CLINICAL STUDY

The population requirement for cataract extraction: a cross-sectional study

ANDREW FROST, CHERIDA HOPPER, STEPHEN FRANKEL, TIM J. PETERS, JENNY DURANT, JOHN SPARROW

Abstract

Purpose **To examine the distribution in the population of indications for cataract extraction in order to relate demand for this procedure to the capacity for satisfying it.**

Methods **An age-stratified random population sample of 2783 individuals aged 55 years and over was taken from inner-city, urban and rural areas of Avon and Somerset. The requirement for cataract extraction was estimated on the basis of measures of vision-related quality of life, refracted visual acuity, and application of the Oxford Clinical Cataract Classification and Grading System. Data were also collected concerning suitability for surgery, including relative contraindications to surgery and whether participants considered their eyesight bad enough to merit surgery. Three sets of composite indications were defined.**

Results **Estimated prevalent requirements for cataract extraction for the three sets of composite criteria were: 29 per 1000 aged over 55 years (95% CI 20–41) for the most inclusive criterion; 17 per thousand (95% CI 10–27) for the intermediate criterion; and 7 per thousand (95% CI 3–14) for the most stringent criterion. These rates are equivalent to a national prevalent requirement for England of 384 000 for the most inclusive criterion. If the approximately 15% of individuals whose desire or fitness for surgery was questionable are removed from this estimate, the prevalent requirement, including the backlog from previous unsatisfied demand, becomes 325 000 individuals.**

Conclusions **The findings suggest only a modest imbalance between supply and demand for cataract surgery. In particular there was a very small prevalence of untreated severe cataract, less than the annual health service surgical capacity, suggesting that the current National Health Service surgical capacity is adequate for cases of severe cataract.**

Key words Cataract prevalence, Cataract surgery rates, Quality of life

The prevailing belief amongst eye-care professionals is that the need for ophthalmic intervention far exceeds the capacity of the available health care services. Such a belief has led to suggestions that cataract surgery may need to be rationed, perhaps by setting visual acuity criteria or by restricting the access of some patients to surgery by skilled ophthalmologists. While there is no doubt that priorities must be determined in health care, as in all areas of public policy,[1] the tenor of the rationing debate can have the effect of legitimising under-provision or sub-optimal care. The increasing interest in 'evidence-based rationing'[2] tends not to extend to an interest in evidence that might question the necessity for rationing in some areas of provision.[3,4] Indeed, rationing decisions are seldom based on clinically relevant and secure data. The findings reported here arise from research designed to introduce more evidence to the rationing debate.

Cataract surgery has in recent years become a safe and cost-effective intervention for one of the commonest causes for incapacitating visual loss in older people. Lack of access to cataract surgery is one of the many hazards faced by the populations of poorer countries[5] but it is unclear why such readily reversible morbidity has to burden older people in wealthy countries such as the UK[6,7] where, paradoxically, much of the interest in rationing is to be found.

The methodological approach used here, which can be described as the epidemiology of indications, goes beyond the conventional measures of pathology to incorporate those additional features that inform the decision to treat.[8] These features include the impact of pathology upon the individual's quality of life. The existing record in ophthalmological epidemiology offers good data on the population distribution of eye disease,[9–11] but the uncertain relationship between pathology and the capacity to benefit from surgery means that such data provide only a limited basis for judging the requirement for cataract extraction. This study was designed to examine the relationship between the potential demand and the supply of cataract extraction surgery.

A. Frost
J. Durant
J. Sparrow
Bristol Eye Hospital and University of Bristol
Bristol, UK

C. Hopper
MRC HSRC, Department of Social Medicine
University of Bristol
Bristol, UK

S. Frankel
T.J. Peters
Department of Social Medicine
University of Bristol
Bristol, UK

John Sparrow, DPhil, FRCOphth ✉
Bristol Eye Hospital
Lower Maudlin Street
Bristol BS1 2LX, UK

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Method

Sample selection and study design

An age- and sex-stratified random sample of 2783 individuals aged 55 years or over was drawn from the population originally sampled for the Somerset and Avon Survey of Health (SASH).[12,13] The target numbers for the strata were determined by the age–sex distribution of England and Wales from the 1991 census.[14] The original SASH study sampled patients aged 35 years or over from 40 practices in Avon and Somerset. The time schedule for the present study, The Somerset & Avon Eye Study (SAES), meant that only patients registered at the first 19 general practices in this sequence were included. These patients were sent a postal invitation to attend a study clinic at the Bristol Eye Hospital. Non-responders were contacted by telephone where possible or mailed a second invitation. If there was no reply to the postal invitations, or if the person was unable or unwilling to attend, information was collected on vision-related quality of life and utilisation of eye care services, either by telephone, postal questionnaire or home visit.

