provider based comparisons.
Potential users	Clinicians, provider management, commissioners.
Possible confounders	No specific ones identified.
Data sources	The data would be captured using interviews for the retrospective assessment during the hospital admission, and questionnaires by post or at out-patients follow-up appointments at 120 days. (Further details as for Indicator 12.)
Data quality	These scales are used within the European standardised audit for fractured proximal femur (Parker et al.1998). Longitudinal indicators can encounter difficulty in achieving complete follow-up. Presentation of the longitudinal indicator should take this into account by giving a count of those lost to follow-up and details of the distribution of their pre-operative scores, in a format that allows comparison with the corresponding distributions for those where follow-up was possible. While carer assessments will be useful in obtaining more complete data, the possibility for bias should be recognised, and all assessments should include a record of their source.
Comments	No specific points.
Further work required	None recommended.
Conclusion & priority	**D - To be implemented where local circumstances allow by periodic survey.**
References	Barnes, W., and Donovan, K. (1987). Functional outcomes after hip fracture. *Physical Therapy,* **67**, 1275-1279. Parker, M.J., Currie, C.T, Mountain, J.A., and Thorngren, K.G. (1998). Standardisation audit of hip fracture in Europe (SAHFE). *Hip International,* **8**, 10-15.

Candidate indicator 14

Characteristics	
Specificity:	Generic
Perspective:	Patient
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Summary of a measure of the attainment of patient specified outcome goals, within a provider unit population which has undergone treatment for fractured proximal femur

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

For a given provider unit population admitted with a fractured proximal femur, and year: *a summary of patient's scores with respect to a measure of attainment of patient specified goals*. It is intended that a maximum of five goals are specified at the outset of a programme of rehabilitation, with a binary assessment of their attainment at a review of progress three months later. A range of summary statistics may be useful including distribution of goal attainment across patients, both in terms of absolute number of goals attained (e.g. X% achieved three goals), and /or in terms of the proportion of the number of goals set (e.g. Y% achieved at least half or all of their set goals).

Rationale

One desirable outcome following the treatment of a disabling fracture should be a return to a good 'quality of life' which should be defined in terms individual to each patient (Ruta and Garratt 1994). An attempt to measure the degree to which such an outcome has been achieved requires some form of individual statement of a patient's goals in undergoing treatment (perhaps weighted by their relative importance), and an assessment of whether such goals have been attained. The outcomes assessed by standard measures (e.g. SF-36) are 'pre-selected' and therefore may exclude what is important for the individual, and thus not be sensitive to the changes which show an individual's progress.

Individualised outcomes measurement tools either in use or currently under evaluation include: Goal attainment scaling (Stolee 1992); Treatment Evaluation by le Roux's Method (TELER; le Roux 1993); Canadian Occupational Performance Measure (COPM; Law et al. 1994); Patient Orientated Evaluation Method (POEM; Basselet Physiotherapy Research Group 1992), Schedule for the Evaluation of Individual Quality of Life (SEIQoL; O'Boyle et al. 1992); Measure Yourself Medical Outcomes Profile (MYMOP; Paterson 1996) and the Binary Individualised Outcome Measure (Spreadbury and Cook 1995). These measures cover a range of sophistication in the methods used in individual goal setting and assessment. The assessment may include a simple binary yes/no measure as to the attainment of the goal, or involve scales rating the level of performance achieved towards the goal. Goal setting may categorise and weight the goals as to the level of importance assigned by the individual and the COPM includes an assessment of satisfaction with performance as well as an attainment rating. A maximum of five goals with a three month review period is suggested to enhance comparability across provider units, which is as specified in the Binary Individualised Outcome Measure (Spreadbury and Cook 1995).

The key advantage of the method is the potential to derive the required information through the formalisation of the care planning review process that will already be in place. So, in the first instance a simple system - that most closely resembles existing practice - is recommended whereby a binary assessment is made for a limited number of goals previously agreed between patient and professional. A tested version of a binary approach is the Binary Individualised Outcome measure, developed by Occupational Therapists in Nottingham (Spreadbury and Cook 1995). The use of any similar tool would allow for this basic information to be obtained and therefore no specific approach or tool is recommended.

Potential uses

It may be a valuable tool to audit outcomes locally and used as a structured basis for useful discussions regarding the aims and achievements of care.

Potential users

Clinicians, commissioners.

Possible confounders

Because increased levels of achievement may be obtained both by increased effectiveness and reduced ambition, comparisons between populations or providers using this indicator need to be sensitive to the nature of the goals set. This may involve a detailed discussion of the goals themselves and is unlikely to be something which could be done mechanistically.

Data sources

Performance measures of this type are a central component of the treatment programme provided by therapists and professionals allied to medicine. The data for this indicator should therefore be generally available but likely to involve additional formal data collection to allow their use in this indicator. Although the Binary Individualised Outcome Measure is designed for use by occupational therapists, any member of the team involved in rehabilitation of patients could be involved in goal setting.

Data quality

Both the Binary Individualised Outcome Measure and the Canadian Outcome Performance Measure are popular and used extensively in England. The COPM has been demonstrated as reliable and responsive among clients receiving rehabilitation services for stroke, Parkinson's disease, hip fracture and arthritis, using a three month review period (Law et al. 1994).

Although it is in the professional interest of the staff to address real problems and/or achieve meaningful goals, there may be a perverse incentive to set low, easily achievable goals, in order to score highly on this indicator. The client-centred nature of the goal setting may discourage this to some extent, however patient expectations will of course be partly determined through the attitudes and recommendations of the professionals providing care. Indeed, one desirable outcome of rehabilitation will be the acceptance of realistic goals on the part of the client. Sufficient training so staff learn and adopt the techniques will increase data quality. Such training would ensure that goals are clearly defined and measurable as well as realistic and achievable through the planned programme of therapy.

Comments No specific points.

Further work required None recommended.

Conclusion & priority **B- To be implemented generally by periodic survey.**

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Candidate indicator 15

Characteristics	
Specificity:	Condition-specific
Perspective:	Patient
Timeframe:	Cross-sectional
Outcome relationship:	Direct

Title

Percentage of patients admitted with a fractured proximal femur who are living in their pre-fracture category of accommodation, 120 days after admission to hospital

Intervention aim

Restore function and well-being after fractured proximal femur.

Definition

For a provider unit and year: *the number of patients admitted with a primary diagnosis of fractured proximal femur within the given year who 120 days later have returned to their pre-fracture category of accommodation, divided by the total number of admissions with a primary diagnosis of fractured proximal femur admitted to the given unit in the given year.* The resulting fraction should be expressed as a percentage and reported as an overall figure by patient age-group and sex.

Rationale

A return home following a fractured proximal femur may be considered a successful outcome of rehabilitation. The percentage of patients returning to pre-fracture accommodation, (for example if they had previously lived in a NHS run nursing home or residential home, then returned to the same category of accommodation as this) has been shown to be a fairly consistent at approximately 75% (Borgquist et al. 1992; Laxton et al. 1997). Although clearly it is partly determined by the availability of support at home or the quality of the community services, a change in the category of accommodation identified by this indicator would suggest an important change in ability and general health status. Assessment at 120 days after admission is specified in preference to other times of 90 days, or six months, as there are still improvements in residential status occurring up to 120 days but after this time change in residential status is less common (Parker et al. 1998).

Potential uses

Clinical audit and provider based comparisons.

Potential users

Clinicians; provider management, commissioners.

Possible confounders

Comparisons should be made in the context of case-mix information covering the severity and co-morbidity of the patient populations. A Barthel Index score may be useful in this role. Availability of different accommodation is a confounder.

Data sources

Denominator data may be identified from CMDS data with a primary diagnosis of fractured proximal femur (ICD 10 codes - S72.0, S72.1, S72.2 and S72.9) and an admission date in the relevant year. The numerator would require admission source data e.g. 19 - Usual place of residence, 54 - NHS run nursing home, residential home or group home, 65 - Local authority Part 3 residential care home, 85 - Non-NHS (other than local authority) run residential care, and information from GP records to identify the residential category 120 days after the admission date. As

this will involve contacting GPs for each patient, sampling may sensibly be undertaken. For general practices with computerised information systems a range of Read codes exist for categories of accommodation e.g. lives in a nursing home (13F61), lives in an old peoples home (13F72) (NHS Centre for Coding and Classification 1996). Retrieving the relevant information should therefore be straightforward. The subset of cases relevant to the numerator would be those patients whose category of accommodation on admission and 120 days later were the same. An alternative categorisation of accommodation status is used in the European audit which is recorded at the time of injury and 120 days after injury. The categories are: at home; institutional care; nursing home; permanent hospital in-patient; rehabilitation unit; acute hospital and other (Parker et al. 1998). Some of these categories are compatible with the currently recorded data from CMDS, but others are not included, so limiting direct comparisons.

Data quality

The validity of the data relies on the quality of procedure coding which may be more accurate than diagnosis codes and should be the subject of further investigation. Deriving the denominator from GP data may be hampered by incomplete recording of admissions for fractured proximal femur. A limitation of this indicator is that it does not distinguish between wardened and unwardened accommodation.

Comments

To capture the longer term outcome, this indicator is specified to identify residential status at 120 days, which if automated would require linkage of data not readily available. An alternative simpler indicator using data which is available now, would be the percentage who are *discharged* to their admission category of accommodation.

