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CATARACT

Report of a working group
to the Department of Health



health

Outcome

indicators

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.

Azim Lakhani (Director - National Centre for Health Outcomes Development)

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This report may be referenced as follows:

Rosenthal R, Goldacre M, Cleary R, Coles J, Fletcher J, Mason A (eds). ~~Health Outcome Indicators: Cataract. Report of a working group to the Department of Health.~~ Oxford: National Centre for Health Outcomes Development, 1999.

OUTCOME INDICATORS FOR CATARACT

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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 fully specified in a standard format and are included in this Report. Outcome indicators, whole numbers correspond to the specifications in Section 4, were grouped under three headings relating to the aims of the interventions.

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

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

Category	Page	
		<i>Indicators related to reduction/avoidance of adverse effects of inappropriate delay in diagnosis/treatment.</i>
		Cataract extractions:
A	22	1. rate per 10,000 population.
		Time spent on the waiting list for elective surgery:
A	32	6. median and inter-quartile range.
		Duration of wait from GP referral to out-patient appointment:
B	30	5. median and inter-quartile range.
		Visual acuity:
B	34	7a. distribution at referral to a consultant ophthalmologist
B	34	7b. distribution assessed pre-operatively.
		Visual function:
C	39	9a. median and inter-quartile range at referral to ophthalmologist
C	39	9b. median and inter-quartile range assessed pre-operatively.
		Rate of referral to a consultant ophthalmologist:
D	26	3. per 1,000 GP population.
		Rate of referral to a general practitioner:
E	28	4. per 1,000 NHS eye tests.

Screening:		
E	24	2a. the percentage of general practitioners who achieve target rates for annual screening of all patients over 75 years old
E	24	2b. the percentage of general practitioners who achieve target rates for annual screening of all patients over 75 years old living in residential or nursing homes.
General health status:		
E	54	15a. summary measure at referral to ophthalmologist
E	54	15b. summary measure assessed pre-operatively.

Indicators related to complications following surgery.

Capsulotomy rate:		
A	50	13a. one year post-operatively, per 1,000 cataract extractions
A	50	13b. five years post-operatively, per 1,000 cataract extractions.
Post-operative complications:		
B	45	11a. rate of complications detected prior to discharge from hospital
B	45	11b. rate of complications detected between discharge and first out-patient appointment
B	45	11c. rate of complications detected following first out-patient appointment and within four months of the procedure.
Unplanned re-admissions:		
B	48	12. re-admission rate for care of the operated eye within 30 days of cataract surgery.
Referral rate within five years of cataract surgery:		
C	52	14. for investigation and care of the operated eye.

Indicators related to return of function after surgery.

Visual acuity:		
B	34	7c. distribution at one week post-operation
B	34	7d. distribution at four months post-operation
B	37	8a. summary of changes, comparing pre-operative values with those of four months post-operation
C	34	7e. distribution at five years post-operation
C	37	8b. summary of changes, comparing pre-operative values with those of five years post-operation.

Visual function:		
C	39	9c. median and inter-quartile range at four months post-operation
C	39	9d. median and inter-quartile range at five years post-operation
E	43	10a. summary of changes, comparing pre-operative values with those of four months post-operation
E	43	10b. summary of changes, comparing pre-operative values with those of five years post-operation.
General health status:		
E	54	15c. summary measure at four months post-operation
E	58	16. summary measure of changes, comparing pre-operative values with those of four months post-operation.
Patient knowledge:		
E	60	17. summary of a measure of post-operative self-management.
Patient satisfaction:		
E	62	18. summary of a measure of patient satisfaction.

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 for 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.

Cataract 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 cataract.

1.7 The work of the Group had three main components:

- development of check lists including a health outcome model for cataract to assist members 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
- check lists for choosing candidate indicators are outlined in Appendix C
- guidelines for specifying candidate indicators are described in Appendix D
- 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 E.

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.

- 1.11** There are a few indicators for cataract, which should be available generally on a routine basis. There are others which should be available from periodically undertaken sample surveys and/or from work undertaken by commissioners, providers and consumers with a particular interest in the condition. For recommendations in this category, there is merit in the establishment, on a sample basis, of indicator values which could then be used in a number of ways. First, they could be used to monitor progress over time. Second, where appropriate, they could be used to determine the extent of geographical variation. Third, they could be used as 'benchmark' values against which local surveys could be compared. For all these purposes there is considerable value in using indicators which have definitions and measurements in common.
- 1.12** Some of the indicators described in this Report are firmly based in the experience of those involved with cataract care. Others are put forward more speculatively. As with all indicators when they are implemented, it is essential that work is undertaken to assess their validity, use and usefulness.

2. HEALTH OUTCOME MODEL FOR CATARACT

Definition and scope of the work

- 2.1** A cataract is defined by the loss of the normal transparency of the lens of the eye. This loss of transparency may occur for a number of reasons. The most common is associated with ageing and the Group addressed only the problems of age-related cataract.
- 2.2** The diagnosis of age-related cataract is based on the presence of a lens opacity, after other causes of cataract have been excluded, which either impairs visual function or prevents inspection of or treatment to the retina when required. The majority of such cataracts occur after the age of 50 years. However, for the purpose of our work no age cut off has been specified as to do so would exclude or include some cases inappropriately. Within each candidate indicator, where appropriate, the indicator will be specified in age bands.

Developing a health outcome model for cataract

- 2.3** The greater part of the input to the development of the cataract outcome model came from already published national work including:
- *Health care needs assessment for cataract surgery*, one of the 19 reviews commissioned by the Department of Health (Williams et al. 1994)
 - *Guidelines for cataract surgery* (Royal College of Ophthalmologists 1995)
 - *Management of cataract*, an Effective Health Care Bulletin (1996) published by Leeds and York Universities.
- 2.4** The health outcome model was developed as an aid to help Group members identify potential indicators. The model contains four main elements:
- an overview of the epidemiology of the condition
 - a review of causes and risk factors
 - a review of the course, complications and consequences
 - a review of relevant interventions.

Overview of epidemiology

- 2.5** It is estimated that over 50% of blindness world-wide is due to cataract (Williams et al. 1994). In the UK, cataract is an important cause of visual impairment in the later years of adult life. Three issues underlie any review of the epidemiology of cataract:
- The clinical prevalence of cataract (based on patients who present to medical care) is different from the survey-based prevalence of cataract defined epidemiologically (based on, say, screening an unselected population).

- The definition used for cataract will profoundly affect incidence and prevalence figures. One way of defining cataract is morphological, describing the size, shape, density and location of lens changes. However, the presence of lens opacity may not always result in significant visual impairment and, commonly, definitions of cataract specify that lens changes be accompanied by a reduction in visual acuity.
- The populations used in some epidemiological studies have been selected groups which may not represent the general population.

2.6 Estimates of the *prevalence* of cataract are variable but do show that it increases with age. The prevalence of 'senile cataract' in people in the Framingham Eye Study (Kahn et al. 1977) was 42% in people aged 52 - 64 and 91% in people aged 75 - 85. However, the addition to the definition of a modest visual deficit, of Snellen 6/9 or worse, reduced the prevalence in the oldest age group from 91% to 46%. A British study in a Leicestershire town (Gibson et al. 1985) estimated the prevalence of cataract to be 42% in people aged 76 - 84 rising to 65% in people over the age of 85. In this study the definition of cataract included visual acuity of 6/9 and worse and excluded all cataracts which could be ascribed to congenital or secondary causes.

2.7 The population *incidence* of cataract has not yet been determined by observational studies. Attempts have been made to estimate the annual incidence of cataract from prevalence data.

2.8 The volume of cataract surgery in NHS hospitals has steadily increased since 1975: for example, surgical rates have doubled in the 65 - 84 year age group and almost tripled in adults aged 85 years and over. In both groups operation rates continue to increase. There is evidence of striking variation in standardised surgical rates between English health district resident populations (Williams et al. 1994).

Causes and risk factors

2.9 Children may have cataract as a result of hereditary disease or because of trauma or intra-uterine infection such as rubella. Cataract may be a consequence of a clinical syndrome or disease such as Down's Syndrome, juvenile diabetes mellitus, galactosaemia, Lowe's Syndrome or hypoparathyroidism.

2.10 In adults the aetiology of cataract includes physical, mechanical and chemical insults, some of which may be related to occupation, and this damage may be cumulative over many years.

2.11 Increased age is the most important association with cataract formation in adults. There is some debate whether it is ageing, as such, which causes cataract or whether the process is more complicated and related to the exposure to multiple risk factors interfering with normal regeneration mechanisms. Diabetes is an important risk factor in people under the age of 60 years and carries a relative risk of three or four times that of the non-diabetic population. Several drugs have the potential to cause cataract, the most important of these being steroids. It is possible that paracetamol and non-steroidal anti-inflammatory drugs are associated with a decreased risk of cataract formation but the evidence for this is weak at the moment (Williams et al. 1994).

2.12 Glaucoma has been recognised for several decades as being associated with cataract formation in some people. The relationship is stronger in older age groups. It is also possible that surgery for glaucoma may cause cataract.

2.13 The most important known risk factors for cataract are diabetes mellitus, myopia, glaucoma and medication with steroids. However, in combination these probably account for less than a third of cataract seen in the general population (Williams et al. 1994).

Clinical course, complications and consequences

2.14 Symptoms will depend on the positioning and degree of density of the cataract. They include:

- blurred vision and loss of low frequency contrast perception
- glare caused by diffraction of bright light, which may occur in the presence of normal visual acuity
- difficulty in reading in low light conditions or in reading small print
- changes or abnormalities in colour perception or colour contrast
- distortion of visual image which may be described as 'double vision'
- rapid change of refraction or difference in refraction between the two eyes.

2.15 The handicap resulting from impaired vision will vary between patients. For someone whose employment depends on good vision the effects may be devastating, with loss of income and self esteem. An old person living alone may be unable to go shopping or maintain the household and so lose independence. Others may find their greatest handicap is interference with recreational activities such as reading or watching television. For a given level of visual impairment, some people find that their quality of life is less affected than others.

2.16 Once a cataract has developed, the lens tends to become progressively more opaque. Studies have shown that at least 20% of cataracts get worse over the course of a year and 65% worsen over five years. Progression rates vary with the site of the opacity and the patient's age. Most people with cataract, if left untreated, will eventually become seriously visually disabled (Effective Health Care Bulletin 1996).

Relevant interventions

2.17 The Group reviewed the relevant interventions for cataract using the following classification of the types of intervention aimed to:

- reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment
- avoid complications following surgery:
 - short term
 - long term
- assure return of function after surgery:
 - short term
 - long term.

2.18 Non-surgical interventions have not yet been shown to be effective in the treatment or prevention of cataract. It is possible that dietary carotenoids and long term vitamin C supplementation may decrease development of cataract. Dietary supplements with vitamin E are the subject of current research.

2.19 It is likely that patients who experience visual impairment sufficient to interfere with their quality of life will consult a health professional. However, some patients tolerate greater degrees of visual impairment than do others, without much impact on their daily life. Thus, vision screening for age-related cataracts may not yield much health benefit in the population as a whole.

2.20 The main intervention to treat cataract is surgery. Cataract extraction surgery was introduced in 1745 by Daviel (Wenzel 1989) and has become one of the most frequently performed surgical procedures throughout the world. It is an effective method of restoring unimpeded light transmission to the retina. However, the benefit that patients receive will depend upon:

- level of visual impairment and functioning before surgery, and the indications for surgery in that particular patient
- surgical procedure used
- method of aphakic correction
- complications of surgery.

Patients' satisfaction with the outcome of surgery may also be influenced by their expectations, and by information (or lack of it) given to them about how much can realistically be achieved for them. Patient factors such as co-morbidities may also be important.

- 2.21** Once a patient has presented with visual symptoms due to cataract that are amenable to surgery, and has decided with a surgeon that surgery is appropriate, then any delay in treatment will result in a delay in health benefit. While waiting for surgery, the seriously visually impaired patient is at an increased risk of accidents as well as suffering reduced quality of life.
- 2.22** The criteria for surgery are related to patients' symptoms (see paragraph 2.14), deterioration in visual function and acuity and cataract morphology. There is wide variation in how these criteria are taken into account and the relative weighting given to them. It is likely that with advances in surgical technique and the increasing use of intra-ocular lenses that the indications for cataract surgery have changed over time (Williams et al. 1994).
- 2.23** Bilateral cataract were present in 12% of adults aged 65 years and over in the Framingham eye study. Patients with bilateral cataract perceive their overall visual function to be an average of that in each eye. There is evidence to suggest that while operating on one eye may improve visual acuity in that eye, patients remain disappointed with their overall visual function until the cataract is removed from the second eye (Effective Health Care Bulletin 1996).
- 2.24** Operative techniques include:
- Standard extra-capsular cataract extraction (ECCE) where the posterior capsule is left in situ and the lens is removed intact with the remaining cortical material aspirated.
 - Phacoemulsification, which breaks up the nucleus with ultrasound so that it and the rest of the lens can be removed through a thin cannula.
 - Intracapsular extraction which involves the removal of the entire lens within its capsule. This technique is generally thought to have no role in routine surgery nowadays.
- 2.25** The two common techniques have a different pattern of post-surgical complications as shown in Exhibit 1.
- 2.26** Cataract surgery has been shown to be highly effective in improving visual acuity (Williams et al. 1994), particularly so following the introduction of intra-ocular lenses. There is little published information about the practical benefits to patients in terms of quality of life or function in the community. Improvements in social functioning are not always due wholly to change in vision but may be due partly to improvements in the mental and emotional state of the patient after surgery.