Clinic protocol

Clinics took place between May 1996 and August 1997. All examinations and tests at these clinics were performed by members of the research team, and included history taking, refraction, visual function tests, ocular examination using a slit-lamp, assessment of quality of life and utilisation of eye care services.

Subjective refraction was attempted on all subjects who attended the study clinic. The refracted visual acuity was measured with the ETDRS (logMAR) chart.[15] In the 9 right eyes and 10 left eyes where refraction could not be accomplished (usually for clinical reasons) the habitual acuity, with spectacles if worn, was substituted. For the purposes of presentation the logMAR acuity values were converted into their Snellen equivalents.

Cataract was measured according to the decimalised version of the Oxford Clinical Cataract Classification and Grading System.[16,17] The lens was examined at the slit-lamp and the appearance compared with standard diagrams. Each lens feature was graded from 0.0 (minimal or absent) to 5.0 (severe) in 0.1 steps. The system was modified to grade the area of the lens within a central circle of 4 mm diameter, because central opacities are considered to be the most important visually. The five cataract features which are most commonly assessed by ophthalmologists were included,[18] namely posterior subcapsular opacity, anterior subcapsular opacity, cortical spokes, nuclear colour (brunescence) and nuclear opalescence (white scatter). Posterior subcapsular opacity, anterior subcapsular opacity and cortical spokes were graded according to the proportion of lens area occupied. The relevant grades for nuclear colour included 2.0 (yellow), 3.0 (orange) and 4.0 (brown). Nuclear opalescence was judged by comparing the apparent brightness of the lens nucleus in the slit-lamp beam with the reference standards in the Oxford system.

Vision-related quality of life impairment was measured with the VCM1 questionnaire.[19,20] The VCM1 contains 10 broadly applicable items referring to physical, social and psychological issues and acts as a global measure of concern about vision. The VCM1 score ranges from 0.0 (no concern) to 5.0 (extreme concern) and is strongly associated with responses to questions about a wide range of quality of life issues including mobility, reading and leisure.

Table 1. *Composite criteria for cataract surgery requirements*

Composite criterion	Visual criteria	Ocular criteria (affected eye)	
		Ocular co-morbidity absent	Ocular co-morbidity present
A	Self-reported poor vision in the affected eye *and* acuity 6/6 or worse in the affected eye *and* VCM1 score >1.0	PSC > 1/3 of the central lens area, *or* ASC > 1/3 of the central lens area, *or* CSP > 1/3 of the central lens area, *or* NC > 2.0 *or* NO > 3.0	PSC > 2/3 of the central lens area, *or* ASC > 2/3 of the central lens area, *or* CSP > 2/3 of the central lens area, *or* NC > 2.5 *or* NO > 4.0
B	Self-reported poor vision in the affected eye *and* acuity 6/9 or worse in the affected eye *and* VCM1 score > 1.5	PSC > 1/3 of the central lens area, *or* ASC > 1/3 of the central lens area, *or* CSP > 1/3 of the central lens area, *or* NC > 2.0 *or* NO > 3.0	PSC > 2/3 of the central lens area, *or* ASC > 2/3 of the central lens area, *or* CSP > 2/3 of the central lens area, *or* NC > 2.5 *or* NO > 4.0
C	Self-reported poor vision in the affected eye *and* acuity 6/9 or worse in the affected eye *and* VCM1 Score > 2.0	PSC > 1/2 of the central lens area, *or* ASC > 1/2 of the central lens area, *or* CSP > 1/2 of the central lens area, *or* NC > 2.5 *or* NO > 3.5	PSC > 3/4 of the central lens area, *or* ASC > 3/4 of the central lens area, *or* CSP > 3/4 of the central lens area, *or* NC > 3.0 *or* NO > 4.5

PSC, posterior subcapsular opacity; NC, nuclear colour, brunescence; NO, nuclear light scatter, opalescence; CSP, cortical spokes; ASC, anterior subcapsular opacity.
Ocular co-morbidity was defined as present in the affected eye if one or more of the following conditions were present in the affected eye: history of retinal detachment or retinal tear, strabismus or lazy eye, central corneal opacity, previous intraocular surgery, advanced age-related macular degeneration, other retinal pathology involving the fovea, optic neuropathy.