Currently, as the accommodation categories are not part of an ordinal scale, the indicator will only identify those who return to their pre-fracture category and not those who have been able to return to a more independent accommodation setting. If the admission source categories were from (or could be adapted to be) an accommodation ladder, improvements in return to accommodation status could also be included as a good outcome. A three point ladder of 'Home', 'Residential' and 'Nursing' has been used to summarise discharge destinations in similar studies measuring outcomes in care of the elderly (Parker et al. 1994). Data gathered from either the CMDS or the European audit would be converted and summarised in this way to facilitate inclusion of improvements in accommodation as a good outcome.

Further work required

None recommended.

Conclusion & priority

D - To be implemented where local circumstances allow by periodic survey.

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5. RECOMMENDATIONS

To be implemented generally on a routine basis

5.1. It is **recommended** that the following indicators be implemented generally on a routine basis (numbers refer to those in the Section 4 specifications):

1A: hospitalised incidence of fractured proximal femur per 10,000 population

7: incidence of pressure sores during the in-patient stay within a provider unit population admitted for care of fractured proximal femur.

5.2. The data required to calculate **hospital admission rates** are already collected and can be readily analysed. The information can be used to monitor trends over time nationally and provide geographical comparisons between populations. The age-standardised rate allows easy comparison between different geographical areas. Variation over time in the age-and-sex specific rates may be used to monitor the effectiveness of policies for the prevention of fractured proximal femur. Knowledge of the rate in resident populations provides a basis for the commissioning of services.

5.3 The acquisition of **pressure sores in hospital** may reflect poor care although it may also be influenced by factors preceding admission. Length of stay may need to be considered when considering the incidence of hospital-acquired pressure sores, but they should be avoidable even in long stay patients. The Read code or other assessment scores may be used to record and distinguish between types of pressure sore. At present the ICD 10 code does not allow pressure sores present on admission to be distinguished from those acquired in hospital. We recommend that the ICD code should be subdivided to distinguish these. For pressure sores present on admission it would be helpful to code whether they improved, deteriorated or remained the same while in hospital.

To be implemented generally by periodic survey

5.4 It is **recommended** that the following indicator be implemented generally by periodic survey:

14: summary of a measure of the attainment of patient-specified outcome goals, within a provider population which has undergone treatment for fractured proximal femur.

5.5 A measure of **attainment of patient-specified outcomes** is important to assess whether patients have achieved their aims in recovery. This can be used as the basis of discussion within a provider unit or with commissioners. Comparisons between provider units are potentially valuable but require consideration of the different outcomes which may be selected by patients in different units.

To be implemented where local circumstances allow on a routine basis

5.6 It is **recommended** that the following indicators be implemented where local circumstances allow on a routine basis:

3: population based mortality rates for patients admitted to hospital with fractured proximal femur

4: case fatality rate for patients admitted to hospital with fractured proximal femur.

At present it is not generally feasible to collect the above indicators except where there is linkage of hospital records and death certificate. With the implementation of the new NHS number these indicators should be compiled routinely.

5.7 The **population based mortality rate** is defined as the number of people who fracture and who die within a specified period of the fracture, expressed per resident population. We consider this preferable to the use of indicators based on death certificate diagnoses in expressing population based mortality because of the problems of certification of FPF as an underlying cause of death. We have specified deaths within 30 days, though other time intervals could be used.

5.8 The **case fatality rate** could be compiled at any agreed time interval, although we have suggested 30 and 120 days. Its main value is to monitor trends over time at national or commissioning level. It could be used to compare providers although small numbers and variation between them in case-mix may make interpretation of this difficult.

To be implemented where local circumstances allow by periodic survey

5.9 It is **recommended** that the following indicators be implemented where local circumstances allow by periodic survey:

8: rate of ipsilateral hip surgery within a provider unit population which has undergone surgical treatment for fractured proximal femur within the previous 120 days

10: summary of a measure of post operative pain, within a provider unit population which has undergone surgical treatment for fractured proximal femur

11: summary of a measure of a return to pre-fracture level of social integration, within a provider unit population which has undergone treatment for fractured proximal femur

13: summary of a measure of a return to a pre-fracture level of mobility, within a provider unit population which has undergone treatment for fractured proximal femur

15: percentage of patients admitted with a fractured proximal femur who are living in their pre-fracture category of accommodation, 120 days after admission to hospital.

5.10 The rate of **ipsilateral hip surgery** within a given time period gives an indication of the lack of success of the first operation. Identification of the rate using routine statistics is dependent on whether the side of the operation is coded and on the linkage of records so that re-operations in other provider units can be identified. The rate may depend on which procedure has been used initially, and on other aspects of case mix, and therefore rates should be compared with caution.

5.11 Pain control is an important part of orthopaedic care. Summary measures of post-operative pain would enable comparisons to be made of outcomes in different provider units. We recommend its collection at 120 days after admission. This is the time period used in the Swedish and European hip surgery audits.

5.12 A measure of a **return to pre-fracture levels of social integration** would be useful to assess the extent to which patients have been able to return to their previous circumstances. This depends both on the individual's response to the injury and on the rehabilitation received. The measure requires a retrospective assessment, soon after admission, of their social integration and a further reassessment at 120 days after admission. We recommend that this indicator is considered where there is local interest.

5.13 Mobility is one of the determining factors of independent living. A measure of the **return to a pre-fracture level of mobility** would allow assessment of the outcome of rehabilitation. Comparisons of different hospitals would have to be made with caution as factors other than care provided will affect mobility.

5.14 Patients living at their **pre-fracture category of accommodation** 120 days after admission for fractured proximal femur is accepted as a successful outcome for most patients. An indicator based on destination at discharge would be easier to compile than that at 120 days as the former data are routinely recorded in hospital records. It would, however, be less reliable as patients may be discharged to convalescent or rehabilitation care before going home or go to stay with relatives in the short term.

To be implemented generally following IT development on a routine basis

5.15 It is **recommended** that the following indicator be implemented generally on a routine basis following the introduction of the new NHS number:

1B: hospitalised incidence of a second (contralateral) fractured proximal femur per 10,000 population.

5.16 The **incidence of a second, contralateral, fractured proximal femur** reflects the failure to prevent this in a group that is known to be at an increased risk. While many such fractures will be unavoidable, areas with high rates may wish to review discharge arrangements or the support that is available to those at risk in the community.

To be further developed

5.17 It is **recommended** that the following indicators require further work either in developing the method of measurement or in identifying their link with the effectiveness of prevention or care.

5.18 If the results of further work show them to be useful, the following indicators should be compiled on a routine basis:

2: rate of accident and emergency (A&E) attendance for fractured distal radius per 10,000 population

6: percentage of patients with a pre-operative length of stay of greater than two days, within a provider unit population undergoing surgical treatment for fractured proximal femur.

5.19 The rate of **A&E attendance for fractured distal radius** in different age groups may reflect the risk of falls and the prevalence of reduced bone density and thus give an indication of the risk of future fractures of the proximal femur. The value of this as a marker for future hip fracture rates requires further assessment. Its compilation would also require accurate coding of the diagnosis in A&E computer systems in order for the data to be readily collected.

5.20 The **length of pre-operative stay within a hospital** may be an indicator of the quality of care in that hospital although, for a minority of patients there may be appropriate reasons recorded in the notes as to why surgery should be delayed. Further research is required to determine whether a pre-operative hospital stay of more than two days without documented medical reasons adversely affects the *outcome* of care. We recognise that this indicator could be used immediately as an indicator of quality in the *process* of care.

5.21 If the results of further work show them to be useful, the following indicators should be compiled by periodic survey:

5: thromboprophylaxis rate within a provider unit population of patients with fractured proximal femur

9: rate of emergency re-admissions (for any reason) within 30 days of discharge within a provider unit population which has undergone surgical treatment for fractured proximal femur

12: summary of a measure of a return to pre-fracture level of activities of daily living, within a provider unit population which has undergone treatment for fractured proximal femur.

5.22 The use of **thromboprophylaxis** in patients undergoing surgery for fractured proximal femur appears to be beneficial but requires further assessment. At present it is started pre, peri, or post-operatively and the data can only be collected by auditing case notes. Further work on assessing the balance of benefits and risks of pharmacological and the effectiveness of non-pharmacological methods, and the feasibility of collecting the data has to be carried out before this indicator can be recommended for implementation.

5.23 The **rate of emergency re-admission** for any reason within 30 days of discharge after surgical treatment for fractured proximal femur needs further evaluation to see if it is a useful measure. Depending on individual circumstances some re-admissions may be unavoidable although others may reflect inappropriate discharge or inadequate care in the first admission. It is not yet clear what the rate would mean in this group of patients and what is the frequency of avoidable admissions. This indicator requires the implementation of the new NHS number in order to enable capture of data on patients admitted to other hospitals.

5.24 A measure of a **return to pre-fracture level of activities of daily living** reflects what patients are able to do for themselves and so gives an indication of the impact of the injury on their lives. The Barthel score is one of the most widely used measures for activities of daily living but it will require further evaluation before it can be recommended for routine use in this group of patients.

Conclusions

5.25 As described in the indicator specifications, indicators collected routinely may be used to identify differences:

- over time
- between providers
- between groups of patients.

5.26 The main use of such indicators is to make broad comparisons to identify major differences. Small differences in indicators may be attributable to a wide range of factors, many of which will probably not reflect differences in health outcome attributable to care.

5.27 Some indicators may be particularly useful in combination. For example, a high case fatality rate (no. **4**) coupled with a high incidence of pressure sores (no. **7**), high incidence of re-operation rate (no. **8**) and high rates of post-operative pain (no. **10**) may, in combination, provide greater evidence of either poor care or particularly difficult to treat patients than any single measure alone.

5.28 Where possible recommendations have been made which are consistent with the Swedish and European hip surgery audits so that data can be pooled with those from other populations, if desired, and comparisons can readily be made.