2.27 Some degree of post-operative astigmatism occurs after cataract surgery and will depend on wound size, surgical closure and technique.

EXHIBIT 1: COMPLICATION RATES OF CATARACT SURGERY

Timeframe	Complications	Complication rates (%)	
		Phacoemulsification	Standard ECCE
Peri-operative	Capsular tear	6-9	3-9
	Vitreous loss	1.5-5.5	1.1
	Nuclear loss	0.25-5.8	No data
Short term	Endophthalmitis	0.1	0.07
Long term	Posterior capsular thickening	20	16-50
	Retinal detachment	0.7	0.1-0.8
	Raised intraocular pressure	No data	2.3
	Cystoid macular oedema	1.5-5.0	0.8-1.2

Rates from Royal College of Ophthalmologists 1995; Schein et al. 1994; Powe et al. 1994; Javitt et al. 1994; Seward et al. 1993.

2.28 Intra-ocular lens implants are now the treatment of choice in the majority of patients on the basis of costs, patient comfort and convenience. If an intra-ocular lens implant is not possible then aphakic correction may be achieved by spectacles or contact lenses. Spectacles are the least invasive of these three but lenses have to be thick and heavy. They result in a poor angle of vision and a quite noticeable magnification of a corrected image. This last factor makes stereoscopic vision difficult except where both eyes are operated upon. Wearers of contact lenses suffer this problem less as image enlargement is only 10%. However, many elderly patients have difficulty with contact lenses because of inadequate tear production, infection, and difficulty in manipulating the lenses.

3. CHOICE OF CANDIDATE INDICATORS

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

- aims of interventions (see paragraph 2.17)
- perspectives of measurement (see paragraph C.6).

3.2 For each part of the matrix, consideration was given to possible indicators. The following paragraphs describe which indicators were chosen, grouped together by the aim of the health intervention. The numbers in the text relate to the Exhibit and to the indicator specifications in Section 4.

3.3 Identification of the **adverse effects of delay** involved consideration of measures of the occurrence and detection of cataract, eye testing, waiting times, visual deficiency and health status.

3.4 The indicator of occurrence of treated cataract that was specified was:

1: rate of cataract extractions per 10,000 population.

This indicator relates to patients whose symptoms from cataract were sufficiently severe for them to consult with health services and for them to have an operation.

Aim of health intervention	EXHIBIT 2: MATRIX FOR CATARACT OUTCOME INDICATORS		
	Primary measurement perspective Population	Clinical	Patient
* Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment	1,2a,2b 3,4	5,6,7a,7b	9a,9b
* Avoid complications of surgery in the short term	13a	11a,11b 11c,12	
* Avoid complications of surgery in the long term	13b	14	
* Assure return of function after surgery in the short term		7c,7d 8a,17	9c,10a,15c 16,18
* Assure return of function after surgery in the long term		7e,8b	9d,10b

3.5 Although little can be done to prevent cataract at the moment, timely and accurate diagnosis may avoid unnecessary delay in treatment. The following candidate indicators relating to early detection were specified:

- 2a:** percentage of general practitioners who achieve target rates for annual screening of *all patients over 75 years old*.
- 2b:** percentage of general practitioners who achieve target rates for annual screening of those *patients over 75 years old living in residential or nursing homes*.
- 3:** rate of referral to a consultant ophthalmologist per 1,000 general practice population.
- 4:** rate of referral to a general practitioner per 1,000 NHS eye tests.

We acknowledge that these are fairly non-specific for cataract but took the view that it would be unrealistic to recommend collection of data specifically on cataract. Data for the indicators are in principle available within the NHS. Low rates may indicate reduced opportunities to detect cataract.

3.6 Once assessed as suitable for cataract surgery the waiting period for an operation represents a delay in receiving a benefit to health. The following candidate indicators were specified to measure this delay:

- 5:** median and inter-quartile range of duration of wait for out-patient appointment following referral to a consultant ophthalmologist, per provider-unit population that subsequently underwent cataract surgery.
- 6:** median and inter-quartile range of duration of time spent on the waiting list for operation, per provider-unit population that subsequently underwent cataract surgery.

3.7 Measurement of visual acuity is one of the standard methods for measuring visual deficiency. The following candidate indicators to be measured before operation were specified:

- 7a:** distribution of visual acuity, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- 7b:** distribution of visual acuity, assessed *pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.

3.8 Visual deficiency may also be measured by assessing visual function. This is often done by clinicians on an informal basis when listening to a patient's clinical history of symptoms and problems, but may also be assessed more formally with standardised measuring instruments. The following candidate indicators to be measured before operation were specified:

- 9a:** median and inter-quartile range of an index of visual function, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- 9b:** median and inter-quartile range of an index of visual function, *assessed pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.

3.9 Visual deficiency may have profound effects on a person's ability to lead an active and satisfying life. The following candidate indicators to be measured before operation were specified:

- 15a:** summary of a measure of general health status, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- 15b:** summary of a measure of general health status, *assessed pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.

3.10 Complications following cataract surgery are important for two reasons. Firstly, they may pose a threat to the patient's eye-sight and secondly, some complications may relate to the skill of the operator and the quality of health care received. The following candidate indicators were specified:

- 11a:** rates of individual post-operative complications, *detected prior to discharge from hospital*, per provider-unit population having undergone cataract surgery.
- 11b:** rates of individual post-operative complications, *detected following discharge from hospital, and by the first out-patient appointment*, per provider-unit population having undergone cataract surgery.
- 11c:** rates of individual post-operative complications, *detected following the first out-patient appointment and within four months of the procedure*, per provider-unit population having undergone cataract surgery.
- 12:** rate of unplanned re-admission within 30 days of cataract surgery, for the care of the operated eye, per provider-unit population having undergone cataract surgery.
- 13a:** *one year* capsulotomy rate, per 1,000 cataract extractions.
- 13b:** *five year* capsulotomy rate, per 1,000 cataract extractions.

- 14:** rate of referral within five years of cataract surgery, for investigation or care of the operated eye, per provider-unit population having undergone cataract surgery.

3.11 The return of function should be examined not only through clinical and objective health status measures but also from the point of view of the patient. The following candidate indicators relating to visual acuity and function were specified:

- 7c:** distribution of visual acuity, *at one week post-operation*, within a provider-unit population having undergone cataract surgery.
- 7d:** distribution of visual acuity, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.
- 7e:** distribution of visual acuity, *at five years post-operation*, within a provider-unit population having undergone cataract surgery.
- 8a:** summary of changes in visual acuity, comparing *pre-operative acuity* with that *four months post-operation*, within a provider-unit population having undergone cataract surgery.
- 8b:** summary of changes in visual acuity, comparing *pre-operative acuity* with that *five years post-operation*, within a provider-unit population having undergone cataract surgery.
- 9c:** median and inter-quartile range of an index of visual function, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.
- 9d:** median and inter-quartile range of an index of visual function, *at five years post-operation*, within a provider-unit population having undergone cataract surgery.
- 10a:** summary of changes in an index of visual function, comparing *pre-operative acuity* with that *four months post-operation*, within a provider-unit population having undergone cataract surgery.
- 10b:** summary of changes in an index of visual function, comparing *pre-operative acuity* with that *five years post-operation*, within a provider-unit population having undergone cataract surgery.

3.12 The other candidate indicators relating to return to function after surgery which were specified were:

- 15c:** summary of a measure of general health status, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.
- 16:** summary of changes in a measure of general health status, as assessed *pre-operatively* and *four months post-operation*, within a provider-unit population having undergone cataract surgery.

17: summary of a measure of patient knowledge regarding post-operative self-management, within a provider-unit population having undergone cataract surgery.

18: summary of a measure of patient satisfaction within a provider-unit population having undergone cataract surgery.

3.13 Consideration was given to the inclusion of the measure, percentage of cataracts operated on as a day case. However, the Group concluded that, although this is an important measure of the quality of service and is already routinely collected, it is not a proxy indicator of health outcome.

4. CANDIDATE INDICATOR SPECIFICATIONS

- 4.1** This Section contains the detailed specifications of the candidate indicators chosen by the Group. To facilitate ease of reference indicators derived from broadly similar data have been grouped together.
- 4.2** Guidance notes which explain the attributes used in the specifications are included in Appendix D.
- 4.3** The detailed work on the specifications was carried out by Robert Cleary, James Coles, and Sallie Curtis of CASPE Research.
- 4.4** Throughout the candidate indicator specifications, the term cataract is used to refer to the diagnosis of age related cataract, which defined the scope of the Working Group's discussions. The diagnosis, covered by the ICD-10 term 'senile cataract' (H25), is defined as the presence of lens opacity, after other causes of cataract have been excluded, which either impairs visual function or prevents inspection of or treatment to the retina when required. No actual age limit has been applied to the definition.

Candidate indicator 1

Characteristics

Perspective: Population

Timeframe: Cross-sectional

Outcome relationship: Indirect

Title	Cataract extractions: rate per 10,000 population.
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	For a given resident population, age-group and sex: <i>the number of cataract extractions, associated with a diagnosis of cataract, performed in a given year, divided by the size of the relevant population.</i> The resulting fraction should be expressed as a rate per 10,000 people, and its numerator should also be reported.
Rationale	At the population level, inadequate provision of cataract surgery is likely to lead to inappropriately delayed treatment for individual patients. This indicator is intended to act as a basis for population level comparisons of service provision with respect to cataract. It is assumed that the age-specific prevalence of cataract is unlikely to vary substantially across regions (Desai 1993b), and therefore that large variations in the rate of surgery are likely to indicate variations in provision rather than need for cataract extraction. Variability in clinical decision making, in both primary and secondary care, has been identified as a major contributory factor in the observed geographical variation in cataract surgery rates (Williams et al. 1994).
Potential uses	Population based comparisons; assessment of regional and national trends or progress towards targets.
Potential users	Commissioners; national and local policy makers.
Possible confounders	As population differences in ethnic origin may influence the prevalence of senile cataract, it may be appropriate to consider this variable within geographical comparisons. The availability of cataract operations within the private sector may also exert different effects on the uptake of NHS surgery within different populations.
Data sources	Numerator data for a health authority population of known size may be obtained from the contract minimum data set held by the commissioner for the specified year. The relevant number of operations would be given by the number of finished consultant episodes recording an ICD-10 diagnosis code of 'senile cataract' (H25), together with an OPCS-4 procedure code of: 'extracapsular extraction of lens' (C71); 'intracapsular extraction of lens' (C72); 'other extraction of lens' (C74) or; 'prosthesis of lens' (C71).
Data quality	The validity of comparisons based on the contract minimum data set depends on the accuracy and completeness of clinical coding, which may not be uniformly high. The possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28), should be considered.

Comments	No specific points.
Further work required	None recommended.
Conclusion & priority	A. To be implemented generally on a routine basis.
References	<p>Desai, P. (1993b). The National Cataract Surgery Survey: III. Process features. <i>Eye</i>, 7, 667-671.</p> <p>Williams, M. H., Frankel, S. J., Nanchahal, K., Coast, J., and Donovan, J. L. (1994). Cataract Surgery. In <i>Health care needs assessment</i> (ed. A. Stevens, J. Raftery). Radcliffe Medical Press, Oxford.</p>

Candidate indicator 2

Characteristics

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

Title	Screening: achievement of target rates: a) Percentage of general practitioners who achieve target rates for annual screening of <i>all patients over 75 years old</i> . b) Percentage of general practitioners who achieve target rates for annual screening of those patients <i>over 75 years old living in residential or nursing homes</i> .
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	<p>For a given health authority, target rate and general medical practitioner census date: <i>the number of the authority's unrestricted principals who have, at the GMP census date, achieved the target rate for over-75s screening within the specified patient group, divided by the number of unrestricted principals for whom the health authority is, at the GMP census date, the responsible authority</i>. The resulting fraction should be expressed as a percentage, and its numerator should be reported.</p> <p>For indicator (a) the relevant patient group is: <i>all registered patients who were 75 or more years old one year before the GMP census date</i>. For indicator (b) the relevant patient group is: <i>all registered patients who were living in a residential or nursing home and who were 75 or more years old one year before the GMP census date</i>.</p> <p>A target rate specifies a percentage of patients within the relevant patient group receiving general health screening in the year prior to the census date. Appropriate target rates have not yet been defined.</p>
Rationale	The indicator is intended to act as a proxy for the detection of previously undiagnosed cataract in patients over-75 years old. This is based on the assumption that GPs with relatively high levels of annual general health screening in this population will be more effective in identifying elderly patients with undiagnosed cataract. The separate reporting of the screening rate in patients receiving residential care (indicator (b)) recognises the possibility that a different pattern of unmet need may exist in this population.
Potential uses	Clinical audit; population based comparisons; assessment of regional and national trends or progress towards targets.
Potential users	Clinicians; commissioners; national and local policy makers.
Possible confounders	The capture rate of screening programmes may be affected by a wide range of patient factors - influencing both prospects for opportunistic screening and responses to screening invitations (Cohen and Busk 1991).