Criteria defining requirement for cataract surgery

The definitions of requirement for cataract surgery were based on three visual criteria in conjunction with five lens opacity types (Table 1, Fig. 1). All the visual criteria needed to be met but only one of the five lens features was required. The criteria were stricter if ocular co-morbidity was present in the affected eye as ocular co-morbidity tends to either increase the risk of complications or reduce the scope for visual improvement, and is thus a relative contraindication to cataract surgery. Many surgeons in the UK are prepared to consider cataract extraction for patients with visual acuities as good as 6/6 Snellen.[21] Comparatively liberal acuity criteria were therefore chosen in order both to reflect modern surgical practice and to avoid precluding surgery in those with good visual acuity but impaired quality of life.

The various criteria were combined to produce the three composite criteria as shown in Table 1, with criterion A being the least stringent and criterion C the most stringent. Data on suitability for surgery under local anaesthetic were collected by asking questions concerning individuals' ability to lie flat on their back and still for an hour, and their reasons if they felt that this would be difficult. These explanations included difficulty breathing, pain of various sorts, stiffness, dizziness, cough or other problems, and a history of epilepsy. They were also asked about a history of allergy to local anaesthetic. Their willingness to undergo surgery was determined by asking whether, if they had a serious eye-sight problem, and there was an operation for it, they would be prepared to have the operation.

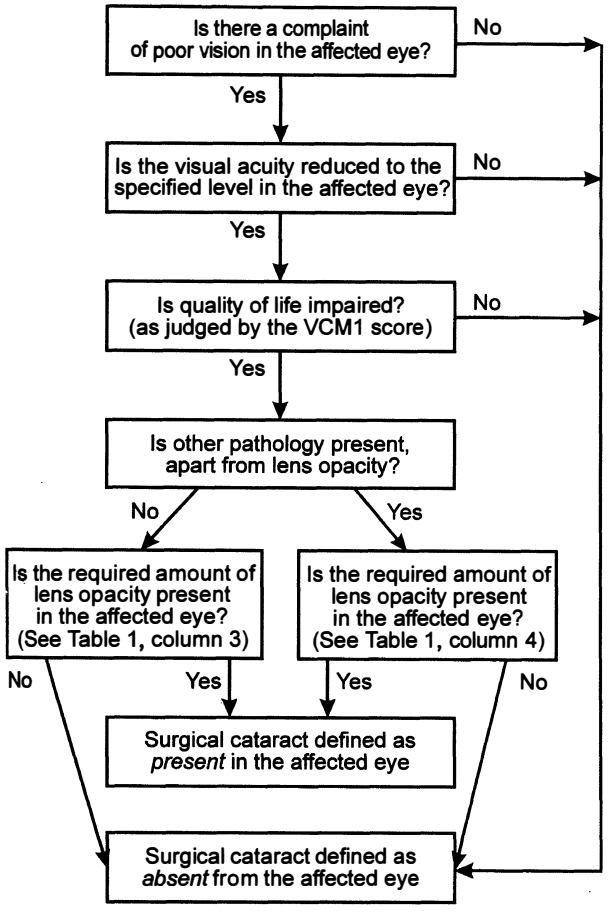

Fig. 1. *Flow diagram illustrating the application of criteria to determine the presence or absence of 'surgical' cataract.*

Statistical methods

The representativeness of the clinic attenders in relation to the sample drawn from the practices was investigated first by considering the age–sex distributions (using age at sampling for the SAES) and self-reported cataract (from the original 1993/94 SASH study) of clinic attenders and those responding to the telephone, postal or home visit questionnaires. Second, descriptive statistics of self-reported vision-related quality of life and use of optometrists were compared between clinic attenders and subjects providing information by telephone, post or home visit.

Standard methods for the estimation of overall and age/sex-specific prevalence of requirement for cataract extraction (with 95% confidence intervals) were applied using the various composite criteria given in Table 1 (using age at clinic visit). These criteria were first applied to the data obtained by the study on each eye separately to determine the numbers of (left and right) eyes requiring cataract extraction. The next step was to calculate the numbers of people requiring cataract extraction, either unilateral or bilateral. The prevalences were then calculated first on the basis of the numbers of people (per 1000) requiring cataract extraction (either unilateral or bilateral), and second on the basis of the total number of eye operations required (per 1000 people).