APPENDIX A: BACKGROUND TO THE WORK

Summary

A.1 Over the last few years a major component of the Department of Health's and NHS Executive's strategy has been to promote the development and use of measures of health outcome. In July 1993 the Central Health Outcome Unit (CHOU) was set up within the Department of Health (DoH). Commissioned by the DoH, in 1993 a feasibility study of potential outcome indicators was published by the Faculty of Public Health Medicine and a package of indicators was published by the University of Surrey for consultation. Following these two phases of development, a third phase of work was initiated by the CHOU. Its remit is to report on 'ideal' health outcome indicators.

Central Health Outcome Unit

A.2 The CHOU is an internal DoH unit whose goal is 'to help secure continuing improvement in the health of the people of England through cost-effective and efficient use of resources' (Lakhani 1994). The objectives of the Unit are to:

- encourage and co-ordinate the development of health outcome assessment, particularly in respect of the development of appropriate methods, appropriate data collection systems, expertise, analytical skills, and interpretation
- encourage and support the use of health outcome assessment and information in making policy about health interventions and in the planning, delivery and monitoring of services.

A.3 Several national committees have a special interest in outcomes and are kept informed of progress:

- Clinical Outcomes Group
- Public Health Network
- CMO Working Group on Information Management and Technology.

Phases 1 and 2

A.4 The Faculty of Public Health Medicine was commissioned to undertake a feasibility study of potential indicators which reflect health end-points for health services and which cover topics in which health care has an important contribution to make. This work (McColl and Gulliford 1993) was constrained in that the set of indicators were to:

- be based on reliable routinely collected data
- reflect health service interventions rather than the wider influence on health.

A.5 The University of Surrey was commissioned to produce a package of comparative statistics based on the outcome measures recommended in the feasibility study. Forty indicators were chosen, 18 for maternal and child health, three for mental health and the rest for other topics in adult health. The publication (Department of Health 1993a) contained indicator definitions, maps and scatter plots showing geographical variations, and tables presenting the rates, with corresponding observed numbers and confidence intervals when appropriate.

The Phase 3 work: ideal indicators of health outcome

A.6 In the third and current phase of the work on health outcomes a number of research institutions were commissioned to assist in developing a structured approach to identify indicators to cover a number of clinical topics. The prime contractor is the Unit of Health-Care Epidemiology, Department of Public Health and Primary Care, University of Oxford.

A.7 The respective roles of the supporting organisations are as follows:

- Unit of Health-Care Epidemiology, University of Oxford, to provide epidemiological and managerial support to the Group and co-ordinate the input of the other agencies.
- CASPE Research, in London, to provide technical advice with regard to the indicators and their data sources, and prepare the detailed indicator specifications.
- NHS Centre for Reviews and Dissemination, University of York, to produce reviews of the literature on the effectiveness and cost-effectiveness of relevant interventions.
- UK Clearing House on Health Outcomes, Nuffield Institute of Health, University of Leeds, to provide support in identifying measures and instruments to be used for assessing outcomes.

- Royal College of Physicians' Research Unit, in London, to co-ordinate the clinical input.

A.8 In the previous work a key criterion for selection of indicators was the requirement for the work to be based on routinely available data. This practical constraint has meant that the recommended indicators were selected and opportunistic rather than an ideal set. This inevitably led, as the DoH acknowledged, to a bias towards outcomes which may be measurable now but which may not necessarily be those which are most appropriate and most needed. The aim of the third phase is to advise on and develop 'ideal' outcome indicators without confining recommendations to data which have been routinely available in the past.

A.9 The initial task of the third phase of the work was to select clinical topics for detailed study. In order to ensure that the work would be manageable, and that the NHS would have the capacity to absorb the output, the CHOU decided to limit the activity to five clinical topics a year.

A.10 A workshop to initiate the work which was attended by over 70 individuals representing a wide range of interests was held in January 1995. A report of the proceedings has been published (Goldacre and Ferguson 1995). The main aims of the workshop were:

- to identify the criteria which should be used to choose clinical topics for the Phase 3 work
- to suggest a list of potential clinical topics which workshop participants would like to be included in the Phase 3 work.

A.11 Following further consultation within and outside the DoH, the CHOU decided in June 1995 to include the following topics in the first two years of Phase 3 work:

- Asthma
- Breast cancer
- Cataract
- Diabetes mellitus
- Fracture of neck of femur.
- Incontinence
- Myocardial infarction
- Pregnancy and childbirth
- Severe mental illness
- Stroke.

Health outcome information

A.12 In this work the potential uses of outcome information have been identified as follows:

- for clinical decision-making and audit of clinical work, including:
  - audit and management of health professionals' practice
  - research

- for informing decisions about the strategic and operational development of services

- for comparisons of organisations in the delivery of services which may be:
  - provider based
  - population based

- for assessing progress towards agreed standards or targets for health outcomes, agreed nationally or locally, which may be:
  - identified from the research literature
  - set by clinical and managerial decisions.

A.13 Current managerial interests which are relevant to the use of health outcome information include:

- The NHS goal 'to secure, through the resources available, the greatest improvement in the physical and mental health of people in England'
- clinical audit
- evidence-based commissioning.

A.14 An important purpose of the work has been to recommend indicators which, if possible, would allow 'health gain' to be assessed alongside information used to measure health service input. The particular focus has been to make recommendations about aggregated statistical information about people with particular conditions which can be used to:

- enable providers of care to review outcomes of the care of their patients
- make comparisons, where appropriate, of health outcomes against locally agreed targets and/or between different places and/or over time.

A.15 For some indicators the information may be obtained from continuous data collection systems but, when having continuously collected information is unnecessary, or when the cost or complexity of this is high, use should be made of sample survey techniques or periodic surveys.

A.16 Health indicators are more likely to be successful if they fit naturally into the everyday work of health care professionals than when they have to be collected as a separate activity. The aim is to have indicators that are:

- *Relevant* because professionals use them everyday in treating their patients and will record them accurately
- *Reliable* because they can be validated or cross checked from other sources
- *Responsive* because they readily identify changes in the patient's state of health
- *Research-based* because there is a plausible link between processes of care and outcome.

A.17 In common with the approach taken to other types of indicators by the NHS, it is recognised that useful outcome indicators should be capable of identifying circumstances worthy of investigation but that, in themselves, they may not necessarily provide answers to whether care has been 'good' or 'bad'. In particular it is acknowledged that there may be difficulties in drawing causal conclusions - say, that a particular aspect of care caused a particular outcome - from indicators derived from non-experimental clinical settings. Nonetheless, the vast majority of clinical care is delivered in routine rather than experimental practice. The assessment of its outcomes entails, by definition, the use of observational rather than experimental data.

A.18 To be useful, work on 'ideal' outcome aspects needs to incorporate considerations of practicability. It is a time of rapid change in information technology. What may be feasible now in some places may not be feasible everywhere. What may not be practical today may become so in a year or two.

APPENDIX B: FRACTURED PROXIMAL FEMUR WORKING GROUP

B.1 The Fractured Proximal Femur (FPF) Working Group was formally constituted in April 1996 and met three times, completing its work in October 1996. The Report was completed in March 1997. The terms of reference were:

- To advise on indicators of health outcomes of the prevention and treatment of fracture of the proximal femur
- To make recommendations about the practicalities of the compilation and interpretation of the indicators, and to advise if further work is needed to refine the indicators and/or make them more useful.

B.2 The membership of the Working Group and the staff of the supporting organisations are shown below. The composition of the Group included the major professional and managerial groups and representatives of patients involved with the prevention and treatment of FPF.

MEMBERSHIP OF THE GROUP

Chairman and members

Orthopaedic surgeons	Jeremy Fairbank	Oxford **(Chairman)**
	Martin Parker	Peterborough
	Simon Frostick	Liverpool
Physicians	Edward Dickinson	Research Unit, RCP
	Richard Bailey	West Sussex
GP	David Beales	Oxford
Nurse	Ann Gill	RCN Soc of Ortho Nursing
Physiotherapist	Anna Culot	Norfolk
Occupational therapist	Penny Spreadbury	Nottingham
Researchers	Paul Pynsent	Birmingham
	Chris Todd	Cambridge
	Kate Saffin	Oxford
CEOs	Jim Waits	Worcester HA
	Philip Chubb	Southmead NHS Trust
Voluntary body	Richard Wiles	College of Health
Department of Health	Jeffrey Graham	London

Academic support and secretariat

Michael Goldacre, Alastair Mason, & John Fletcher, University of Oxford
Robert Cleary & Moyra Amess, CASPE Research
Alison Eastwood, NHS Centre for Reviews and Dissemination, University of York
Andrew Long, UK Clearing House on Health Outcomes, University of Leeds

APPENDIX C: WORK COMMISSIONED FROM THE NHS CENTRE FOR REVIEWS AND DISSEMINATION

Alison Eastwood, October 1996

SCOPE

C1. The Working Group commissioned three short literature reviews related to specific effectiveness issues:

- the effect of admission to operation time on outcome
- thromboprophylaxis
- the organisational framework of services.

C2. Given the short time period available for the work, it was not possible to identify systematically and summarise all the evidence. Instead, attention was focused on existing reviews, with additional reference to primary studies where relevant. For each of the areas, a MEDLINE search covering the years 1986-1996 was undertaken. Additional information was also sought from reference lists and consultation with experts.

THE EFFECT OF ADMISSION TO OPERATION TIME ON OUTCOME

Introduction

C3. This section assesses the evidence about the effect of delay in surgery on outcomes. In particular, it addresses the time from admission to hospital until surgery for patients with hip fracture.