Data sources	<p>At present, no standard system of routine data collection provides the required information. Health service indicators reflecting cervical cytology screening rates (e.g. XM61 ‘% GMPs achieving higher rate for cervical cytology’) rely on the General Medical Practitioner Census as a data source, and this provides a model for aggregate collection of geriatric screening data at the general practitioner level (NHS Executive 1995).</p> <p>Primary data collection at the patient level is supported by version three of the Read Codes, which would allow dated encoding of ‘geriatric screening’ (68Q...), and housing dependency - ‘lives in nursing home’ (13F61) or ‘lives in an old peoples’ home’ (13F72).</p>
Data quality	<p>Aggregate data of the kind supplied by the GMP Census can be expected to be of an acceptable quality. The validity of comparisons based on Read coded activity and patient history information would depend critically on the degree to which standard coding methods were employed by GPs contributing to those comparisons.</p>
Comments	<p>The link between rates of geriatric screening and the efficacy of detection of previously undiagnosed cataract has not been established.</p>
Further work required	<p>The distribution of rates of geriatric screening, across general practices, is required to inform the selection of appropriate target rates.</p> <p>More generally, the level of unmet need for cataract surgery in the over-75s needs to be established, as does the effectiveness of geriatric general health screening in reducing this need.</p>
Conclusion & priority	<p>E. To be further developed because link with effectiveness is not clear.</p>
References	<p>Cohen, J., and Busk, M. (1991). Screening the over-75s: theory into practice. <i>Geriatric Medicine</i>, 21(ii), 27-30.</p> <p>NHS Executive (1995). <i>Health Service Indicators Handbook: 1995 Edition</i>. Department of Health, Leeds.</p>

Candidate indicator 3

<p>Characteristics <i>Perspective:</i> Population <i>Timeframe:</i> Cross-sectional <i>Outcome relationship:</i> Indirect</p>

Title	Rate of referral to a consultant ophthalmologist per 1,000 general practice population.
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	For a given general practitioner: <i>the number of patients referred to a consultant ophthalmologist by the GP in a given year, divided by the number of patients registered with the GP at the end of that year.</i> This fraction, expressed as a rate per 1,000 patients, should be reported as an overall figure and by patient age-group and sex. The associated numerators should also be reported.
Rationale	<p>The importance of the GP’s role in detecting eye disease is clear (Sheldrick et al. 1992; Fink et al. 1994), as is, in the case of cataract, the need for referral to secondary care once the condition has become problematic (Featherstone et al. 1992).</p> <p>A comparison between GPs based on their rates of referral specifically for cataract would be an appropriate indicator of the relative effectiveness of their detection and diagnosis of that condition - assuming a constant prevalence between practice populations. However, as it is unclear to what extent provisional diagnoses, made in advance of referral, would be retrievable from GPs, the indicator defined here is offered as a proxy for the detection of cataract in primary care.</p> <p>The specification of the year-end as the basis for assessing practice size, is merely intended as a convenient standard for the retrospective calculation of the indicator.</p>
Potential uses	Clinical audit; provider based comparisons; population based comparisons.
Potential users	Clinicians; commissioners.
Possible confounders	Variations in the true age and sex specific incidence and prevalence of ocular pathology, including but not restricted to cataract, between practice populations - as influenced, for example, by ethnic origin. Rates of referral within the NHS will also be affected by corresponding private referral rates.
Data sources	The contract minimum data set for out-patients captures referrals made by identified GPs to identified consultants and/or specialties. As such it offers a source of numerator data which could be brought together with the relevant practice population sizes. The success of this approach would be dependent on the extent of the implementation of the out-patient CMDS, as individual GPs may refer to more than one provider-unit. To obtain a valid assessment of a given GP’s referral rate, all relevant referral destinations would have to be able to supply the out-patient CMDS.

As an alternative, individual GPs could supply a count of their referrals to consultant ophthalmologists. Coding support for this approach is under development within version 3 of the Read codes covering 'referral procedures' (Ua048).

Data quality	The completeness of the out-patient CMDS and GPs' own referral records, where relevant systems are implemented, are currently open to question.
Comments	Improved knowledge of the way in which risk factors for ocular pathology vary between practice populations would aid the interpretation of inter-practice comparisons based on this indicator.
Further work required	None recommended.
Conclusion & priority	D. To be implemented following IT development on a routine basis.
References	<p>Featherstone, P. I., James, C., Hall, M. S., and Williams, A. (1992). General practitioners' confidence in diagnosing and managing eye conditions: a survey in South Devon. <i>British Journal of General Practice</i>, 42, 21-24.</p> <p>Fink, A., Wright, L., and Wormald, R. (1994). Detection and prevention of treatable visual failure in general practice: room for improvement? <i>British Journal of General Practice</i>, 44, 587-589.</p> <p>Sheldrick, J. H., Vernon, S. A., and Wilson, A. (1992). Study of diagnostic accord between general practitioners and an ophthalmologist. <i>British Medical Journal</i>, 304, 1096-1098.</p>

Candidate indicator 4

Characteristics
<i>Perspective:</i> Population
<i>Timeframe:</i> Cross-sectional
<i>Outcome relationship:</i> Indirect

Title	Rate of referral to a general practitioner per 1,000 NHS eye tests.
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	For a given health authority population: <i>the number of NHS eye tests in a given year resulting in a referral to a general practitioner, divided by the number of NHS eye tests undertaken in the population(s) that year.</i> This fraction, expressed as a rate per 1,000 eye tests, should be reported by patient age-group and sex.
Rationale	The indicator is intended to reflect the extent to which serious eye disease within a given population is detected by NHS eye tests.
Potential uses	Population based comparisons; assessments of regional/national trends or progress towards targets.
Potential users	National/local policy makers; commissioners.
Possible confounders	Eligibility for, and the uptake of, NHS eye tests. The appropriateness of referrals made. Risk factors for eye disease in the population.
Data sources	Part B of the NHS General Ophthalmic Services sight test application form (GOS(ST)A), identifies which NHS eye tests resulted in a referral to a general practitioner. The form is submitted to a patient's health authority by practitioners (ophthalmic opticians or ophthalmic medical practitioners) requiring reimbursement for an NHS sight test. Annual statistics based on a national collation of GOS forms are available to the Department of Health (Government Statistics Service 1995), but these are not currently broken down by referral status, age or sex.
Data quality	Levels of completion of the relevant sections of GOS forms are likely to vary between health authorities, and may vary over time.
Comments	The GOS forms only capture data on NHS eye tests, estimated to be less than half of all eye tests undertaken (Federation of Ophthalmic and Dispensing Opticians 1995). The potential value of the indicator is also limited by its lack of specificity with respect to cataract.
Further work required	The degree to which GOS forms currently provide complete data on NHS eye tests should be established. Incompleteness and lack of specificity of the data probably limit their value. It may be worth field testing the extent of variation between populations, and the interpretability of the data - but the priority for implementation must remain low.

Conclusion & priority **E. To be further developed because link with effectiveness is not clear.**

References

Federation of Ophthalmic and Dispensing Opticians (1995). *Optics at a glance*.
Federation of Ophthalmic and Dispensing Opticians, London.

Government Statistics Service (1995). *SBE 515 - NHS sight tests*.
Government Statistics Service, London.

Candidate indicator 5

Characteristics

Perspective: Population

Timeframe: Cross-sectional

Outcome relationship: Direct

Title	Duration of wait from GP referral to out-patient appointment: median and inter-quartile range of duration of wait following referral to a consultant ophthalmologist, per provider-unit population that subsequently underwent cataract surgery.
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	For a given provider-unit: <i>the median value and inter-quartile range of waiting time (in days), between a general practitioner's referral to a consultant ophthalmologist and the subsequent out-patient appointment, experienced by the population of patients undergoing cataract surgery in a given year.</i> To facilitate comparisons with Patient's Charter standards for waiting times, the 90th percentile of the distribution should also be reported.
Rationale	<p>As a patient with cataract waits for diagnosis and treatment, the severity of their condition may increase (Effective Health Care Bulletin 1996), as may the risks of reduced quality of life or even injury associated with deteriorating vision. The Patient's Charter sets as a standard to be expected that 90% of patients will be seen in out-patients within 13 weeks (Department of Health 1995).</p> <p>Although, for cataract patients, the overall waiting time between referral to hospital and the subsequent surgery may be the important interval, attempts to manage this waiting time must recognise the out-patient wait as an important component of the whole. The duration of elective wait, being the other main element, is addressed by Indicator 6.</p> <p>Inter-unit comparisons of waiting time will indicate the relative ability of providers to meet the demand for cataract surgery facing them.</p>
Potential uses	Provider based comparisons; assessments of regional/national trends or progress towards targets.
Potential users	National/local policy makers; provider management; commissioners; consumers/public.
Possible confounders	Local uptake of private health care is likely to affect the demand made of NHS services.

Data sources	The data currently required for the Patient's Charter performance tables will only support specialty level comparisons of out-patient waiting time. However, the systems used to collect these data may, at some providers, support an analysis in terms of subsequent diagnosis and surgery. For the future, widespread adoption of the out-patient contract minimum data set would allow relevant out-patient records (including referral date) to be linked by the NHS number to the in-patient contract minimum data set. Relevant cases from the latter would be identified as those consultant episodes recording an ICD-10 diagnosis code of 'senile cataract' (H25), together with an OPCS-4 procedure code (dated within the specified year) of: 'extracapsular extraction of lens' (C71); 'intracapsular extraction of lens' (C72); 'other extraction of lens' (C74) or; 'prosthesis of lens' (C71).
Data quality	The completeness and accuracy of the out-patient contract minimum data set, where relevant systems are implemented, will be open to question. Furthermore, the validity of comparisons based on the contract minimum data set will depend on the accuracy and completeness of clinical coding, which may not be uniformly high. In particular the possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28), should be considered.
Comments	No specific points.
Further work required	None recommended.
Conclusion & priority	B. To be implemented where local circumstances allow on a routine basis.
References	<p>Department of Health (1995). <i>The Patient's Charter and you</i>. Department of Health, Leeds.</p> <p>Effective Health Care Bulletin (1996). <i>Management of cataract</i>. Universities of Leeds and York.</p>

Candidate indicator 6

Characteristics

Perspective: Population

Timeframe: Cross-sectional

Outcome relationship: Direct

Title	Time spent on the waiting list for elective surgery: median and inter-quartile range of duration of wait per provider-unit population that subsequently underwent cataract surgery.
Intervention aim	Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment.
Definition	For a given provider-unit: <i>the median value and inter-quartile range of waiting time (in days), between a consultant ophthalmologist's decision to admit and the subsequent operation, experienced by the population of patients who underwent cataract surgery in a given year.</i> To facilitate comparisons with Patient's Charter standards for waiting times, the percentage of the patients waiting less than 18 months should also be reported.
Rationale	<p>As a patient with cataract awaits treatment, the severity of their condition may increase (Effective Health Care Bulletin 1996), as may the risks of reduced quality of life or even injury associated with deteriorating vision. The Patient's Charter sets as a required standard, that all cataract patients will be operated on within 18 months of the decision to admit them (Department of Health 1995).</p> <p>Although, for cataract patients, the overall waiting time between referral to hospital and the subsequent surgery may be the important interval, attempts to manage this waiting time must recognise the time on the surgical waiting list as an important component of the whole. The duration of the wait for an out-patient consultation, being the other main element, is addressed by Indicator 5.</p> <p>Inter-unit comparisons of waiting time will indicate the relative ability of providers to meet the demand for cataract surgery facing them.</p>
Potential uses	Provider based comparisons; assessments of regional/national trends or progress towards targets.
Potential users	National/local policy makers; provider management; commissioners; consumers/public.
Possible confounders	Local uptake of private health care is likely to affect the demand made of NHS services.
Data sources	For an individual patient, the required value is held in the hospital episode statistics derived data item 'duration of elective wait'. Relevant cases from the underlying contract minimum data set would be identified as consultant episodes recording an ICD-10 diagnosis code of 'senile cataract' (H25), together with an OPCS-4 procedure code (dated within the specified year) of: 'extracapsular extraction of lens' (C71); 'intracapsular extraction of lens' (C72); 'other extraction of lens' (C74) or; 'prosthesis of lens' (C71).