Calculation of the total number of eyes meeting the criteria is likely to overestimate the number of operations actually required because a proportion of individuals with bilateral cataract will not have second eye surgery. An adjustment was therefore made to estimates of the total number of operations on the assumption that 50% of individuals with bilateral cataract would proceed to second eye surgery.[22–24] For the prevalences relating to the numbers of people requiring a cataract operation, corrections to the confidence intervals were performed to allow for the clustering effects of sampling the individuals through the 19 general practices. Given that the numbers of bilateral cases were so small, ignoring the intra-subject (between eye) correlation would not materially affect the widths of the confidence intervals for the number of operations required.[25] The observed age- and sex-specific prevalences of operations required under the various criteria were then applied to the population of England from the 1991 census. These estimates of population prevalence were calculated assuming that all first eye and 50% of second eye operations would be performed.

Table 2. *Age–sex distributions and response rates of clinic attenders and other responders in relation to the total sample*

Age in (years)[a]	Total sample[b] *n* (%)	Clinic attenders *n* (%)	Attendance rate	Other sources[c] *n* (%)	Response rate[d]
Women					
55–64	498 (34)	210 (36)	42%	145 (32)	71%
65–74	493 (33)	219 (38)	44%	129 (28)	71%
75+	482 (33)	147 (26)	30%	183 (40)	68%
Total	1473 (100)	576 (100)	39%	457 (100)	70%
Men					
55–64	471 (40)	177 (35)	38%	119 (37)	63%
65–74	422 (36)	211 (42)	50%	109 (34)	76%
75+	281 (24)	114 (23)	41%	91 (29)	73%
Total	1174 (100)	502 (100)	43%	319 (100)	70%

[a]Age at sampling.
[b]Excluding those dead or moved.
[c]Telephone interview, postal questionnaire or home visit.
[d]Figures given are overall response rates, that is, the percentage of individuals about whom some information is known either by clinic attendance or other means.

Results

Of the 2783 individuals aged over 55 years sampled from the 19 practice registers, 136 were found to have died or were no longer at the address on the register. Of the remaining 2647, 1078 (41%) attended the research clinic at the Bristol Eye Hospital. The ages of those who attended the clinic ranged from 55 to 95 years with median 68 years and mean 68.9 years. The age–sex distributions of the whole sample, of the clinic attenders and of the other responders (telephone interview, postal questionnaire or home visit) are given in Table 2, along with the clinic attendance rates and overall response rates. Although the clinic attendance rates were much lower than the overall response rates, for both sexes the age profiles of clinic attenders were broadly representative of the whole sample. Nevertheless, women aged 75 years and over were under-represented amongst clinic attenders, and men in the 65–74 years age group were over-represented in comparison with the whole sample. Information on self-reported cataract from the original SASH study was available on 2401 (91%) of the 2647 individuals in the present study. For the three groups (clinic attenders, other sources and non-responders), the proportion who reported cataracts were 9.4%, 8.2% and 6.5% respectively (chi-squared on 2 degrees of freedom = 4.4, $p = 0.11$). Thus the proportion who reported cataract was slightly higher amongst those who responded.

Table 3 presents descriptive statistics regarding the representativeness of the clinic attenders in terms of variables relating to vision-related quality of life (VR-QOL) and utilisation of eye care services. There were slightly higher prevalences of VR-QOL impairment (using scores of > 1.0 and > 2.0 as criteria) in the clinic attenders, compared with those from whom information was obtained by telephone interview, postal questionnaire or home visit. The proportion of subjects who had attended an optometrist in the previous 2 years was close to 70% for both groups.

From Table 4, depending on the composite criterion applied, up to 27 persons per 1000 population aged 55+ years required at least one cataract extraction. With stricter criteria (in particular that relating to the threshold for the VCM1 score), this prevalence reduced to 6 per 1000. From the widths of the confidence intervals of these estimates, statistical precision was reasonable in comparison with the much greater impact of changing the composite criteria. In contrast, given the small numbers of bilateral cases, estimating the total numbers of cataract extractions required led to little change in the prevalence figures (Table 4); the assumption that 50% of people with bilateral cataracts have a second eye operation has therefore had relatively little impact. The screening questions indicated that 15.4% of individuals may not be suitable for surgery under local anaesthetic. Ninety-six per cent of those eligible for cataract surgery within criterion A indicated that they would accept surgery if offered.