Quality of available evidence

C4. No reviews in this area were identified. There are very few studies of rigorous design from which strong conclusions can be drawn. No randomised controlled trials were found. The studies identified tend to be retrospective and occasionally prospective series of patients undergoing surgery for fractured neck of femur, looking specifically at the association between delay and mortality and other outcomes, or more generally at factors affecting mortality. This study design is prone to bias and it is difficult to attribute causation. Delays in operations may occur due to the concomitant medical conditions, such that patients need to be stabilised before they can undergo surgery. Patients experiencing delay between admission and operation may well be less healthy than those who experience no delay. Thus, it may be the health of the patient, rather than any delay in operation which effects the resulting outcomes. Unless results can be adjusted for confounding factors, it is difficult to interpret accurately the results of these studies.

C5. There may well be a delay between fracture and admission. Approximately half of the studies measured time from fracture to operation, as opposed to admission to operation, although some consider both.

C6. In the literature, there is no consensus on the cut-off time beyond which delay is harmful. Some studies have used 6, 12 or 24 hours while others have measured the delay individually for each patient (in either hours or days).

Results

C7. Zuckerman et al. (1995) undertook a prospective study of 367 patients with hip fracture, to determine the effect of operative delay on postoperative complications and one year mortality. They only included patients 65 years or older, who were cognitively intact, living at home, and able to walk before the fracture. The operation was performed within two calendar days in 73% of the patients. Controlling for the patient's age, sex and the number of pre-existing medical conditions, it was found that an operative delay (>two calendar days) increased the risk of one year mortality (adjusted hazard ratio=1.76, 95% CI: 1.00-3.10, p=0.05). The magnitude of the increased mortality risk was larger for all other variables included in the analysis. Further, when the severity of pre-existing medical conditions was also controlled for, the increase in mortality associated with operative delay was no longer significant (adjusted hazard ratio=1.60, 95% CI: 0.90-2.85, p=0.11). There was more than a threefold increase in the risk of mortality associated with the severity of pre-existing medical conditions (adjusted hazard ratio=3.19, 95% CI: 1.58-6.44, p=0.001). Thus it seems likely that the association of operative delay with mortality may be explained by the severity of pre-existing medical conditions.

C8. Sexson and Lehner (1987) undertook a retrospective study of 300 records of patients with fractures of the femoral neck or intertrochanteric region, obtaining 94% follow-up at one year. Only 27.3% of patients were operated on within 24 hours of admission. They found no statistically significant difference in mortality between those patients operated on within 24 hours and those after 24 hours (91% vs. 83%, p=0.1). However, this relationship was confounded by the effects of pre-existing medical conditions. Relatively healthy patients (less than two pre-existing conditions) had a survival rate of 97% for surgery within 24 hours and 85% with a delay of 24 hours or more (p=0.02). For those patients who were relatively less healthy (three or more medical conditions), survival rates were 67% vs. 78% (p=0.4). Those healthy patients admitted on weekends may have an increased mortality as only 17% of patients underwent surgery within 24 hours if they were admitted at the weekend compared with 32% for weekdays. The authors conclude that healthy patients should undergo surgery within 24 hours of admission, and less healthy

patients can be stabilised medically before undergoing surgery without adding increased risk from the delay. This is one of the few studies which attempted to adjust for pre-existing medical conditions.

C9. In a prospective study of 1000 patients with femoral neck fracture 75% of patients were operated on within 30 hours of admission (patients with neoplasms and re-admissions excluded) (Holt et al. 1994). Discriminant analysis (of six hourly groups) showed that delay did not affect mortality until 30 hours had occurred between admission and operation. However, the authors acknowledge that the results are skewed by the fact that the patients who were not operated on until 30 hours post-admission were more likely to be unfit on admission due to concomitant medical disorders. The lack of adjustment for confounding factors limits the reliability of these results.

C10. Bredahl et al. (1992) undertook a retrospective study of patients with femoral neck or trochanteric fracture, comparing the outcomes of those operated on within 12 hours of admission and those operated on after 12 hours. Patients with a clinical disorder requiring pre-operative treatment were excluded. The overall mortality difference was statistically significant at 12 months, favouring the early operation group (27.7% vs. 34.4%). The difference for femoral neck fractures was also statistically significant (25.5% vs. 34.5%), but not for trochanteric fractures. The length of stay was significantly longer in the late operation group (33 vs. 28 days). Only 15% of this group had a delay of greater than 24 hours, and no explanation is given as to why surgery was delayed in any of the patients.

C11. Eiskjaer and Ostgard (1991) examined the records of 204 patients with a displaced femoral neck fracture, including those with severe co-morbidity. They found that delay between admission and surgery did not influence the chances of survival. Medical conditions were the most important determinants of survival. The authors conclude that the surgical delay essential for stabilising the patient is not a problem, but they stress that ample time should be spent on assessment and resuscitation before surgery.

C12. In a retrospective case series of 274 patients, Dolk (1990) showed that mortality differences between groups were explained by differences in ages rather than admission to operation. The author concludes that 'No disadvantage was found with emergency operations, but the advantages were not so impressive and delay of operations until the next day did not affect the mortality or hospital stay.' In this study the reason for delay was recorded, and delays of over 48 hours did not occur other than for medical reasons. In an earlier prospective case series, Dolk (1989) also evaluated 282 patients with hip fractures (femoral neck or trochanteric) with one and two year follow-up and a review of hospital records after ten years. He found a significantly longer post-operative hospital stay (and post-operative hospital stay plus

after-care period) for those patients who experienced longer delay. He also found a difference in hospital stay, and time from fracture to operation, depending on the day the fracture occurred. Those occurring Sunday to Wednesday, usually were operated on days one and two, those occurring on Friday and Saturday would often be operated on after the weekend.

C13. Only one study has identified a higher mortality rate in patients being operated on within 24 hours of admission compared to those operated on after 24 hours (Kenzora et al. 1984). This early study (data were collected from 1971-1977) is a retrospective analysis of 406 patients with proximal femoral fractures, identifying risk factors that influence mortality. The authors report a one year mortality rate of 34% for patients operated on within 24 hours of admission, and 5.8% for those patients operated on between days two and five ($p<.00001$). They repeated the analysis excluding those patients with four or more concomitant medical conditions at the time of surgery (which they found had significantly higher mortality rates). Restricting attention to 'relatively' healthy patients, the one year mortality rate was 28% for those operated on within 24 hours, compared to 4% of those operated on between two and five days following admission ($p<.001$). The authors recommend that serious medical conditions need to be stabilised for at least 24 hours and pulmonary and physical therapy instituted before scheduling open surgical procedures.

C14. A number of identified studies have evaluated time from fracture to surgery, rather than admission to surgery. Hoerer et al. (1993) reviewed 611 patients hospitalised for fractures of the femoral neck between 1983 and 1988, 91% of whom underwent surgery. 49.5% of surgical patients underwent surgery within the first 12 hours following admission, 39% within 12-24 hours and 11% within 2-7 days. The authors found no significant correlation between immediate post-operative mortality and time interval from injury to operation. They did find that patients who underwent surgery within 24 hours of injury had a significantly shorter length of stay than those treated later (53% of patients operated on within 12 hours, or within 12-24 hours had a length of stay of between 7-14 days, compared to 24% of patients operated on within 2-7 days). However, this result is confounded by the fact that those patients treated later, were more likely to be 'less healthy' and have other comorbid conditions - no adjustment for this was made.

C15. In a prospective study of 765 patients with proximal femoral fracture, Parker and Pryor (1992) examined the impact of the time interval between injury and surgery on outcome. They excluded patients where delay in surgery was due to medical conditions, and by restricting attention to patients treated by hemiarthroplasty or by internal fixation of an extracapsular fracture with a dynamic hip screw or a nail-plate. Patients were split into four groups depending on time from injury to operation (<24 hours, 24-47 hours, 48-72

hours, >72 hours). No statistically significant differences were found when the groups were analysed and so they were collapsed into two groups of early and late surgery (<48 hours, >48 hours). Using these groups, there was no statistically significant difference in mortality, the early group had a significantly lower incidence of pressure sores (18% vs. 28%, p=0.01) and a higher incidence of confusional state after operation (21% vs. 13%, p=0.05). There was a trend towards an increased length of stay and incidence of pulmonary embolism for the late surgery group.

C16. Davis et al. (1988) examined the effect of time between injury and operative treatment on the mortality and morbidity of 230 consecutive patients with intertrochanteric fractures of the femur. They found that the mortality rate was not influenced by the timing of surgical treatment, nor was the frequency of pressure sores and chest infections. They conclude that time between fracture and operation is not an important determinant of outcome.

C17. Davie et al. (1979) assessed the outcome of 200 consecutive cases of hip fracture who underwent surgery. They found that patients who reached hospital within 48 hours of fracture had an 8% mortality rate, whereas those who reached hospital after 48 hours had a mortality rate of 18.5%. Patients operated on within 48 hours of injury had a mortality rate of 9% compared with 11.3% for those operated on after 48 hours of injury. The authors conclude that there is no significant change in mortality due to delay in operation, even after a delay of 72 hours. Instead they find the time from injury to admission to be of importance. However, no attempt has been made to account for case-mix.

C18. Villar et al. (1986) undertook a retrospective study of 145 women patients who had undergone hemiarthroplasty for a displaced subcapital fracture of the femoral neck. They evaluated social circumstances at three months, and found that the median delay in surgery (from injury) for patients who showed good rehabilitation was 29 hours, but 57 hours for those who showed poor rehabilitation. The mean difference in delay between the two groups was 43 hours (95% CI: 41.35, 44.45, p<0.0001). The authors conclude that 'subcapital fracture in an otherwise fit elderly patient should therefore be regarded as a surgical emergency.' No adjustment was made in the analysis for potential confounding factors. Dias (1987) has questioned the attribution of 'the deterioration in the patients' social circumstances to the operative delay'.