Data quality	The 'duration of elective wait' data item is derived from two contract minimum data set items 'date of procedure' and 'decision to admit date'. While the former is likely to be reliable, the latter may be interpreted differently by different providers - requiring inter-unit comparisons to be treated with caution. Furthermore, the validity of the denominator data will depend on the accuracy and completeness of clinical coding, which may not be uniformly high. In particular the possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28), should be considered.
Comments	No specific points.
Further work required	None recommended.
Conclusion & priority	A. To be implemented generally on a routine basis.
References	<p>Department of Health (1995). <i>The Patient's Charter and you</i>. Department of Health, Leeds.</p> <p>Effective Health Care Bulletin (1996). <i>Management of cataract</i>. Universities of Leeds and York.</p>

Candidate indicator 7

Characteristics

Perspective: Clinical
Timeframe: Cross-sectional
Outcome relationship: Direct

Title

Visual acuity: cross-sectional indicators within a provider-unit population undergoing cataract surgery:

- a) Distribution of visual acuity, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- b) Distribution of visual acuity, assessed *pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.
- c) Distribution of visual acuity, *at one week post-operation*, within a provider-unit population having undergone cataract surgery.
- d) Distribution of visual acuity, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.
- e) Distribution of visual acuity, *at five years post-operation*, within a provider-unit population having undergone cataract surgery.

Intervention aim

Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment (Indicators a & b).

Assure return of function after surgery in the short term (Indicators c & d).

Assure return of function after surgery in the long term (Indicator e).

Definition

Each of the indicators (a-e) refers to an assessment of visual acuity at a different stage in the process of care:

- *at referral to a consultant ophthalmologist*
- *within one week pre-operation*
- *at one week (\pm one day) post-operation*
- *at four months (\pm 14 days) post-operation*
- *at five years (\pm six months) post-operation.*

For a given provider-unit, process stage (defined above), and visual acuity category: *the number of cataract extractions in a given year, for which the assessment (made at the specified process stage) of the operated eye's best-corrected Snellen visual acuity falls within the given category, divided by the total number of extractions in that year.* This fraction, expressed as a percentage, should be reported with its numerator and denominator both as an overall figure and by age-group and sex.

For each indicator, the distribution of acuity across cases is expressed in terms of the proportion of cases falling into each of the following acuity categories (adapted from Desai 1993a):

- *Adequate ($6/12$)*
- *Low-1 ($< 6/12$ and $> 6/24$)*
- *Low-2 ($< 6/24$ and $> 6/60$)*
- *Blind ($< 6/60$).*

Rationale

Clinically, the visual impairment associated with cataract is most commonly assessed in terms of best-corrected Snellen visual acuity. In aggregate, assessments at referral (Indicator a) give an indication of whether those referrals have generally been made at a timely point in the development of the condition. A further pre-operative assessment, shortly before surgery (Indicator b), will similarly reflect the timeliness of the procedure. Pre-operative assessments can also act as a baseline for longitudinal measures of the change in visual acuity, and as case mix descriptors for inter-unit comparisons.

Post-operatively, in the absence of co-existing visual pathology, visual acuity is an important indication of the success of cataract surgery, including aphakic correction, in providing an unimpeded and well focused retinal image. Early post-operative assessments (Indicator c) may be influenced by peri-operative complications, while later assessments (Indicators d & e) provide concise judgements of the degree to which an important goal of surgery has been met and maintained.

Where five year follow-up data are being reported, it must be recognised that a sizeable number of patients will have died before the follow-up. The indicator specification requires that the number of operations originally undertaken is reported, in order that the proportion of cases lost to follow-up may be calculated.

Potential uses

Clinical audit; provider-based comparisons.

Potential users

Clinicians; provider management; commissioners.

Possible confounders

Co-existing ocular pathology may influence not only the post-operative levels of acuity obtained, but also the appropriate timing of referral and surgery.

Data sources

Although Snellen visual acuity is likely to be recorded almost universally in the medical notes of those undergoing cataract surgery, there is no standard system for the routine collection of the relevant data in a form that is readily aggregated. While ICD-10 supports the coding of a patient's Snellen acuity in terms of the 'better eye' and the 'worse eye', it does not allow the acuity of a given eye (i.e. the left or the right) to be identified.

With respect to the 'at referral' and 'pre-operative' assessments (Indicators a & b), current practice is likely to support routine collection at the appropriate times. Although out-patient follow-up provides an opportunity to collect post-operative acuity data, follow-up regimens may vary widely between surgeons. Thus, even approximations of the 'one week' and 'four month' timing specified for the post-operative indicators (c & d) may not match the routine practice at a given provider.

Where the usual timing of these four assessments does correspond to the indicator specifications, or where it can be adapted to do so, a relatively simple system based on collation of a standard proforma for Snellen acuity could be used to support routine data collection.

Snellen acuity at five years post-operation is unlikely to be routinely assessed by most providers. An extension of the system suggested above, for a periodic sample of cataract patients, could include an additional out-patient follow-up. Alternatively, opportunistic capture of relevant acuity data by general practitioners (perhaps for an identified cohort) is at least a theoretical possibility. Version 3 of the Read Codes provides comprehensive facilities for encoding visual acuity data, which could be linked to surgical data by means of the NHS number.

Data quality

Measurements of visual acuity made in a specialist setting are likely to be reliable. It will be important, however, to ensure that all measurements are made as 'best corrected'. The uptake of a data collection system that requires the adoption of a proforma may vary between surgeons.

Comments

No specific points.

Further work required

Pilot testing of both data collection and the compilation of summary statistics.

Conclusion & priority

Indicators a-d: **B. To be implemented where local circumstances allow on a routine basis.**

Indicator e: **C. To be implemented where local circumstances allow by periodic survey.**

References

Desai, P. (1993a). The National Cataract Surgery Survey: II. Clinical outcomes. *Eye*, 7, 489-494.

Candidate indicator 8

Characteristics

Perspective: Clinical

Timeframe: Longitudinal

Outcome relationship: Direct

Title

Visual acuity: longitudinal indicators of change, within a provider-unit population undergoing cataract surgery:

- a) Summary of changes in visual acuity, as measured *pre-operatively* and *four months post-operation*, within a provider-unit population having undergone cataract surgery.
- b) Summary of changes in visual acuity, as measured *pre-operatively* and *five years post-operation*, within a provider-unit population having undergone cataract surgery.

Intervention aim

Assure return of function after surgery in the short term (Indicator a).
Assure return of function after surgery in the long term (Indicator b).

Definition

Four categories of visual acuity should be used (adapted from Desai 1993a):

- *Adequate* ($6/12$)
- *Low-1* ($< 6/12$ and $> 6/24$)
- *Low-2* ($< 6/24$ and $> 6/60$)
- *Blind* ($< 6/60$).

The indicator reports the percentage distribution of post-operative acuity for each category of pre-operative acuity.

The elements of the distribution are calculated as follows: for a given provider-unit, follow-up interval and combination of pre-operative and follow-up visual acuity categories: *the number of cataract extractions in a given year, for which the pre-operative and follow-up assessments of the operated eye's best-corrected Snellen visual acuity fell within the given combination of acuity categories, divided by the total number of cataract extractions in that year for which the pre-operative assessment fell within the given pre-operative category*. This fraction, expressed as a percentage, should be reported with its numerator both as an overall figure and by patient age-group and sex (in order to allow the additional presentation of age/sex specific distributions).

'Pre-operative' refers to an assessment made *within one week pre-operation*.

'Follow-up' refers to an assessment made at *four months (± 14 days) post-operation* (Indicator a) or *five years ($\pm six months$) post-operation* (Indicator b).

Rationale

While cross-sectional measures of post-operative visual acuity provide a valuable indication of surgical success, longitudinal measures are required to quantify the benefit, in terms of modified acuity, of the intervention.

If we know both the pre-operative and post-operative acuity for each case, indicators can be compiled which summarise the distribution of post-operative acuity for each category of pre-operative acuity. As a result, the proportions that have improved (or worsened) by one and two categories can be calculated for each level of pre-operative severity.

Indicator (a) presents results for a follow-up period that can be expected to generally indicate the maximum improvement obtained. Indicator (b) provides a longer term view of the benefit.

Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Co-existing ocular pathology may influence both pre- and post-operative levels of visual acuity.
Data sources	The indicators may be derived from the cross-sectional data underlying Indicators 7b, 7d and 7e. Linkage between pre- and post-operative data can be made on the basis of NHS number and the date of surgery.
Data quality	The comments under 'Data quality' for candidate Indicator 7 also apply here. Additionally, it is unlikely that the underlying cross-sectional data will provide complete follow-up. Presentation of the longitudinal indicators should take this into account by giving the numbers and pre-operative acuity distribution of those lost to follow-up.
Comments	No specific points.
Further work required	Pilot testing of both data collection and the compilation of summary statistics.
Conclusion & priority	Indicator a: B. To be implemented where local circumstances allow on a routine basis. Indicator b: C. To be implemented where local circumstances allow by periodic survey.
References	Desai, P. (1993a). The National Cataract Surgery Survey: II. Clinical outcomes. <i>Eye</i> , 7, 489-494.

Candidate indicator 9

Characteristics

Perspective: Patient

Timeframe: Cross-sectional

Outcome relationship: Direct

Title **Visual function: cross-sectional indicators, within a provider-unit population undergoing cataract surgery:**

- a) Median and inter-quartile range of an index of visual function, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- b) Median and inter-quartile range of an index of visual function, *assessed pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.
- c) Median and inter-quartile range of an index of visual function, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.
- d) Median and inter-quartile range of an index of visual function, *at five years post-operation*, within a provider-unit population having undergone cataract surgery.

Intervention aim Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment (Indicators a & b).
Assure return of function after surgery in the short term (Indicator c).
Assure return of function after surgery in the long term (Indicator d).

Definition Each of the indicators (a-d) refers to an assessment of visual function at a different stage in the process of care:

- *at referral to a consultant ophthalmologist*
- *within one week pre-operation*
- *at four months (± 14 days) post-operation*
- *at five years (\pm six months) post-operation.*

For a given process stage (defined above), and population of patients undergoing cataract surgery at a given provider-unit in a given year: *the median and inter-quartile range of an index of visual function, the VF-14 (Steinberg et al. 1994a), as assessed at the specified process stage.* These statistics, with the associated number of cases, should be reported by patient age-group and sex. To facilitate comparisons with published VF-14 data, corresponding means and standard deviations should also be reported.

The definitions of follow-up intervals for a patient-level assessment (as opposed to one associated with the operated eye) are complicated by the potential for staged bilateral surgery. The following conventions apply to the presentation of this indicator:

1) Where the second eye is subject to cataract extraction before the four month follow-up of the first eye, the first eye is considered to be lost to follow-up. Pre-operative data for such cases are to be presented separately from those subject to follow-up.

2) Where the second eye is subject to cataract extraction after the four month follow-up but before the five year follow-up, then both procedures are subject to independent patient-level follow-up. In these cases results for first eyes and second eyes should be presented separately. In practice, the six month tolerance on the five year follow-up interval will allow one VF-14 assessment to act as the long term follow-up for both sides of a staged bilateral intervention - as long as the two procedures were undertaken in the same 12 months.

Rationale

While visual acuity provides a clinical assessment of an important aspect of the impairment associated with cataract, it does not provide a direct measure of the visual disability experienced by patients. Indeed, the relationship between acuity and measures of visual disability such as the VF-14, the Activities of Daily Vision Scale, and the Visual Functioning Scale of Brenner and colleagues, is sufficiently complex for acuity to be an inadequate proxy for visual function (Mangione et al. 1992; Brenner et al. 1993; Steinberg et al. 1994b).

The VF-14 consists of 14 items that question a patient's ability to perform a variety of every day visual tasks (e.g. reading small print; recognising people). Having been developed and tested in the United States for the cataract Patient Outcome Research Team, it has now been validated and successfully employed in the UK within the Cataract Outcome Study (Desai et al. 1996).

In aggregate, assessments at referral (Indicator a) give an indication of whether those referrals have generally been made a timely point in the development of the condition. A further pre-operative assessment, shortly before surgery (Indicator b), will similarly reflect the timeliness of the procedure. Pre-operative assessments can also act as a baseline for longitudinal measures of the change in visual function, and as case mix descriptors for inter-unit comparisons.

Post-operatively, assessments of visual disability provide a direct measure of the degree to which the stated goal of enabling visual function has been met in the short term (Indicator c) and long term (Indicator d).

Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Co-existing ocular pathology may influence both pre- and post-operative levels of visual function, as may other forms of co-morbidity.
Data sources	<p>Although visual function is likely to be the subject of informal assessment both pre- and post-operatively, such assessments are not made in a standard form. The specification of the VF-14 as a standard form of functional assessment would allow data on visual function to be aggregated and compared between provider-units. The additional costs, in staff time etc., associated with a standardised assessment may make routine use impractical. However, many of the benefits of an indicator based on a standard assessment would accrue from periodic sampling of the relevant surgical population.</p> <p>The timings specified for the functional assessments match those of the visual acuity indicators (Indicators 7 a, b, d & e). Where systems are put in place to capture acuity data, a subset of patients could be identified as a cohort for parallel visual function assessment. This sub-group might correspond to the sample selected for acuity follow-up to five years (Indicator 7e).</p> <p>The VF-14 may be administered face to face or over the telephone, and a simple scoring algorithm yields a single index of visual function. Self-administration may be difficult because of the visual disability present pre-operatively and potentially present post-operatively.</p>
Data quality	<p>Recent use of visual function questionnaires in the UK, both face to face and by telephone, has demonstrated that pre-operative and short term post-operative response rates are acceptable (Desai et al. 1996, face to face administration only; CASPE Research, unpublished data). Long term follow-up response rates have not been tested. Use of the telephone for post-operative follow-up may have a systematic effect on visual function data, as those without phones are excluded from the assessments. The exclusion from formal assessment of patients with hearing or cognitive disabilities, or who are not English speaking, may also have a systematic effect on aggregate visual function data.</p> <p>Inter-administrator reliability for the VF-14 will depend on appropriate instruction of interviewers and their use of an interview script.</p>
Comments	No specific points.
Further work required	None recommended.

Conclusion & priority

C. To be implemented where local circumstances allow by periodic survey.

References

Brenner, M. H., Curbow, B., Javitt, J. C., Legro, M.W., and Sommer, A. (1993). Vision change and quality of life in the elderly. Response to cataract surgery and treatment of other chronic ocular conditions. *Archives of Ophthalmology*, **111**, 680-685.

Desai P., Reidy A., Minassian D. C., Vafidis G., and Bolger J. Gains from cataract surgery: visual function and quality of life. *British Journal of Ophthalmology*, **80**, 868-873.

Mangione, C. M., Phillips, R. S., Seddon, J. M., Lawrence, M.G., Cook, E.F., Dailey, R., and Goldman, L. (1992). Development of the 'Activities of Daily Vision Scale': a measure of visual functional status. *Medical Care*, **30**, 1111-1126.

Steinberg, E. P., Tielsch, J. M., Schein, O. D., Javitt, J.C., Sharkey, P., Cassard, S.D., Legro, M.W., Diener-West, M., Bass, E.B., Damiano, A.M., Steinwachs, D.M., and Sommer, A. (1994a). The VF-14 an index of functional impairment in patients with cataract. *Archives of Ophthalmology*, **112**, 630-638.

Steinberg, E. P., Tielsch, J. M., Schein, O. D., Javitt, J.C., Sharkey, P., Cassard, S.D., Legro, M.W., Diener-West, M., Bass, E.B., Damiano, A.M., Steinwachs, D.M., and Sommer, A. (1994b). National study of cataract surgery outcomes: variation in 4-month post-operative outcome as reflected in multiple outcome measures. *Ophthalmology*, **101**, 1131-1141.

Candidate indicator 10

Characteristics

Perspective: Patient

Timeframe: Longitudinal

Outcome relationship: Direct

Title	<p>Visual function: longitudinal indicators of change, within a provider-unit population undergoing cataract surgery:</p> <p>a) Summary of changes in an index of visual function, as measured <i>pre-operatively</i> and <i>four months post-operation</i>, within a provider-unit population having undergone cataract surgery.</p> <p>b) Summary of changes in an index of visual function, as measured <i>pre-operatively</i> and <i>five years post-operation</i>, within a provider-unit population having undergone cataract surgery.</p>
Intervention aim	<p>Assure return of function after surgery in the short term (Indicator a). Assure return of function after surgery in the long term (Indicator b).</p>
Definition	<p>For a given follow-up period, and population of patients undergoing cataract surgery at a given provider-unit in a given year: <i>a summary of the distribution of changes observed in individual patients, from pre-operative baseline to post-operative follow-up, in an index of visual function, the VF-14</i> (Steinberg et al. 1994a). 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).</p> <p>‘Pre-operative baseline’ refers to a visual function assessment made <i>within one week pre-operation</i>. ‘Post-operative follow-up’ refers to a similar assessment made at <i>four months (± 14 days) post-operation</i> (Indicator a) or <i>five years (± six months) post-operation</i> (Indicator b).</p>
Rationale	<p>While cross-sectional measures of post-operative visual function will in part reflect the success of surgery, longitudinal measures will better quantify the benefit of the intervention in terms of modified disability.</p> <p>The change in VF-14 associated with cataract extraction is known to be correlated with the pre-operative level of the index (larger improvements occur in patients with worse pre-operative scores; Steinberg et al. 1994b). Such effects are common in finite health status scales. The selection of summary statistics used to describe the changes in the index should be informed by an examination of typical pre- and post-operative distributions and pilot testing of alternative report formats.</p> <p>Indicator (a) presents results for a follow-up period that can be expected to reflect the maximum level of benefit obtained: late enough to avoid the effects of post-operative convalescence, and early enough to avoid deterioration in visual function due to new ocular pathology. Indicator (b) provides a longer term view of the benefit obtained by patients.</p>

Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Co-existing ocular pathology may influence both pre- and post-operative levels of visual function, as may other forms of co-morbidity.
Data sources	The indicators may be derived on a sample basis from the cross-sectional data underlying Indicators 9b, 9c and 9d. Linkage between pre- and post-operative data could be established on the basis of the NHS number and the date of surgery.
Data quality	The comments on data quality associated with Indicator 9 also apply here. Additionally, it is unlikely that the underlying cross-sectional data will provide complete follow-up. Presentation of the longitudinal indicators should take this into account by giving a count those lost to follow-up; and details of the distribution of their pre-operative scores, in a format that allows comparison with the corresponding distribution for those who were followed-up.
Comments	No specific points.
Further work required	Specification and pilot testing of interpretability of summary statistics.
Conclusion & priority	E. To be further developed (because further work is needed on methods of measurement) with the intention that the resulting indicator would be implemented by means of periodic survey where local circumstances allowed.
References	<p>Steinberg, E. P., Tielsch, J. M., Schein, O. D., Javitt, J.C., Sharkey, P., Cassard, S.D., Legro, M.W., Diener-West, M., Bass, E.B., Damiano, A.M., Steinwachs, D.M., and Sommer, A. (1994a). The VF-14 an index of functional impairment in patients with cataract. <i>Archives of Ophthalmology</i>, 112, 630-638.</p> <p>Steinberg, E. P., Tielsch, J. M., Schein, O. D., Javitt, J.C., Sharkey, P., Cassard, S.D., Legro, M.W., Diener-West, M., Bass, E.B., Damiano, A.M., Steinwachs, D.M., and Sommer, A. (1994b). National study of cataract surgery outcomes: variation in 4-month post-operative outcome as reflected in multiple outcome measures. <i>Ophthalmology</i>, 101, 1131-1141.</p>

Candidate indicator 11

Characteristics

Perspective: Clinical

Timeframe: Cross-sectional

Outcome relationship: Direct

Title

Post-operative complications following cataract surgery:

- a) Rates of individual post-operative complications, *detected prior to discharge from hospital*, per provider-unit population having undergone cataract surgery.
- b) Rates of individual post-operative complications, *detected following discharge from hospital, and by the first out-patient appointment*, per provider-unit population having undergone cataract surgery.
- c) Rates of individual post-operative complications, *detected following the first out-patient appointment and within four months of the procedure*, per provider-unit population having undergone cataract surgery.

Intervention aim

Avoid complications following surgery in the short term.

Definition

For a given provider-unit, complication of surgery and detection period: *The number of cataract extractions in a given year which were subsequently identified within the specified detection period as suffering the specified complication, divided by the number of cataract extractions in the given year.* This fraction, expressed as a percentage, should be reported with its numerator and both as an overall figure and by patient age-group and sex.

Each of the indicators (a-c) refers to the detection of a complication within a different period of time following surgery:

- a) *Prior to discharge home from hospital.*
- b) *Following discharge home, until and including the first scheduled out-patient visit (defined as the first within one month of surgery).*
- c) *Up to and including a follow-up at four months (± 14 days) post-operation, excluding complications recorded by Indicator (a) or (b).*

The following complications are to be monitored separately for each detection period, for the purposes of deriving complication rates:

- *corneal oedema*
- *raised intra-ocular pressure*
- *wound leak*
- *uveitis*
- *cystoid macular oedema.*

Infectious endophthalmitis and retinal detachment are to be similarly monitored for reporting as sentinel events.

Capsule rupture is to be monitored as an operative complication rate under Indicator (a) and *posterior capsule thickening* is to be monitored as a late post-operative complication rate under Indicator (c).

Rationale

Post-operative complications may cause discomfort and extended hospitalisation or other increased use of resources. They may lead to an overall outcome that is poor. With appropriate consideration of patient risk factors, complication rates may draw attention to pre-, intra- and post-operative procedures which require improvement.

The specification of the three detection periods will allow the time course of the development of the more common complications within a surgical population to be tracked.

The complications identified for reporting as rates are those identified by the National Cataract Surgery Survey (Desai 1993a) to have an incidence of 1% or more for one or more of the three detection periods. Potentially devastating complications such as endophthalmitis are sufficiently rare that they are more appropriately defined as sentinel events.

Potential uses

Clinical audit; provider based comparisons.

Potential users

Clinicians; provider management; commissioners.

Possible confounders

Complication rates for cataract surgery should be considered in the context of information on co-existing ocular pathology, and other co-morbidity.

Data sources

In general, in-patient complications may be captured by diagnostic coding within the contract minimum data set. However, ICD-10 is insufficiently detailed to identify the complications specified for Indicator (a) without some risk of error. In the case of *corneal oedema*, *uveitis*, *infectious endophthalmitis* and *retinal detachment*, reasonably close approximations are available within the classification, and are listed below:

H18.2	'other corneal oedema';
H20	'iridocyclitis';
H44.0 / H44.1	'purulent/other endophthalmitis';
H33.5	'other retinal detachment'.

The coding of *capsule rupture* and *wound leak* would be covered by the general ICD-10 complications codes T81.2 ('accidental puncture and laceration during a procedure NEC') and T88.8 ('other specified complication of surgical and medical care NEC'). The use of such general codes to identify the specific complications of interest would require a subsequent review of case notes to exclude false-positives.

The other two complications monitored by the indicator are less well served by the contract minimum data set. The only ICD-10 codes available for the clinical terms *raised intra-ocular pressure* and *cystoid macular oedema* are H40.0 ('glaucoma suspect') and H35.3 ('degeneration of macular and posterior pole'), neither of which

can be considered synonymous. However, where Read-coded consultant episode data are collected, exact codes should be available: X00ea ('raised intra-ocular pressure'); F4253 ('cystoid macular oedema').

Denominator data for the indicators may be identified as consultant episodes recording an ICD-10 diagnosis code of 'senile cataract' (H25), together with an OPCS-4 procedure code (dated within the specified year) of: 'extracapsular extraction of lens' (C71); 'intracapsular extraction of lens' (C72); 'other extraction of lens' (C74) or; 'prosthesis of lens' (C71). For the subset of complications where suitable ICD or Read codes exist, numerators for Indicator (a) would then be defined by the subset of these cases including a relevant secondary diagnosis code.

The collection of numerator data for Indicators b & c, as well as more complete and accurate estimates for Indicator a, will require additional data collection and collation, based on clinical proforma completed prior to discharge and at appropriately timed out-patient follow-up appointments.

Data quality

Clinical coding of complications, whether in support of the contract minimum data set or on proforma completed at out-patient clinics, will rely on detailed instruction and guidance, if comparable codes are to be recorded by a wide range of clinical coders and clinicians. Additionally, the validity of denominator data will depend on the accuracy and completeness of clinical coding, which may not be uniformly high. In particular the possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28), should be considered.

Comments

Complication rates are sufficiently low that even on an annual basis any observed inter-unit difference may be difficult to discriminate from chance variation. Given that practice will vary between units, in terms of length of stay (especially as influenced by the day surgery rate), and the timing of follow-ups, particular care should be exercised in interpreting comparisons of complication rates for a single detection period. The total number of complications across all three periods will generally be a more robust statistic.

Further work required

None recommended.

Conclusion & priority

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

References

Desai, P. (1993a). The National Cataract Surgery Survey: II. Clinical outcomes. *Eye*, **7**, 489-494.