Table 3. *Comparisons between participants who attended the research clinic and those for whom other sources of information were used*

	Clinic attenders	Other sources[a]
Mean VCM1 score	0.47	0.29
Median VCM1 score	0.2	0.0
Inter-quartile range for VCM1 score	0.0, 0.6	0.0, 0.3
Prevalence of VCM1 score >1.0	14.8%	10.2%
Prevalence of VCM1 score >2.0	4.8%	4.4%
Attended optician in last 2 years	72% (765/1069)	70% (511/728)

[a]Telephone interview, postal questionnaire or home visit.

Table 4. *Prevalence estimates for requirements for cataract extraction according to various criteria*

Criterion for cataract surgery	No. eyes per 1000 requiring CE		No. people requiring CE per 1000 aged 55+ (95% CI[b])	Estimated[c] total no. CE operations required per 1000 persons aged 55+ (95% CI[b])
	Right eye (n = 949[a])	Left eye (n = 961[a])		
A	14.8	15.6	27 (17, 39)	29 (20, 41)
B	10.5	8.3	16 (9, 26)	17 (10, 27)
C	5.3	2.1	6 (2, 13)	7 (3, 14)

The prevalence estimates relate to the 55+ age group.
CE, cataract extraction.
[a]Excludes 56 right and 48 left eyes in which CE was already performed.
[b]95% CI calculated without correcting for clustering.
[c]Assuming 50% of people with bilateral catarct (all of whom were aged over 75 years) have second eye surgery.

For comparison with the North London Eye Study[11] the subject prevalence of completed cataract surgery in 65+ years age group in our clinic sample was 9.6%.

Table 5 presents the age- and sex-specific prevalences of the numbers of cataract extractions required. As expected, the prevalence increases with age, particularly for the 75+ years age group. There are less clear differences between the sexes, with no overall pattern and few differences which are beyond the levels of precision of the estimates for any of the criteria. Using these age- and sex-specific prevalences, Table 6 presents the projected numbers of operations which would be required under the various criteria in England, using the 1991 census data, assuming that all first eye and 50% of second eye operations would be performed. Clearly the numbers vary widely across these three criteria, with that projected from (the relatively strict) criterion C being considerably lower than those from the other two criteria.

Discussion

This study is the first population survey in the UK to combine detailed cataract grading with measurements of both visual acuity and vision-related quality of life.

Other studies

A number of studies describing the epidemiology of cataract have been reported recently. Wormald *et al.*[9] examined 207 individuals aged 65 years and older drawn from the register of a health centre in inner London. Snellen acuity was measured, though lens opacities were not formally graded and subjects did not undergo refraction. Only 8 of 16 patients with low vision were known by their general practitioner to have an eye problem, and cataract accounted for 75% of cases with low vision. The North London Eye Study examined 1547 individuals drawn from the registers of 17 general practices.[11] LogMAR visual acuity was measured with the habitual correction. Cataract was graded according to the LOCS II system.[26] The prevalence of cataract causing visual impairment was 30% although it is unclear how the LOCS grades were used in the prevalence calculations. A second Melton Eye Study is currently in progress, with lens opacities graded according to the Oxford system and refracted visual acuity measured in logMAR.[10] Our interest in both ocular pathology and quality of life makes comparison of our principal findings with these studies difficult, although two other studies have the potential for performing similar analyses, albeit with restricted ranges of cataract subtypes.[27,28]

Representativeness

There are a number of aspects of this study that must be considered before the implications of the findings can be discussed. The age–sex distributions of clinic attenders and other responders were similar to the overall sample, and so reasonably representative. Information was available on 70% of the sample, but the attendance rate at the clinic was low at 41%.

The similarity of clinic attenders and other responders in terms of vision-related quality of life impairment and use of optometric care nevertheless suggests that the attenders are reasonably representative of the overall sample. Moreover, the higher prevalences of self-reported cataract and vision-related quality of life impairment amongst the clinic attenders suggest that the research clinic, like the VCM1 questionnaire survey as a whole,[13] may have attracted individuals with visual morbidity. This argues against the underestimation of cataract prevalence.