C19. Beals (1972) undertook a retrospective analysis of 607 patients (between 1956 and 1961), including all femoral neck fractures treated with a Smith Peterson nail and all trochanteric fractures treated with a Neufeld nail. Patients were grouped according to the time from fracture to surgery (< 2 days, 3-4 days, 5-6 days, >6 days). Delay frequently occurred due to delay in presentation. No relationship was found between the delay and hospital deaths, nor with any specific cause of death. No case-mix adjustment was made.

C20. Two of the studies identified have evaluated complications resulting from surgery rather than mortality or morbidity measures. Manninger et al. (1989) assessed the value of urgent internal fixation of fractured neck of femur in terms of the complication rate associated with surgery (the time and quality of union, and the incidence of collapse of the head of the femur), rather than mortality or survival. Three patient groups were defined: operation within six hours of injury, 6-24 hours, and more than 24 hours. Patients were allocated to the first and second group based on the time of admission and theatre availability, delay of the operation of more than 24 hours was the consequence of the patient's general condition or late arrival. There was no difference in the general medical condition in the patients in the first two groups, but those in the third group had significantly more medical illnesses. The authors found that the time and quality of union and the incidence of collapse of the head of the femur were significantly better in the first group. There was no significant difference between second and third groups.

C21. A series of 2,418 patients admitted from their own homes with a femoral neck fracture to hospital was reviewed six years after the fracture (Holmberg et al. 1987). Operative delay was only one small part of the overall study. It is not clear from the article whether operative delay was measured from admission or fracture. The authors found no common trend between fracture outcome and operative delay, except for a high complication rate for all three types of complications (redisplacement, non-union and segmental collapse) when the delay was one week or longer. However, no adjustment was made for case-mix.

Conclusions

C22. From the literature identified, there is insufficient evidence to support the use of time from admission to operation as a process indicator of quality of care for fractured neck of femur. The identified studies are generally of weak design and most only use death and clinical complications as outcome measures. Few studies have included outcome measures such as pain, other symptoms, social functioning after discharge and patient satisfaction.

C23. Many of the studies measured time from injury to operation rather than admission to operation. It is difficult to use the results of these studies to assess the evidence of delay from admission to operation as there may be a delay in admission subsequent to the fracture (Beals 1972). One study found that it was time from injury to admission which was important, rather than injury to operation (Davie et al. 1979). However, these studies are generally of weak design and do not account for confounding factors.

C24. The design of the identified studies is not rigorous enough to attribute differences in outcome to the time between admission and operation. Further more, there is conflicting evidence as to whether such a difference exists. It seems likely that there are several possible factors which could confound the results, especially the health of the patient at the time of the fracture. Patients experiencing delays are more likely to have concomitant illness, which may influence their survival.

C25. Studies which reported the reason for delay in surgery show that it is not only health factors which are important. Patient consent, day of admission and theatre availability are also relevant.

C26. It is not clear what cut-off period (if any) should be used when making comparisons, and there is no clear consensus in the literature. If the crucial time interval for delay is operation within six hours of fracture, then studies which use longer cut-offs will miss the effect.

C27. These issues make the use of this measure as a proxy outcome indicator problematic in practice. Whatever information systems develop in the NHS, there is little likelihood of being able to adjust adequately for confounding variables. Given all these potential confounding factors and the difficulty in attributing any results to a readily definable patient group, the use of time from admission to operation should not be used as a proxy outcome indicator for fractured neck of femur.

THROMBOPROPHYLAXIS

Introduction

C28. It is thought that deep vein thrombosis (DVT) may occur in up to half of all patients who have had orthopaedic surgery. Although the majority of these are subclinical and will resolve completely, some will produce permanent valvular damage and venous insufficiency. A minority will embolise to the lungs and may produce slight, substantial or fatal effects (Antiplatelet Trialists' Collaboration, 1994; Collins et al. 1988). There are a number of different

approaches to preventing venous thromboembolism. In an early review, Hull et al. (1986) identify eight different prophylactic measures which can be used: low-dose heparin, intermittent pneumatic leg compression, oral anticoagulants, dextran, aspirin, adjusted-dose subcutaneous heparin, graduated compression stockings and combined prophylactic modalities (e.g. low dose heparin with the venoconstrictor dihydroergotamine, or intravenous dextran with intermittent pneumatic compression). More recently trials have also considered low molecular weight heparin (Collins et al. 1988; Green et al. 1994; Lassen et al. 1991).

C29. There are wide variations in the use of thromboprophylaxis. This may be explained in part by the relatively rare occurrence of fatal pulmonary embolism (PE), and concerns about the safety of antithrombotic drugs (Clagett et al. 1995).

C30. Although a number of reviews of thromboprophylaxis have been undertaken, not all reviews identify the patient groups in the individual trials. In some reviews, separate analyses of general and orthopaedic surgery are carried out, but within orthopaedic surgery the different patient groups may not be identified (e.g. hip fracture, elective hip surgery, total hip replacement, total knee replacement). Patients with hip fracture may be more at risk from the adverse effects of thromboprophylaxis than other patient groups. 'Prophylaxis of hip fracture surgery remains a major challenge due to the risk of bleeding in these typically elderly patients with recent trauma.' (Clagett et al. 1995). Consequently, I have restricted attention to those reviews which have explicitly included trials of patients with hip fracture, although in some cases combined analyses may be for orthopaedic surgery.

Quality of available evidence

C31. The quality of the reviews identified was quite variable. Only a few provided details of the search strategy used to identify trials, inclusion or exclusion criteria applied, details of the primary studies included, and methodological details of data synthesis. The majority of reviews only considered randomised controlled trials. Two reviews used inclusion criteria to ensure that only trials with truly random allocation were included, such that prior knowledge of the next treatment is precluded (Antiplatelet Trialists' Collaboration 1994; Collins et al. 1988). The majority of reviews only considered data from trials with objective outcome measures (e.g. DVT was usually detected by radiolabelled fibrinogen, venography or both). Analyses done on an intention to treat basis were only reported in three reviews (Antiplatelet Trialists' Collaboration 1994; Collins et al. 1988; Leizorovicz et al. 1992).

C32. The occurrence of PE (both fatal and non-fatal) is rare and so it is difficult to identify significant differences in small studies. Even though DVT is more common, relatively large numbers are needed to be able to identify clinically significant differences between groups. In a review of 52 studies Leizorovicz et al. (1992) noted that none of the studies identified had a sample size sufficient to be able to detect a 30% risk reduction in DVT .

C33. There may also be questions of external validity for a number of trials, in that the patients included in the trial may not be representative of all types of patients, particularly those at high risk of venous thromboembolism. As one review pointed out: 'It is important to note that most clinical trials excluded patients with a history of either venous thromboembolism or clinically significant bleeding. Therefore, published results of efficacy and safety from these trials may not apply to patients judged as at especially high risk for either postoperative venous thromboembolism or bleeding.' (Clagett et al. 1995).

Results

C34. In a recent review of the prevention of venous thromboembolism in a number of different patient groups, Clagett et al. (1995) identify 19 trials of DVT prophylaxis following hip fracture surgery. The authors did not find any adequate studies of non-pharmacological prophylaxis measures (e.g. intermittent pneumatic compression). From their analysis they report studies of low-dose unfractionated heparin (two small studies), low molecular weight heparin (LMWH) (five studies), low intensity oral anticoagulant prophylaxis (five studies), and aspirin (three studies). The combined data for the different regimens all show substantial reductions in the relative risk of DVT compared to control/placebo (44%, 44%, 50% and 29% respectively), although the reduction in relative risk with aspirin is lower than the other methods. There is insufficient evidence to comment on the comparative safety of the different regimens. They did not identify any studies directly comparing LMWH with low-intensity oral anticoagulant prophylaxis. The authors conclude that 'either LMWH or low-intensity oral anticoagulants are preferable and treatment should be initiated pre-operatively as soon as the patient is judged to be in a clinically stable condition. Although this appears to be a thorough review, there is no methodology section explaining the way in which the analysis was undertaken. It would appear that to calculate the relative risk reduction, single treatment arms have been combined across trials, and then different prophylactic measures compared with placebo/control.

C35. The Antiplatelet Trialists' Collaboration (1994) undertook a review of randomised trials of antiplatelet therapy, splitting their analyses into three different areas one of which was the reduction in DVT and PE by antiplatelet prophylaxis among surgical and medical patients. Within this review 11 randomised controlled trials (964 patients) in traumatic orthopaedic surgery were identified for inclusion. Trials without true random allocation were excluded, as were trials where the treatment comparisons may have been confounded (thus comparisons of antiplatelet therapy versus other potential thromboprophylactic measures were excluded, although trials of antiplatelet plus anticoagulant regimens versus the same anticoagulant regimen alone were included). Ten of the 11 trials provided data to estimate the percentage odds reduction in DVT, which was statistically significant in favour of antiplatelet therapy (31% (SD 13%), 2p=0.02). The mean duration of antiplatelet therapy was two weeks. The absolute risk reduction in patients undergoing traumatic orthopaedic surgery was 60 patients per 1000 (SD 29). This compares to an overall reduction of 88 patients per 1000 (SD 14) for all surgery (2p<0.00001). All 11 studies provide information about pulmonary embolism, yielding a percentage odds reduction of 51% (SD 24, 2p=0.04). This compares to a highly significant overall reduction of 64% (SD 10, 2p<0.00001) for all surgery. The absolute risk reduction for traumatic orthopaedic surgery is 41 patients per 1000 (SD 14, 2p<0.005), again this corresponds to a mean duration of therapy of two weeks. There are not enough data available to determine which antiplatelet regimen is the most effective in terms of DVT or PE. No consistent measures of bleeding complications were available, but the available evidence suggests that the risk of significant bleeding was small. The authors conclude that 'It had previously been supposed that antiplatelet therapy did not influence venous thromboembolism [...]. These results indicate that antiplatelet therapy - either alone or, for greater effect, in addition to other proved forms of thromboprophylaxis (such as subcutaneous heparin) - should be considered.' This is a rigorous review, with clear details of the methodology used in the meta-analysis. The authors undertook a wide search to try and identify all relevant trials.