Candidate indicator 12

Characteristics
<i>Perspective:</i> Population
<i>Timeframe:</i> Longitudinal
<i>Outcome relationship:</i> Indirect

Title	Unplanned re-admission rate within 30 days of cataract surgery, for care of the operated eye, per provider-unit population having undergone cataract surgery.
Intervention aim	Avoid complications following surgery in the short term.
Definition	<p>For a given provider-unit and year of operation: <i>the number of emergency admissions (to any unit) for care of an eye which was subject to cataract surgery not more than 30 days earlier (in the specified year and unit) divided by the number of cataract extractions in the given year and unit.</i> This fraction, expressed as a percentage, should be reported with its numerator both as an overall figure and by patient age-group and sex.</p> <p>Admissions for care of the operated eye are defined as the initial consultant episodes within a provider spell, for which the primary diagnosis is associated with the operated eye and falls anywhere within Chapter VII of ICD-10 ‘diseases of the eye and adnexa’ - excluding the asterisk categories of eye disorders associated with diseases elsewhere in the classification.</p>
Rationale	Emergency re-admissions may result from sub-optimal care during the original admission (Henderson et al. 1989) and, in the case of cataract, those in the several weeks following surgery may be the result of serious early post-operative complications. With appropriate consideration of patient risk factors, re-admission rates may draw attention to pre-, intra- and post-operative procedures which require improvement.
Potential uses	Clinical audit; provider based comparisons.
Potential users	Clinicians; provider management; commissioners.
Possible confounders	Re-admission rates following cataract surgery should be considered in the context of information on co-existing ocular pathology present at the time of surgery, as well as other co-morbidity. Variations in local clinical practice and service provision may influence the likelihood of re-admission for different patients with similar complications.
Data sources	The denominator is defined, within the contract minimum data set, by the number of consultant episodes recording an ICD-10 diagnosis code of ‘senile cataract’ (H25), together with an OPCS-4 procedure code (dated within the specified year) of: ‘extracapsular extraction of lens’ (C71); ‘intracapsular extraction of lens’ (C72); ‘other extraction of lens’ (C74) or; ‘prosthesis of lens’ (C71).

Records relevant to the numerator will be included among consultant episodes (from any provider-unit) which have a relevant primary diagnosis code (see 'Definition' above), an emergency admission method and an episode start date that is equal to the admission date. 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 operation date and the new episode start date. The procedure described above will identify re-admissions for care of either eye. Additional local data collection (perhaps by abstraction from medical notes selected as above) will be required to identify the subset of admissions for care of the operated eye.

Data quality

The validity of indicators based on the contract minimum data set will depend on the accuracy and completeness of routine clinical coding, which may not be uniformly high. Among potential problems with the denominator is the possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28). The broad definition specified for relevant re-admissions should, however, reduce the impact of coding inconsistencies on the reliability of the numerator data.

Comments

Some re-admissions resulting from post-operative complications will be associated with primary diagnoses that are not specific to the eye.

Further work required

None recommended.

Conclusion & priority

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

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.

Candidate indicator 13

Characteristics

Perspective: Clinical
Timeframe: Longitudinal
Outcome relationship: Indirect

Title **Capsulotomy rate: indicators of the occurrence of posterior capsule thickening following cataract surgery:**

- a) *One year* capsulotomy rate, per 1,000 cataract extractions.
- b) *Five year* capsulotomy rate, per 1,000 cataract extractions.

Intervention aim Avoid complications following surgery in the short term (Indicator a).
Avoid complications following surgery in the long term (Indicator b).

Definition For a given resident population and follow-up period: *the number of cataract extractions in a given year which are associated with patients who subsequently underwent, within the specified follow-up period, ipsilateral capsulotomy as treatment for posterior capsule thickening, divided by the number of cataract extractions in the given year.* This fraction, expressed as a rate per 1,000 extractions, should be reported with its numerator both as an overall figure and by patient age-group and sex.

The indicators (a & b) refer to different follow-up periods: either

- *up to one year following surgery, or*
- *up to five years following surgery.*

Rationale Posterior capsule thickening is the commonest long term complication from cataract surgery (Royal College of Ophthalmologists 1995; Powe et al. 1994), and has the potential to compromise the visual outcome yielded by cataract extraction. It may be treated by capsulotomy. The indicator will reflect the need for capsulotomy that has been met within the population under consideration.

Potential uses Population based comparisons, particularly over time.

Potential users National/local policy makers; commissioners.

Possible confounders Comparisons between populations should be made in the context of information regarding ocular pathology co-existing at the time of cataract surgery as it may influence the occurrence of late complications.

Comparisons of the incidence of late complications will also be influenced by mortality within the populations being considered. Capsulotomies undertaken outside the NHS will not be registered by the indicator, and the occurrence of such surgery is likely to be influenced by geographical and socio-economic factors.

Data sources	<p>Denominator cases may be obtained from the contract minimum data set held by the commissioner for the population under consideration. They will correspond to those consultant episodes recording an ICD-10 diagnosis code of 'senile cataract' (H25), together with an OPCS-4 procedure code (dated within the specified year) of: 'extracapsular extraction of lens' (C71); 'intracapsular extraction of lens' (C72); 'other extraction of lens' (C74) or; 'prosthesis of lens' (C71). The procedure code must be accompanied by an OPCS-4 laterality code (Z94.2, 'right' or Z94.3, 'left').</p> <p>Numerator cases may be identified from a central database of all NHS in-patient activity, as those consultant episodes with an NHS number which matches a denominator case, and which record a diagnosis of 'other specified cataract' (H26.8), or 'cataract, unspecified' (H26.9), or 'other specified disease of lens' (H27.8) and a procedure (for the same side as the denominator case, and within its follow-up period) of 'capsulotomy of posterior lens capsule' (C73.3). This OPCS-4 code will cover both surgical and laser procedures, with the latter being identifiable by an accompanying code of 'laser therapy to organ NEC' (Y08).</p>
Data quality	<p>The validity of indicators based on the contract minimum data set will depend on the accuracy and completeness of routine clinical coding, which may not be uniformly high. Among potential problems to be considered are: possibility of miscoding between 'senile cataract' (H25), 'other cataract' (H26) and 'cataract and other disorders of the lens in diseases classified elsewhere' (H28); and incomplete coding of procedure laterality. In addition ICD-10 coding of posterior capsule thickening is insufficiently specific, and the H26.8/H26.9/H27.8 combination used in the definition may include a small proportion of unwanted cases (relating to capsulotomy for reasons other than opacification) within the numerator.</p>
Comments	<p>Caution will be required in interpreting comparisons between populations, as the capsulotomy rate will reflect both the occurrence of posterior capsule thickening and the threshold for surgery operating at local providers.</p>
Further work required	<p>The appropriate threshold for capsulotomy in response to posterior capsule thickening needs to be established.</p>
Conclusion & priority	<p>A. To be implemented generally on a routine basis.</p>
References	<p>Powe, N. R., Schein, O. D., Gieser, S. C., Tielsch, J.M., Luthra, R., Javitt, J., and Steinberg, E.P. (1994). Synthesis of the literature on visual acuity and complications following cataract extraction with intraocular lens. <i>Archives of Ophthalmology</i>, 112, 239-252.</p> <p>Royal College of Ophthalmologists (1995). <i>Guidelines for cataract surgery</i>. Royal College of Ophthalmologists, London.</p>

Candidate indicator 14

Characteristics
<i>Perspective:</i> Clinical
<i>Timeframe:</i> Longitudinal
<i>Outcome relationship:</i> Indirect

Title	Rate of referral within five years of cataract surgery, for investigation or care of the operated eye, per provider-unit population having undergone cataract surgery.
Intervention aim	Avoid complications following surgery in the long term.
Definition	For a given provider-unit and year of operation: <i>the number of new referrals (to any unit) for out-patient investigation or care of an eye which was subject to cataract surgery not more than five years earlier (in the specified year and unit) divided by the number of cataract extractions in the given year and unit.</i> This fraction, expressed as a percentage, should be reported with its numerator both as an overall figure and by patient age-group and sex.
Rationale	New referrals to out-patients (i.e. after discharge from out-patient follow-up) following surgery may be associated with a reduction in the quality of the longer term outcome experienced by the patient.
Potential uses	Clinical audit; provider based comparisons.
Potential users	Clinicians; provider management; commissioners.
Possible confounders	Re-referral rates following cataract surgery are likely to depend critically on the prevalence of co-existing ocular pathology at the time of surgery, as well as other co-morbidity. One of the more common reasons for re-referral will be for the treatment of posterior capsule thickening which varies in frequency across different surgical techniques.
Data sources	<p>The denominator is defined, within the contract minimum data set, by the number of consultant episodes recording an ICD-10 diagnosis code of ‘senile cataract’ (H25), together with an OPCS-4 procedure code (dated within the specified year) of: ‘extracapsular extraction of lens’ (C71); ‘intracapsular extraction of lens’ (C72); ‘other extraction of lens’ (C74) or; ‘prosthesis of lens’ (C71).</p> <p>Records relevant to the numerator will be included among out-patient contract minimum data set first attendance records (for any provider-unit) with a specialty function code of ‘ophthalmology’ (130). The subset of these records that relate to new referrals within five years, may be identified by linkage on the basis of the NHS number and the difference between the original operation date and the first attendance date.</p> <p>The procedure described above will identify new referrals for investigation or care of either eye. Additional local data collection (perhaps by abstraction from medical notes selected as above) will be required to identify the subset relevant to the operated eye.</p>

The success of this approach would be dependent on the extent of the implementation of the out-patient CMDS - as the five year follow-up period may mean that a significant proportion of relevant referrals are to units other than the one undertaking the original surgery.

Data quality

The completeness of the out-patient CMDS records, where relevant systems are implemented, will be open to question. Among potential problems with the denominator is the possibility of miscoding between ‘senile cataract’ (H25), ‘other cataract’ (H26) and ‘cataract and other disorders of the lens in diseases classified elsewhere’ (H28).

Comments

In the absence of widespread completion of the out-patient CMDS, and given the indicator’s requirement for additional data collection with respect to laterality, a formal cohort study may be an appropriate means of determining the re-referral rate on a sample basis.

Further work required

None recommended.

Conclusion & priority

C. To be implemented where local circumstances allow by periodic survey.

References

None.

Candidate indicator 15

Characteristics

Perspective: Patient
Timeframe: Cross-sectional
Outcome relationship: Direct

Title

General health status: cross-sectional indicators of general health status, within a provider-unit population undergoing cataract surgery:

- a) Summary of a measure of general health status, *at referral to a consultant ophthalmologist*, within a provider-unit population subsequently undergoing cataract surgery.
- b) Summary of a measure of general health status, *assessed pre-operatively*, within a provider-unit population subsequently undergoing cataract surgery.
- c) Summary of a measure of general health status, *at four months post-operation*, within a provider-unit population having undergone cataract surgery.

Intervention aim

Reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment (Indicators a & b).

Assure return of function after surgery in the short term (Indicator c).

Definition

For a given process stage (defined below), and population of patients undergoing cataract surgery at a given provider-unit in a given year: *an aggregate summary of patients' responses to a multi-dimensional health status instrument (to be specified), as administered at the given process stage*. The summary statistics, which have not been specified, will describe the distribution of scores for each dimension of the instrument, broken down by patient age-group and sex.

Each of the indicators (a-c) refers to an assessment of general health status at a different stage in the process of care:

- *at referral to a consultant ophthalmologist*
- *within one week pre-operation*
- *at four months (± 14 days) post-operation.*

The definition of a follow-up interval for a patient-level assessment (as opposed to one associated with the operated eye) is complicated by the potential for staged bilateral surgery. The following convention applies. Where the second eye is subject to cataract extraction before the four month follow-up of the first eye, the first eye is considered to be lost to follow-up. Pre-operative data for such cases are to be presented separately from those subject to follow-up.

Rationale

The case for employing general health status (alternatively, 'health related quality of life') measures in assessments of the effectiveness of clinical interventions has been argued both in general (e.g. Bowling 1991) and for cataract surgery in particular (Legro 1991). Brenner et al (1993) have demonstrated that improvements in visual function following a range of ophthalmic interventions, including cataract surgery, were associated with improvements in health related quality of life.

For present purposes, the required health status instrument should meet a number of criteria. Firstly, the measure should be broadly based in terms of the components

of health status it measures - to reduce the chances that aspects of the outcome that are of importance to patients are not excluded from consideration. Furthermore, the results relating to these different dimensions of health status should be reported separately - so that important aspects of the outcome are not obscured by aggregation. Secondly, the metrical properties of the instrument (in terms of validity, reliability, and sensitivity to clinical intervention) should have been demonstrated in the population of interest. Thirdly, the design of the instrument should meet practical considerations relating to its administration.