C36. Green et al. (1994) review the literature on LMWH, reporting four studies addressing its use in venous thromboembolism prophylaxis for hip fracture. Of the four studies, one compares two different doses of LMWH (QD vs. BID), one compares LMWH with unfractionated heparin (UFH), one with dextran, and one with placebo. For the study evaluating different doses, the total DVT prevalence was similar between groups, but the proximal DVT prevalence was significantly lower in the QD group (4.2% vs. 12.2%, p<0.005). Symptomatic PE did not occur in either group (total n=97). In the double-blind study comparing LMWH with UFH, total DVT was significantly less in the UFH group (43.7% vs. 20%, p<0.005), although the difference in proximal DVT was not significant (37.5% vs. 16.7%, p=0.059). Significantly more lung scans were

carried out in the LMWH group (6 vs. 0, p=0.016). In the double-blind study of LMWH compared to placebo, there were two phases to the study. In the second phase the dosage was increased threefold (from 100mg BID to 300 mg BID dermatan sulfate). In the first phase there was no significant difference in either total (65% vs. 51.4%) or proximal (40.5% vs. 29.7%) DVT. In the second phase, both results were significantly lower in the LMWH group (37.8% vs. 63.9% and 20.3% vs. 41.7% for total and proximal DVT respectively). The authors conclude that 'for patients with hip fractures, LMWH is more effective than dextran 70 and less effective than UFH 15,000 units per day'. Also, 'For hip fracture, the safety of LMWH compared to either UFH, dextran 70, or warfarin appears to be similar'. 'However the DVT prevalence for [...] acute hip fracture remains unacceptably high, and additional studies of LMWH in combination with other prophylaxis methods, such as external pneumatic compression, are needed.'

C37. Leizorovicz et al. (1992) undertook a meta-analysis to determine whether prophylactic treatment with LMWH reduces the incidence of thrombosis in patients who have had general or orthopaedic surgery. They identify 52 studies, 23 of which related to orthopaedic surgery, and four of which related specifically to hip fracture. The only trial comparing LMWH with placebo found a significant reduction in DVT in the LMWH group. Three trials comparing LMWH with UFH showed differing results, one reported a reduction, one no difference and one an increase in the number of DVT in the LMWH group compared to the UFH group. In all the studies, the sample sizes were not large enough to detect statistically significant differences in the relatively rare occurrence of PE or total mortality. Overall the authors conclude that the results 'suggest that low molecular weight heparins are more efficacious than unfractionated heparins for the prophylactic treatment of DVT and PE.' This is a thorough review with a good search strategy, clear inclusion criteria and analysis undertaken on an intention to treat basis. However, there are a few inconsistencies in the paper, reconciling the results presented in the tables with the text of the review.

C38. In a meta-analysis of clinical trials with LMWH in the prevention of post-operative thromboembolic complications, Lassen et al. (1991) looked at RCTs of LMWH in general and orthopaedic surgery, separately identifying acute hip surgery trials. Unfortunately no details of the search, inclusion criteria, or primary study details are given. They identified two studies comparing LMWH with placebo, and four studies comparing it with low dose heparin two or three times daily. Versus placebo they found a significant reduction in the odds ratio of 0.42 (95% CI: 0.23-0.77) for DVT. No clinical difference in bleeding was noted. For the studies comparing LMWH with low dose heparin they found a non-significant trend in favour of LMWH (0.77, 95% CI: 0.46-1.29). The authors conclude that 'in acute hip surgery,

thromboprophylaxis with LMWH is more effective than placebo, but equally efficient as LDH [low dose heparin]. However, more and larger studies are required in this group of patients to evaluate efficacy.' No details of the search strategy, or the methodology used in the meta-analysis are presented. Comparing the results with other reviews where meta-analysis was undertaken on an intention to treat basis, it would appear that the authors may have only included patients who completed treatment.

C39. In a review of thromboprophylaxis in patients undergoing major orthopaedic surgical procedures, Hirsh and Levine (1989) identify seven different prophylactic measures (aspirin, dextran, oral anticoagulants, low dose heparin, low dose heparin and dihydroergotamine (DHE), low molecular weight heparin, adjusted dose heparin). For both low dose heparin and DHE, and adjusted dose heparin only one study was identified. For low molecular weight heparin two studies were identified. The studies used in the combined analysis for the other measures are all for hip surgery. Few of them are for surgery for hip fracture and these are not analysed separately. The authors conclude that 'for studies comparing active prophylaxis with no prophylaxis, aspirin was relatively ineffective, while dextran, oral anticoagulants and low dose heparin were approximately equally effective, each being associated with a risk reduction of approximately 50 per cent.' Unfortunately no confidence intervals or p-values are given for the results, and no details of the search strategy or meta-analysis methodology is provided.

C40. In a meta-analysis of randomised controlled trials of peri-operative administration of subcutaneous heparin, studies are grouped into general, orthopaedic and urological surgery (Collins et al. 1988). Within orthopaedic surgery, eight randomised controlled trials (nine studies) relating to traumatic orthopaedic surgery were identified. The authors found 73/264 DVT in the heparin group compared with 123/251 in the control group, yielding a 64% reduction in odds ($p<0.0001$). They found no differences between different regimens, all were either every 8 or 12 hours, and duration was usually 7-10 days, or until ambulation. Due to the rare occurrence of PE, only overall figures for all types of surgery are given. There was a statistically significant reduction in both fatal and non-fatal PE for the heparin group compared with the control, but no difference in fatal haemorrhage or death due to other causes between groups. There was a statistically significant reduction in overall mortality. Reports of bleeding were incomplete and inadequate in many trials. There was an increase risk of bleeding in the heparin group (although once again these results are not split by type of surgery). The risk of bleeding did not depend on the frequency of treatment. The authors conclude that overall, the peri-operative use of subcutaneous heparin can prevent about one half of all PE and about two thirds of all DVT. Reduction in fatal PE was striking leading to a reduction in total mortality, and this finding holds across all types of surgery evaluated. This is a rigorous review, with clear inclusion criteria

and a thorough search strategy. Only those randomised controlled trials where allocation was truly random (i.e. investigators could not determine the treatment assignment before deciding whether to enter the patients) are included.

C41. Gent and Roberts (1986) carried out a meta-analysis of DHE plus heparin compared with heparin alone. They identified 17 studies, three of which related to orthopaedic surgery. The combined data resulted in a DVT risk reduction of 49% (p=0.004) in favour of combined therapy. However, only one of the three studies is specifically related to hip fracture, and the individual results of this study was a non-significant reduction of 21% (p=0.320).

C42. In their general review of venous thromboembolism prophylaxis Hull et al. (1986) conclude that 'in patients undergoing surgery for fractured hip, either warfarin or dextran provides effective protection against venous thromboembolic complications. At present, neither is widely used in this patient group due to the fear of bleeding complications. The risk of bleeding associated with warfarin sodium can be substantially reduced by using a less intense warfarin regimen. Patients who sustain a fractured hip are frequently elderly and are at particular risk for volume overload with dextran prophylaxis; in these patients, the less intense warfarin regimen is preferred.' However, these conclusions are not explicitly supported by the evidence.

C43. Two research projects in this area are currently in progress:

- A Cochrane Collaboration review evaluating prophylaxis against DVT and PE in hip fracture surgery
- The Pulmonary Embolism Prevention (PEP) trial.

C44. The first stage of the Cochrane Collaboration review is the comparison of heparin or mechanical prophylaxis compared with placebo or different combinations of prophylaxis. 'The objective of this systematic review is to present the best evidence for effectiveness and safety of thromboembolic prophylaxis in patients undergoing hip fracture surgery. The methods of prophylaxis reviewed will include systemic and oral anticoagulants, plasma expanders, antiplatelet agents, anaesthetic techniques and mechanical methods. The main outcomes of interest will be: confirmed deep venous thrombosis, confirmed pulmonary embolism, death within six months of surgery or due to confirmed pulmonary embolism, complications associated with the prophylactic agent (wound haemorrhage, haematoma or infection), other local side effects, systemic side effects and the development of the post-phlebitic limb. The length of hospital stay will also be considered. Though each trial report will be reviewed for data which would allow economic evaluation, these will not be assessed as an outcome measure in the first instance.' (Gillespie et al. 1995).

C45. The Pulmonary Embolism Prevention Trial is a randomised placebo-controlled trial of the effects of low-dose aspirin on mortality and major morbidity in patients with hip fracture. The trial 'aims to determine really reliably whether any beneficial effects of aspirin on mortality and major morbidity outweigh any risks, such as serious bleeding, when used in patients with hip fracture' (Pulmonary Embolism Prevention Trial Office 1993). To date (since the beginning of 1995), 7,000 patients have been recruited into the trial, the aim being to recruit 14,000 patients overall by the end of 1997.

Conclusions

C46. All of the reviews examined concluded that thromboprophylaxis was effective, although for some reviews the conclusions are based on combined analyses of all orthopaedic surgery trials. In those reviews which reported analyses for the differing patient groups, there are variations between the groups. In general, there were fewer trials of patients with hip fracture and more of patients undergoing total hip replacement. However, in those reviews in which comparison was possible, the results of hip fracture trials were qualitatively similar to others, although the effect size was smaller for some.

C47. Given the relatively small number of trials for hip fracture patients, it is not clear from the reviews what the preferred prophylactic method is. There may be additional concerns about bleeding complications for elderly patients with hip fracture who may be more at risk. The data on bleeding complications is often incomplete and inconsistent between studies, further research is required to clarify the relative risk of complications for the different prophylactic measures. In reviews which compared a number of treatments, there was no consistently clear difference between methods, with the exception of aspirin. In reviews which assessed aspirin, it was less effective than other methods, although in the one review on antiplatelet therapy, the therapy was found to be effective compared to placebo. The authors of this review suggest that for greater effect aspirin could be combined with other prophylactic measures (Antiplatelet Trialists' Collaboration 1994).

C48. Unfortunately no evidence was identified evaluating the effectiveness of non-pharmacological prophylactic methods (such as intermittent pneumatic compression, graduated compression stockings or foot pump). However, a number of authors have identified this as a potentially useful prophylactic method which requires evaluation (e.g. Clagett et al. 1995; Green et al. 1994).

C49. Thus, the evidence supports the use of thromboprophylaxis, although the precise method is not clear. Unfortunately, only a small proportion of studies included in the identified reviews relate to patients with hip fracture. These patients may be at high risk of the side-effects of thrombotic drugs (e.g. bleeding). However, little consistent information on side-effects is available. Further evidence is required on the bleeding complications of the various thrombotic agents, and on the effectiveness of non-pharmacological methods.

THE ORGANISATIONAL FRAMEWORK OF SERVICES

Introduction

C50. The aim of this section is to evaluate the effectiveness of different organisational frameworks of services for patients with fractured neck of femur. The search did not identify any studies which only looked at different methods of treatment prior to surgery. The identified studies focus on schemes for post-operative care, although many such schemes encompass pre-operative factors (e.g. pre-operative assessment, early surgery). There are three broad types of post-operative organisation examined in the literature apart from conventional inpatient care; early discharge to home or community, specialist in-patient rehabilitation (with geriatrician supervision), or transfer to nursing homes early after surgery.

Quality of available evidence

C51. Only one review was identified which looked at different methods of organising care (Kennie and Reid 1990), although there is a Cochrane review ongoing in this area (see paragraph C60). All the other studies identified are primary studies, the designs of which vary from randomised controlled trials to basic descriptions of schemes that have been set up. In general, the trials are not rigorous, tending to have relatively small sample sizes and varying outcome measures.

Results

C52. A brief narrative review of post-operative and rehabilitative care in elderly women with fractures of the proximal femur was identified (Kennie and Reid 1990). The review is not methodologically rigorous, with no detail of any search strategy, no methodology, and little if any detail of the primary studies referred to. The authors examine four different models of after-care: orthopaedic in-patient, hospital-at-home care, shared care, and nursing home care. They report that conventional care in orthopaedic wards may result in a longer length of stay, a reduction in functional outcome, an increase in

mortality, and a reduction in patients being discharged to independent living (based on evidence from a randomised controlled trial and annual follow-up undertaken by the authors and colleagues (Kennie et al. 1988; Reid and Kennie 1989). Hospital-at-home schemes, which emphasise close links between the hospital and community, and good discharge planning with increased support and rehabilitation, have reported reduced length of stay, although the impact on patients and carers quality of life has not been evaluated (see Pryor et al. 1988; Sikorski and Senior 1993, described below). However, such schemes are only available for selected patients (e.g. those with carers and no cognitive impairment). The limited evidence about the impact of collaboration between orthopaedic and geriatric medicine, suggests that length of stay maybe reduced, but little has been done to evaluate patient outcomes. Two possible models of shared care are presented; one where geriatricians provide consultancy but the patients stay on the orthopaedic ward under the care of the orthopaedic surgeon, and the other where patients are transferred to geriatric or rehabilitation wards, with the care largely undertaken by the geriatrician. There are no comparisons of these two models, but the randomised controlled trial and annual follow-up undertaken by the authors and colleagues provides evidence that the second model is effective in regaining independence, and reducing length of stay (see Kennie et al. 1988; Reid and Kennie 1989, described below). Finally, placing patients in nursing homes for rehabilitation leads to a reduction in length of stay, but also a reduction in discharge from nursing homes. The amount of GP contact in homes is very variable, and the authors emphasise the need for consultant supervision of rehabilitative after-care. The authors highlight the general principles of rehabilitative care, but with little evidence to support their guidance. The principles include: early mobility, functionally orientated personal care, therapy, psychological support, case management, planning for discharge and secondary prevention (Kennie and Reid 1990).

C53. Kennie et al. (1988) undertook a non-blinded randomised controlled trial allocating 108 patients to post-operative collaborative care between orthopaedic surgeons and physicians in geriatric medicine (treatment group), or routine orthopaedic care (control group). Patients were elderly women with proximal femoral fractures, excluding those who died before the trial, with pathological fracture, who would be discharged within seven days of starting the trial, and those unfit for transfer to a peripheral hospital. At discharge, significantly more patients in the treatment group were independent in terms of activities of daily living and had a shorter length of stay (24 days compared with 41 for the control group, 95% CI for difference: 2-25). Significantly fewer intervention patients were discharged to institutional care (10% vs. 32%, 95% CI for difference: 6-37%), and more to their own homes (63% vs. 38%, 95% CI for difference: 6-44%) compared with the control group. This was consistent across a range of ages and mental states. The authors conclude that 'both hospital and patient benefited when post-operative rehabilitation was provided

in a setting specialising in such care for elderly patients with trauma'. At one year follow-up Reid and Kennie (1989) reported that 67% (95% CI: 60-75%) of the control group and 81% (95% CI: 71-92%) of the treatment group were still alive. Compared to the control group, significantly more women in the treatment group were more independent in comparison with their pre-fracture state. 69% of the treatment and 39% of the control group were living in the same place as before the fracture, 6% and 13% respectively have moved into institutional care. No differences were found between the groups in life satisfaction or strain on carers.

C54. Gilchrist et al. (1988) conducted a randomised controlled trial to evaluate the effectiveness of a designated orthopaedic geriatric unit in women patients over 65 years of age with hip fractures. 97 patients randomly assigned to a designated orthopaedic geriatric unit one year after it had been established, were compared with 125 patients assigned to orthopaedic wards. The authors found no difference in mortality, length of stay or discharge placement between groups. More untreated medical conditions were recognised in the unit compared to the orthopaedic ward. The results are 'contaminated' by the use of the same health care professionals between the two sites, which may underestimate the effect of the designated unit. The authors conclude that the unit is as effective as the orthopaedic ward, and can be administered at no greater cost.

C55. Pearson et al. (1988) evaluated the impact of a 16 bed elderly care nursing unit established within a large hospital, to care for patients with fractured neck of femur, cerebrovascular accident or amputation of a lower limb. The unit was set up specifically for the study, and eligible patients were randomised to the unit or control group ('normal pathway' in an acute hospital ward or community hospital). Patients in the unit were significantly more independent, received better nursing, were more satisfied, less likely to die and more likely to be discharged to their own home. However, although the majority of deaths were patients with cerebrovascular accident, most results were not split by patient category and so it is difficult to tell the outcomes of those patients with fractured neck of femur.

C56. The Peterborough hospital-at-home (HAH) scheme aims to provide rapid effective surgery combined where possible with early discharge for home rehabilitation. 200 consecutive patients admitted to hospital with hip fracture (over a ten month period from 1986) were followed (Pryor et al. 1988). Patients were classified into three groups: (1) those suitable for early discharge living in the HAH catchment area; (2) those suitable for early discharge living in areas not covered by HAH; and (3) those who needed rehabilitation in hospital because of infirmity, coexisting medical conditions, or residence in nursing home accommodation. 55% of patients were judged to be suitable for early discharge, 28% were discharged to the HAH (group 1), 23% to group 2

(4% of patients were excluded). The average hospital stay of group 1 was 8.2 days (range 3-18) with on average 8.8 (2-21) days in HAH care. The hospital stay of all patients discharged directly home was reduced from an average of 22 days in 1985 (when the present scheme was unavailable) to 14.6 days in 1986-87. More recently, Hollingworth et al. (1993) evaluated the economic impact of the same scheme in a population study of approximately 1,000 patients, comparing those patients for whom HAH was available with those for whom it was not. About 40% of patients were suitable for HAH, and the total direct cost of HAH was significantly lower. The authors concluded that HAH leads to lower direct costs despite higher administration cost, largely because of the increased throughput in orthopaedic and geriatric wards. However, for this to be a benefit, use needs to be made of the freed beds. This study reported a significantly higher re-admission rate for HAH patients compared with non-HAH patients. This finding was also reported in another study in Derbyshire, although in that case the increase was not significant (O'Cathain 1994).

C57. In a recent case-control study of a hospital at home scheme for the early discharge of patients with fractured neck of femur, the scheme was found to be equivalent to hospital care in most outcomes, but better on emotional status of the patients (O'Cathain 1994). Approximate costings hint at the reduced cost of the scheme, but full costs were not evaluated. However, the study design is not rigorous, as the control group was very small and potentially biased (they were considered suitable for hospital at home care, but either the GP, patient of carer refused, or the accommodation was not suitable).