At least three instruments broadly meet these criteria (although estimates of reliability in a cataract surgery population are not available). The American National Study of Cataract Surgery Outcomes (Steinberg et al. 1994b) and the UK Cataract Outcome Study (Desai 1996) have both employed the Sickness Impact Profile (SIP; Bergner et al. 1981). Brenner et al (1993) used a composite instrument tapping psychological status, social functioning and general well-being in a large US multi-centre study of ophthalmic interventions. Mangione et al. (1994) in a study of around 450 American cataract patients have used the Medical Outcomes Study 36 item Short Form (SF-36; Ware & Sherbourne 1992) to demonstrate an attenuation in age-related declines in health status. The widely used Nottingham Health Profile (Hunt et al. 1993) has particular advantages in terms of simplicity of administration, but recent use in a UK cataract surgery sample suggests it may be insensitive to the effects of cataract extraction (CASPE Research, unpublished data).

The selection of a single standard instrument for the indicator should await analysis and publication of the SIP data collected by the UK Cataract Outcome Study. This database, and practical considerations relating to the administration of the SIP should then act as a benchmark against which potential alternative measures may be judged.

Assessments of general health status at referral (Indicator a) will, in combination with data on visual acuity and visual function, give an indication of whether those referrals have been made at a timely point in the development of the condition. A further pre-operative assessment, shortly before surgery (Indicator b), will similarly reflect the timeliness of the procedure. Pre-operative assessments can also act as a baseline for longitudinal measures of the change in health status, and as case mix descriptors for inter-unit comparisons.

Post-operatively, assessments of general health status provide a measure of the level of health related quality of life enjoyed by patients following surgery. The present indicator, unlike those relating to visual acuity and visual function, restricts post-operative data collection to a single point four months after surgery. This is in recognition of the difficulty of interpreting general health status data from longer term follow-ups - which will be influenced by a range of health issues unrelated to cataract.

Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Co-morbidity, and life events affecting health will influence both pre- and post-operative levels of general health status.
Data sources	<p>Although aspects of general health status are likely to be the subject of informal clinical assessment both pre- and post-operatively, such assessments are not made in a standard form. The specification of a standard form of general health status assessment would allow data on health related quality of life to be aggregated and compared between provider-units. The additional costs, in staff time etc., associated with a standardised assessment may make routine use impractical. However, many of the benefits of an indicator based on a standard assessment would accrue from periodic sampling of the relevant surgical population.</p> <p>The timings specified for the health status assessments match those of the visual acuity indicators (Indicators 7 a, b & d). Where systems are put in place to capture acuity data, a subset of patients could be identified as a cohort for parallel general health status assessment.</p> <p>The health status questionnaires described above may, in general, be administered face to face or over the telephone.</p>
Data quality	<p>Recent use of general health status questionnaires in the UK, both face to face and by telephone, has demonstrated that pre-operative and short term post-operative response rates are acceptable (Desai et al. 1996, face to face administration only; CASPE Research, unpublished data). Use of the telephone for post-operative follow-up may have a systematic effect on health status data, as those without phones are excluded from the assessments. The exclusion from formal assessment of patients with hearing or cognitive disabilities, or who are not English speaking, may also have a systematic effect on aggregate health status data.</p> <p>Inter-administrator reliability for the health status instrument will depend on appropriate instruction of interviewers and their use of interview scripts.</p>
Comments	No specific points.
Further work required	Selection of a general health status measure and possibly further pilot testing in the UK cataract surgery population. Definition of appropriate summary statistics.
Conclusion & priority	E. To be further developed (because further work is needed on methods of measurement) with the intention that the resulting indicator be implemented by means of periodic survey where local circumstances allow.

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Candidate indicator 16

Characteristics

Perspective: Patient

Timeframe: Longitudinal

Outcome relationship: Direct

Title	General health status: summary of changes, as assessed pre-operatively and four months post-operation, within a provider-unit population having undergone cataract surgery.
Intervention aim	Assure return of function after surgery in the short term.
Definition	For a population of patients undergoing cataract surgery at a given provider-unit in a given year: <i>an aggregate summary of the changes observed in individual patients, from pre-operative baseline to a follow-up at four months (± 14 days) post operation, with respect to a multi-dimensional measure of general health status (to be specified).</i> The summary statistics, which have not been specified, will describe the distribution of observed changes for each dimension of the instrument, broken down by patient age-group and sex.
Rationale	<p>While cross-sectional measures of general health status will in part reflect the success of surgery, longitudinal measures will better quantify the benefit associated with the intervention in terms of modified health related quality of life (Ziebland 1994).</p> <p>The comments on the selection of a particular health status measure, given in the rationale for Indicator 15, apply here also. The selection of summary statistics used to describe the aggregate changes in patients' responses should be informed by an examination of typical pre- and post-operative distributions and pilot testing of alternative report formats.</p> <p>The indicator presents health status changes for a follow-up period that can be expected to reflect the maximum level of benefit obtained: late enough to avoid the effects of post-operative convalescence, and early enough to avoid deterioration in health status due to extraneous factors.</p>
Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Co-morbidity, and life events affecting health will influence both pre- and post-operative levels of general health status.
Data sources	The indicators may be derived on a sample basis from the cross-sectional data underlying Indicators 15b and 15c. Linkage between pre- and post-operative data can be established on the basis of the NHS number and the date of surgery.

Data quality	The comments associated with Indicator 15 also apply here. Additionally, it is unlikely that the underlying cross-sectional data will provide complete follow-up. Presentation of the longitudinal indicators should take this into account by giving a count of those lost to follow-up and details of the distributions of their pre-operative scores, in a format that allows comparison with the corresponding distributions for those who were followed-up.
Comments	No specific points.
Further work required	Selection of a general health status measure and possibly further pilot testing in the UK cataract surgery population. Specification and pilot testing of interpretability of summary statistics.
Conclusion & priority	E. To be further developed (because further work is needed on methods of measurement) with the intention that the resulting indicator be implemented by means of periodic survey where local circumstances allow.
References	Ziebland, S. (1994). Measuring changes in health status. In <i>Measuring health and medical outcomes</i> (ed. C. Jenkinson). UCL Press, London.

Candidate indicator 17

Characteristics

Perspective: Clinical

Timeframe: Cross-sectional

Outcome relationship: Indirect

Title	Patient knowledge: summary of a measure about post-operative self-management, within a provider-unit population having undergone cataract surgery.
Intervention aim	Assure return of function after surgery in the long term.
Definition	For the population of patients undergoing cataract surgery at a given provider-unit in a given year: <i>a summary of patients' responses to a questionnaire measuring knowledge and skills associated with post-cataract self care (to be specified), administered immediately prior to discharge from hospital.</i> The summary statistics, which have not been specified, will describe the distributions of scores on the knowledge and skill dimensions of the instrument, broken down by patient age-group and sex.
Rationale	Reduced lengths of stay for cataract surgery, especially through the increasing use of day surgery, shifts the onus for post-operative care towards the patient. Effective post-operative management for cataract patients places restrictions on everyday activities, requires an awareness of symptoms that may require medical intervention, and skilled administration of eye medication. A measure of relevant awareness and skill will reflect the degree to which patients' education needs have been met. Inter-unit or time based comparisons may help identify where teaching procedures may be improved.
Potential uses	Clinical audit; provider-based comparisons.
Potential users	Clinicians; commissioners; provider management.
Possible confounders	Not considered because of early stage of development.
Data sources	A broadly suitable questionnaire has been developed and tested in Canada (the Knowledge and Skills Test or KST; Allen et al. 1992). Recent work in the UK (Rose, personal communication) has led to a revised and anglicised version of the KST. Subject to further testing of reliability and validity, the latter could be used in a brief interview of a periodic sample of cataract surgery discharges.
Data quality	The exclusion from formal assessment of patients with hearing or cognitive disabilities, or who are not English speaking, may have a systematic effect on aggregate knowledge and skill data. Inter-administrator reliability for the questionnaire will depend on the appropriate instruction of interviewers and their use of interview scripts.
Comments	The link between patient knowledge and skill following cataract surgery and subsequent levels of adverse outcome (as mediated by patient behaviour) has not been established.

Further work required Reliability and validity testing of the revised KST questionnaire.

Conclusion & priority **E. To be further developed because link with effectiveness is not clear.**

References Allen, M., Knight, C., and Strang, V. (1992). Effectiveness of a post-operative teaching programme for cataract patients. *Journal of Advanced Nursing*, **17**, 303-309.

Candidate indicator 18

Characteristics

Perspective: Patient
Timeframe: Cross-sectional
Outcome relationship: Direct

Title	Patient satisfaction: summary of a measure, within a provider-unit population having undergone cataract surgery.
Intervention aim	Assure return of function after surgery in the short term.
Definition	For the population of patients undergoing cataract surgery at a given provider-unit in a given survey period: <i>a summary of patients' responses to a questionnaire measuring satisfaction with in-patient care and out-patient follow-up (to be specified).</i>
Rationale	While patient satisfaction is itself a desirable outcome, there is also evidence that care which is less satisfactory to the patient is also less effective (Kaplan et al. 1989). It has been shown that patients' reported levels of satisfaction can reflect doctor's technical competence as judged by independent, professional assessors (Dimatteo and Hays 1980) .
Potential uses	Clinical audit; provider-based comparisons
Potential users	Clinicians; commissioners; provider management.
Possible confounders	A range of social and demographic variables have been shown to influence patient satisfaction (Fitzpatrick 1990). As a minimum, comparative analyses of satisfaction should be informed by knowledge of the age/sex mix of patients at different units.
Data sources	The Royal College of Surgeons' (RCS) comparative audit service provides an extensive and standard survey of patient satisfaction among surgical patients (Meredith and Wood 1994). The comprehensive nature of this measure, with respect to surgical interventions may make it an appropriate benchmark against which alternative generic measures (e.g. Thompson 1988; Wilkin et al. 1992; Smith 1992) may be judged, and a basis for developing a cataract surgery specific version.
Data quality	Pilot testing of the RCS instrument has reported acceptable response rates.
Comments	No specific points.
Further work required	Selection of a generic measure, or development of condition specific questionnaire, on the basis of pilot data collection experience with cataract surgery patients.
Conclusion & priority	E. To be further developed (because further work is needed on methods of measurement) with the intention that the resulting indicator be implemented by means of periodic survey where local circumstances allow.

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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 now on a routine basis (the numbers refer to the indicator specifications in Section 4):
- 1: cataract extractions: rate per 10,000 population.**
 - 6: time spent on the waiting list for elective surgery: median and inter-quartile range.**
 - 13a: capsulotomy rate, one year post-operatively per 1,000 cataract extractions.**
 - 13b: capsulotomy rate, five years post-operatively per 1,000 cataract extractions.**
- 5.2** Timely diagnosis and treatment may avert deterioration in visual function and will reduce the patient's time spent waiting for the benefit of surgery. We propose an indicator covering the **cataract extraction rate per 10,000 population**. Variation in operation rates - between different places and over time - may indicate variation in access to services; and relatively low rates may suggest unmet need. Once a decision has been made that a patient should undergo operation, it is desirable that, to gain benefit soon, the time spent waiting for care is short. We propose an indicator based on the **time spent on the waiting list for elective surgery**, measured as the wait between a consultant ophthalmologist's decision to admit and the subsequent operation. These measures can be implemented generally on a routine basis - the data are already available within the NHS.
- 5.3** We have specified indicators on the occurrence of posterior capsule thickening following cataract surgery, to be expressed as the **capsulotomy rate per 1,000 cataract extractions at one year** and at **five years** following cataract extraction. Posterior capsule thickening is the commonest long-term complication after cataract surgery. It may be treated by capsulotomy. The indicator will reflect the need for capsulotomy, as a possible adverse outcome of earlier surgery, within the treated population. The compilation of the indicator requires linkage between records of capsulotomy and records of earlier cataract surgery. With the implementation of the new NHS number nationally, it should be possible to compile this indicator routinely. We recommend that this be done.

To be implemented where local circumstances allow on a routine basis

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

- 5:** duration of wait from GP referral to out-patient appointment following referral to a consultant ophthalmologist: median and inter-quartile range.
- 7a:** visual acuity: distribution at referral to a consultant ophthalmologist.
- 7b:** visual acuity: distribution assessed pre-operatively.
- 7c:** visual acuity: distribution at one week post-operation.
- 7d:** visual acuity: distribution at four months post-operation.
- 8a:** visual acuity: summary of changes, comparing pre-operative values with those at four months post-operation.
- 11a:** rates of individual post-operative complications, detected prior to discharge from hospital.
- 11b:** rates of individual post-operative complications, detected following discharge from hospital and by the first out-patient appointment.
- 11c:** rates of individual post-operative complications, detected following the first out-patient appointment and within four months of the procedure.
- 12:** rate of unplanned re-admission within thirty days of cataract surgery, for care of the operated eye.

5.5 It is desirable that the **duration of wait from GP referral to an out-patient appointment** with a consultant ophthalmologist is short. Information on this measure of waiting time is not yet universally available as a routine in the NHS. Where such data are available, we recommend the routine compilation of an indicator based on this duration of wait.

5.6 We have specified indicators based on measures of **visual acuity** at referral to a consultant ophthalmologist, assessed pre-operatively, at one week post-operation, at four months post-operation, and at five years post-operation. Visual acuity is recorded in the patient's record both prior to and after operation as a routine. Measures of visual acuity prior to operation are useful both as an indication of severity of visual loss (i.e. as a measure of case-mix, and perhaps of delay in presentation or treatment) and as baseline measures with which to compare post-operative findings. It is likely that, increasingly, measures of visual acuity will be recorded electronically as part of a computerised patient record. Although currently the most frequently recorded visual test, there are nonetheless problems with the reliability and validity of the measure and the use of indicators based on visual function is to be encouraged.

- 5.7 We have specified indicators for the occurrence of complications following cataract surgery, measured as **complications detected prior to discharge from hospital** and complications **detected following discharge and by the first out-patient appointment**. For the purpose of deriving complication rates we have specified the detection, separately, of corneal oedema, raised intra-ocular pressure, wound leak, uveitis, cystoid macular odema, infectious endophthalmitis, and retinal detachment. We recommend that the latter two conditions be monitored for reporting as 'sentinel events' worthy of local audit on an individual event basis. For the others, the data required go a little beyond those which are generally collected and coded routinely. Where clinical proformae are completed locally, to enable the coding of such complications in the patients' records, we recommend that indicators based on them are compiled routinely.
- 5.8 The indicator based on **unplanned re-admission within 30 days of cataract surgery for care of the operated eye** requires linkage of records of surgery to subsequent re-admissions. We recommend that this indicator is compiled routinely where local circumstances allow such linkage.

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:
- 9a: **median and inter-quartile range of an index of visual function, at referral to a consultant ophthalmologist.**
 - 9b: **median and inter-quartile range of an index of visual function, assessed pre-operatively.**
 - 9c: **median and inter-quartile range of an index of visual function, at four months post-operation.**
 - 9d: **median and inter-quartile range of an index of visual function, at five years post-operation.**
 - 7e: **distribution of visual acuity, at five years post-operation.**
 - 8b: **summary of changes in visual acuity, as measured pre-operatively and five years post-operation.**
 - 14: **rate of referral within five years of cataract surgery for investigation or care of the operated eye.**
- 5.10 Visual acuity provides information on an important clinical measure of visual loss, but it does not provide a direct measure of the **visual function** experienced by patients. Although this is assessed informally in clinical practice, formal assessments are not generally recorded in a standard, structured format. Where they are (e.g. using the VF-14), and are coded in computerised records, and where there is local interest in cataract services, we recommend that indicators of visual function are compiled from time to time.

5.11 Both for **visual function** and for **visual acuity**, we have also specified an indicator based on long-term follow-up (we specified at **five years post-operation**). We do not think that long-term follow-up at a defined time interval is common in routine clinical practice. Where there is particular local interest in cataract services, long-term success in restoration of visual acuity and function is an important measure. For similar reasons, where local interests and circumstances allow, we propose an indicator based on **referral within five years of surgery for investigation or care of the operated eye**.

To be implemented following IT development on a routine basis

5.12 It is **recommended** that the following indicator be considered for implementation after further developments in information technology:

3: rate of referral to a consultant ophthalmologist per 1,000 general practice population.

5.13 It would be desirable to have a measure of **referral rates from general practices** to consultant ophthalmologists. These data are not routinely available yet but will probably become available with the development of new applications for information handling. When available, we recommend that an indicator based on referral rates be compiled routinely.

To be further developed

5.14 It is **recommended** that the following indicators need further work in either identifying their link with effectiveness or on their specification design.

2a: screening: percentage of general practitioners achieving target rates for annual screening of all patients over 75 years old.

2b: screening: percentage of general practitioners achieving target rates for annual screening of those patients over 75 years old living in residential or nursing homes.

4: rate of referral to a general practitioner per 1,000 NHS eye tests.

10a: visual function: summary of changes comparing pre-operative values with those four months post-operation.

10b: visual function: summary of changes comparing pre-operative values with those five years post-operation.

15a: general health status: at referral to a consultant ophthalmologist.

15b: general health status: assessed pre-operatively.

15c: general health status: at four months post-operation.

16: general health status: summary of changes as assessed pre-operatively with those at four months post-operation.

17: patient knowledge: summary of a measure regarding post-operative self-management.

18: patient satisfaction: summary measure.

- 5.15** If the results of further work show them to be useful, we suggest that all should be compiled by periodic survey except the first three which could be compiled routinely.
- 5.16** We have specified indicators on general practitioners' achievement of target rates for annual **screening** of people over 75 years of age. These relate to the annual general health screening rather than the data specific for visual screening (the latter data are not available). The indicator is suggested as a proxy for the detection of previously undiagnosed cataract and is based on the assumption that general practitioners with relatively high levels of annual general health screening will be more effective in identifying elderly people with undiagnosed cataract. The validity of these assumptions, and the utility of the indicator, are unproven. We suggest that further work might be undertaken to determine whether routine screening of the elderly does indeed result in any important increase in the detection of undiagnosed, treatable cataract. We have specified an indicator on **rate of referral to general practitioners per 1,000 NHS eye tests**. This is intended to reflect the extent to which serious eye disease is detected by NHS eye tests. As with the screening indicator, the relationship between routine eye testing and the detection of cataract is unproven.
- 5.17** We suggest that further work needs to be done on methods for compiling indicators of **longitudinal change in visual function comparing pre-operative and post-operative function**.
- 5.18** Successful treatment of cataract is associated with improvements in health-related quality of life. We have suggested the development of indicators of **general health status** at referral to a consultant ophthalmologist at, pre-operative assessment and at post-operative assessment; and the compilation of a summary indicator of changes in general health status. Further work needs to be undertaken to develop appropriate methods of measurement.
- 5.19** Reducing lengths of stay for cataract surgery, especially the increased use of day surgery, shifts the responsibility for post-operative care further towards the patient. A measure of **patient knowledge about post-operative self-management** may help identify where patients' needs in this respect have been met and where further improvement may be needed. The potential usefulness of this indicator is untested and we have therefore recommended that this be developed further. We have also suggested the development of further work on measures of **patient satisfaction** with cataract surgery and its outcome.

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, a feasibility study of potential outcome indicators was published by the Faculty of Public Health Medicine in 1993 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 wider influences 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 1993) 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 were 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 for 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 in consultation when appropriate with other Colleges and Faculties.

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 a selected and opportunistic set 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 10 clinical topics in the first two years.

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 the 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 The Group was influenced in its work by considering the potential uses of outcome information, 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 assessing geographical variation and trends over time in the delivery of services, making comparisons 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'
- evidence-based commissioning
- clinical audit.

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 to develop uses of aggregated statistical information about people with particular conditions which could be used to:

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

A.15 Information for outcome indicators 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 The use of health indicators in practice is more likely to be successful if the measures on which they are based 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*, in that professionals use the measures on which they are based in treating their patients and will record them accurately.
- *Reliable*, in that they can be validated or checked against other sources.
- *Responsive*, in that they readily identify changes in the patient's state health.
- *Research-based*, in that there is a known link between processes of care and outcome.

A.17 In common with the approach taken to other types of indicators by the NHS, the Group recognise that useful outcome indicators would 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 recognised 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. Assessing the outcomes of routine practice entails, by definition, the use of observational rather than experimental data.

A.18 To be useful, work on 'ideal' outcome indicators 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: CATARACT WORKING GROUP

B.1 The Cataract Working Group was formally constituted in January 1996 and met twice, completing its work in August 1996. The Report was completed in December 1996. The terms of reference were:

- To advise on indicators of health outcomes of the prevention and treatment of cataract, including the prevention of adverse outcomes of delayed treatment
- 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 professional and managerial groups involved with cataract as well as individuals representing patients' perspectives.

Chairman and members:

Ophthalmologists	Ralph Rosenthal	Leicester (Chairman)
	James McGill	Southampton
	John Sparrow	Bristol
	David Gartry	London
Physician	Rowan Harwood	London
Nurse	Heather Waterman	Manchester
GP	Justin Allen	Leicestershire
Public health	Parul Desai	London
	Catherine Brogan	Oxford/Anglia
Researcher	John Harding	Oxford
CEOs	Lynda Hamlyn	Northampton Health Authority
	John Langan	Kingston NHS Trust
Voluntary body	Maureen Mathews	Aylesbury
NHS Trust Federation	Ross Tristem	London

Academic support and secretariat:

Michael Goldacre, Alastair Mason and John Fletcher, University of Oxford
James Coles, Robert Cleary and Sallie Curtis, CASPE Research, London
Alison Eastwood, NHS Centre for Reviews and Dissemination, University of York
Andrew Long and Paul Dixon, UK Clearing House on Health Outcomes, Nuffield Institute for Health, University of Leeds

APPENDIX C: METHODS FOR CHOOSING INDICATORS

C.1 Candidate outcome indicators were identified by the Group with the help of the following:

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

C.2 The Group noted that indicators may be related to:

- i. risk factors in the general population or relating to the individual
- ii. knowledge, attitudes including satisfaction with service delivery, and care-seeking behaviour of individual patients with cataract
- iii. patients' symptoms, function, health status and well-being
- iv. patients' physiological/pathological state
- v. events occurring to patients as a result of their cataract and its treatment
e.g. contacts with general practitioners or optometrists, issuing of prescriptions, out-patient visits, in-patient admissions.

C.3 The data sources for the indicator entities noted in paragraph C.2 will differ. It is likely that:

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

C.4 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 using sample survey techniques when it is not essential to have continuously collected information.

C.5 Three 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 C.6)
- measurement timeframe (see paragraph C.7)
- outcome relationship, in that the indicator is either a direct or an indirect, proxy measurement of outcome (see paragraph C.8).

- C.6** For the Group's purpose the measurement perspective was classified as that of the patient, the clinician, or the population. In the treatment of cataract, for example, a measure of quality of life may be most relevant to the patient's perspective while clinical concerns may properly focus on measures of visual acuity. The population perspective has a broader view, best addressed by measures able to assess the burden of the condition 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.
- C.7** The measurement timeframe relates to whether the indicator is:
- cross-sectional: an indicator at a single point in time for any one individual, for example the prevalence of visual acuity below a certain level
 - longitudinal: a measure of progression over time for any one individual, for example the change in visual function in individuals.
- C.8** 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 processes of care 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. Where indicators of direct outcome are difficult to obtain, some proxy indicators were considered.
- C.9** There is an increasing recognition of the importance of outcome measures derived from data generated by patients. For the purposes of the work, three main areas of interest have been identified:
- impact of the condition on the patient
 - satisfaction of the patient with the care provided
 - the patient's awareness of the management of the condition.
- C.10** With the assistance of the check-lists and the cataract model, 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, care or cure of the disease?

APPENDIX D: GUIDANCE NOTES FOR INDICATOR SPECIFICATIONS

Title	A short title to identify the indicator.
Intervention aim	<p>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 cataract these stages are:</p> <ul style="list-style-type: none">- reduce or avoid adverse effects of inappropriate delay in diagnosis and treatment- avoid complications following surgery <i>in the short term</i>- avoid complications following surgery <i>in the long term</i>- assure return of function after surgery <i>in the short term</i>- assure return of function after surgery <i>in the long term</i>.
Characteristics	<p>Classifies the indicator on three dimensions:</p> <ul style="list-style-type: none">- Perspective: <i>population, clinical or patient</i>.- Timeframe: <i>cross-sectional</i> measure or <i>longitudinal</i> assessment of change.- Outcome relationship: whether it is a <i>direct</i> measure of outcome or an <i>indirect</i> measure of structure or process, used as a proxy for outcome.
Indicator definition	<p>In addition to a definition of the variable of interest, the description specifies:</p> <ul style="list-style-type: none">- 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; whether absolute difference or proportional change.
Rationale	<p>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.</p>
Cataract definition	<p>A single definition of cataract has been used as shown in paragraph 2.1. Its application is affected by the rationale, and data sources used and these factors are addressed in each indicator definition.</p>

Potential uses	<p>The following classification has been used:</p> <ul style="list-style-type: none">- local management of practice- local audit- provider based comparisons- population based comparisons- assessment of regional / national trends or progress towards targets. <p>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.</p>
Potential users	<p>The following classification has been used:</p> <ul style="list-style-type: none">- clinicians- provider management- commissioners- national/regional policy makers- consumers/public.
Possible confounders	<p>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.</p>
Data sources	<p>Where possible, existing sources of data for deriving the indicator and the degree to which complete coverage of the population of interest would be obtained, have 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.</p>
Data quality	<p>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.</p>
Comments	<p>General comments regarding the indicator's definition, validity, practicality etc..</p>
Further work required	<p>Suggestions about the additional research and development work required to complete the indicator's specification to a level appropriate for large scale piloting.</p>
Conclusion & priority	<p>A statement indicating the Working Group's assessment of the priority for implementation.</p>
References	<p>Appropriate references used in the construction of the indicators.</p>

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