C58. Todd et al. (1995) undertook an audit of all eight hospitals in East Anglia, relating process to patient outcomes. They constructed the following measures of good practice based on a regional consensus conference and Royal College guidance: multidisciplinary management, pre-operative assessment of health and social circumstances, post-operative planning within four days, early mobilisation, prophylactic anticoagulants and antibiotics, and outcome assessment (mortality/morbidity). One of the eight hospitals had a significantly lower mortality rate than the others, and the authors conclude that the audit results suggest that an overall package of care, using a multidisciplinary approach may reduce mortality.

C59. Sikorski and Senior (1993) describe the results of the Domiciliary Rehabilitation and Support Program (DRSP), an intensive program for patients with fractured neck of femur. The principles of the DRSP are: early surgery (same day where possible), rapid mobilisation (within five hours of surgery), sedation avoidance,early discharge with physiotherapy and nursing support in the home. The authors report a prospective study of 615 patients aged 60 and over, and find that length of stay was reduced to 18.9 (±27.3) days compared

to 28 days in the previous year. Morbidity and mortality were equivalent to other reported series. The program resulted in additional costs due to the extra staff required, but large savings were made in the ward costs through reductions in the length of stay. Overall there was a financial saving to the hospital of 15%. From this the authors conclude that such a program is safe and effective. However, this is only a descriptive study with no control group.

C60. A Cochrane review evaluating the effectiveness and cost effectiveness of various models of post-surgical after-care of elderly patients with proximal femoral fracture is in progress, but the results are not yet available. "In the first instance it will review the impact of specialised in-patient rehabilitation under the auspices of a collaborating 'geriatric' or 'care of the elderly' department. One version of this type of after-care is known as a geriatric-orthopaedic rehabilitation unit or GORU. At a later stage, as randomised controlled trials become available and are identified, this review will also try to assess the impact of the following strategies:

- early discharge from hospital to support, rehabilitation and after-care in the patient's, or a carer's, home in the community. These schemes are variously known as 'rapid transit', 'early supported discharge' or 'hospital at home' schemes.
- placement in nursing home for rehabilitative care in the recovery phase after hip fracture." (Madhok et al. 1995).

Conclusions

C61. There is not enough evidence available in the literature to identify precisely specific organisational forms of care which are most effective in the treatment of patients with fractured neck of femur. It seems that a multidisciplinary approach which focuses attention on the outcomes of patients may reduce length of stay, but evaluations related to quality of life measures are scarce. Also, for a number of possible frameworks identified, only a subset of patients are suitable for such schemes (e.g. hospital-at-home). However the number of patients for whom such schemes are appropriate varies between studies.

C62. The available research evidence does not support the use of measures of organisation of care as a process proxy for good outcome.

APPENDIX D: METHODS FOR CHOOSING INDICATORS

D1. Candidate outcome indicators were identified by the Group with the help of the following:

- the health outcome model for fractured proximal femur (see Section 2)
- various classifications of the characteristics of outcome indicators.

D2. The Group noted that indicators may be related to:

i. environmental factors in the general population or relating to the individual
ii. knowledge, attitudes, behaviour in the general population
iii. knowledge, attitudes including satisfaction with service delivery, behaviour of individual patients with FPF
iv. patients' symptoms, function, health status, well-being
v. patients' clinical state
vi. patients' pathological/physiological state
vii. events occurring to patients as the endpoints of earlier occurrence of disease and/or interventions such as contacts with general practitioners, issuing of prescriptions, out-patient visits, in-patient admissions and death.

D3. The data sources for the indicator entities noted in paragraph D2 will differ. It is likely that:

- indicators for (i) and (ii) would come from population surveys
- indicators for (iii) and (iv) would come from patients either opportunistically or when specifically called
- indicators for (v) and (vi) would come from doctors and other health workers
- indicators for (vii) would come from administrative information systems.

D4. The Group recognised the high cost and complexity of obtaining information from continuous data collection systems. Particular consideration was given to obtaining outcome indicator data from sample survey techniques such as a periodic survey when it is not essential to have continuously collected information.

D5. Four characteristics of an outcome indicator have been identified and each has been classified. They are:

- measurement perspective, relating to whose perspective the indicator is most relevant (see paragraph D6)
- specificity (see paragraph D7)
- measurement timeframe (see paragraph D8)
- outcome relationship, in that the indicator is either a direct or an indirect, proxy measurement of outcome (see paragraph D9).

D6. For the Group's purposes, measurement perspective was classified as that from the patient's, the clinical, or the population's viewpoint. In the treatment of fractured femur, for example, a measure of quality of life may be most relevant to the patient's perspective while clinical concerns may properly focus on signs of radiological healing. The population perspective has a broader view, best addressed by measures able to assess the burden of the disease as a whole. Of course, these perspectives are not necessarily in opposition and will often be associated with shared goals. Where possible, a set of indicators should be developed which satisfies all three measurement perspectives.

D7. The specificity of an indicator relates to whether it is specific or generic in application. For example, non-union of the femur is specific while the measurement of mobility is much less so and would be influenced by a number of conditions. Condition-specific indicators have the advantage that their relative insensitivity to other conditions is likely to increase their sensitivity to changes in the condition of interest. Generic measures provide outcomes relevant to a wide range of conditions. A comprehensive indicator set might contain examples of both generic and specific indicators.

D8. The measurement timeframe relates to whether the indicator is:

- cross-sectional and thus an indicator at a single point in time for any one individual
- longitudinal measure of progression over time for any one individual.

D9. The Group's main task has been to develop direct indicators of health outcome although in many areas it may be difficult to identify or obtain such information. However, it is recognised that some care processes are so closely related to the production of benefits that the successful completion of the intervention might be used as a proxy measure of the actual outcome. In the absence of direct outcomes, proxy indicators have therefore been developed.

D10. There is increasing recognition of the importance of outcome measures derived from data generated by patients. For the purposes of the Group's work, three main areas of interest have been identified:

- impact of the condition on the patient
- satisfaction of the patient with the care provided and/or outcome achieved
- awareness of the patient of the management of the condition, and services available.

D11. With the assistance of the check-lists and a knowledge of the disease supplemented by commissioned work, the Group addressed the following key questions:

- What are health professionals trying to achieve for each patient?
- What can each patient realistically expect will be achieved for him/herself?
- What should be achieved for the population as a whole in respect of the prevention and treatment of the condition.

APPENDIX E: GUIDANCE NOTES FOR CANDIDATE INDICATOR SPECIFICATIONS

Indicator title

A short title to identify the indicator.

Intervention aim

Distinguishes the level of intervention for which the indicator is primarily developed. It is assumed that, for a given condition, an ideal set of indicators would be reasonably balanced across the spectrum of health intervention stages. For fractured proximal femur these stages are:

- reduce or avoid risk of fracture
- reduce or avoid risk of death
- reduce or avoid risk of complications
- restore function and well-being including reduction of:
    - impairment
    - disability
    - handicap.

Characteristics

Classifies the indicator on four dimensions:

- Specificity: *condition specific or generic.*
- Perspective: *population, clinical or patient.*
- Timeframe: *cross-sectional* measure or a *longitudinal* assessment of change.
- Outcome relationship: whether it is a *direct* measure of outcome or an *indirect* measure of structure or process, used as a proxy for outcome.

Indicator definition

In addition to a definition of the variable of interest, the description specifies:

- how the variable is to be aggregated across cases, e.g. definitions of both a numerator and a denominator
- if a variable is to be reported with respect to a set of denominators, e.g. mortality broken down by age and sex
- if appropriate, how longitudinal change in the variable is to be represented, e.g. over what time interval and whether absolute difference or proportional change.

Rationale

A brief statement of the reasons and objectives behind the indicator, both in terms of the issues it addresses and its selection from a range of potential alternatives.

FPF definition

A single definition of FPF has been used as shown in paragraph 2.1. Its application is affected by the rationale, location of incidence and data sources used and these factors are addressed in each indicator definition.

Potential uses

The following classification has been used:

- local management of practice
- local audit
- provider based comparisons
- population based comparisons
- assessment of regional/national trends or progress towards targets.

It is recognised that a given indicator may serve several purposes. Indicators that are valuable for the management of individual patients are likely to have practical advantages with respect to data collection in a clinical setting. However, in order for such indicators to be useful for other purposes, a method of aggregation across cases must be specified for the variable of interest.

Potential users

The following classification has been used:

- clinicians
- provider management
- commissioners
- national/regional policy makers
- consumers/public.

Possible confounders

This section has attempted to identify the population risk factors likely to influence the outcome indicator, and therefore useful in its interpretation. Where such factors are well defined and have a clear or potential association with the outcome of interest, they may be used to specify denominators to be included in the indicator definition itself.

Data sources

Where possible, existing sources of data have been identified for deriving the indicator and the degree to which complete coverage of the population of interest would be obtained has been noted. Where data are not widely available from existing systems, suggestions for new methods of data collection, capable of wide implementation have been made.

Data quality

While the theoretical capabilities of existing and proposed information systems are outlined above, the actual or expected limitations of those systems - in terms of their completeness and accuracy etc. - are noted in this section.

Comments

General comments regarding the indicator's definition, validity, practicality etc.

Further work required

Suggestions about the additional research and development work required to complete the indicator's specification to a level appropriate for large scale piloting.

Conclusion & priority

A statement indicating the Working Group's assessment of the priority for implementation.

References

Appropriate references used in the construction of the indicators.

APPENDIX F: REFERENCES

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