Table 5. *Estimated number of cataract operations required per 1000 population in specific age groups*

Criterion	Women				Men				Both sexes
	55–64	65–74	75+	All (55+)	55–64	65–74	75+	All (55+)	All ages (55+)
A	0 (0, 19)	19 (5, 49)	89 (72, 108)	29 (20, 41)	6 (0, 35)	16 (3, 45)	84 (68, 103)	28 (19, 40)	29 (20, 41)
B	0 (0 19)	5 (0, 27)	57 (43, 73)	15 (8, 25)	6 (0, 35)	10 (1, 37)	65 (51, 82)	22 (14, 33)	17 (10, 27)
C	0 (0, 19)	5 (0, 27)	24 (15, 36)	8 (3, 16)	0 (0, 23)	0 (0, 19)	28 (6, 80)	7 (3, 14)	7 (3, 14)

Estimated number of cataract operations required per 1000 population, assuming bilateral cataract surgery is performed on 50% of those with bilateral cataract. The 95% confidence limits are shown in parentheses.

Table 6. *Population projections for requirement for cataract extraction*

Age (years)	Pop N males	Pop N females	Criterion A PR/1000 males	Criterion A PR/1000 females	Criterion A Total CEs needed	Criterion B PR/1000 males	Criterion B PR/1000 females	Criterion B Total CEs needed	Criterion C PR/1000 males	Criterion C PR/1000 females	Criterion C Total CEs needed
55–64	2368	2461	6	0	14 208	6	0	14 208	0	0	0
65–74	1902	2329	16	19	74 683	10	5	30 665	0	5	11 645
75+	1169	2217	84	89	295 509	65	57	202 354	28	24	85 940
Total					384 400			247 227			97 585

Pop N, population of England in thousands; PR/1000, prevalence rate per 1000 assuming 50% with bilateral cataract have both operations; CE, cataract extraction.

It is also possible to compare the morphological grades of cataract found in the SAES with the second Melton Eye Study.[10] There were slightly fewer posterior subcapsular and cortical opacities in the SAES sample, but when the cataract features were present their scores for severity were all slightly higher in the SAES. It therefore appears that the levels of objectively measured cataract reported here are comparable with those found elsewhere (though only a proportion of these cases met the 'surgical' eligibility criteria of cataract severity, visual impairment and quality of life impairment). Furthermore, the amount of completed cataract surgery in the clinic sample (subject prevalence 9.6% in the 65+ years age group) was also similar to that in the North London Eye Study[11] (10%) and in the National Diet and Nutrition Survey[29] (9.7%). This is reassuring in terms of the generalisability of the findings. It should be noted that the amount of completed cataract surgery is the combined result of National Health Service (NHS) and private sector activity.

Accuracy of the estimates

The indications for cataract surgery are necessarily imprecise in that a generally accepted case-definition of cataract, and a comprehensive set of indications based upon patient-centred outcomes, is not presently available. The determination of such indications from purpose-designed outcome studies would be helpful. The limitations of vision test results, particularly visual acuity, are well recognised,[22,30] and there is growing awareness of the importance of vision-related quality of life in judging the appropriateness of surgery.[31,32] This study was designed to reflect clinical practice in these respects, but with the advantage of standardised methods of data collection. The data permitted the construction of a set of realistic case scenarios which can be directly translated into prevalence figures for indications for surgery at a population level.

Lens opacities form a continuous spectrum of severity, and the estimates presented are based upon pragmatic clinical criteria. Tables 4 to 6 illustrate the high sensitivity of prevalence estimates to small changes in surgical thresholds. Criterion A may be regarded by some as too lax, but the presentation of different levels of stringency allows for a range of opinion. The relatively small proportion of bilateral cases means that limiting the number of second-eye surgeries would have little effect on the *prevalent* surgical requirement (although a larger impact on the *incident* requirement would be expected). If the presence of ocular co-morbidity were completely ignored in decision-making, the estimate for criterion A would rise by approximately 37%. Ignoring severe ocular co-morbidity such as advanced macular degeneration in cases of mild cataract would, however, be unrealistic. The other, equally unrealistic, extreme would be to consider the presence of ocular co-morbidity to be an absolute contraindication to surgery. This would lead to a reduction of the estimate for criterion A by approximately 20%.

The main finding is that the prevalent requirement for cataract extraction is estimated as 384 000 in England according to the least restrictive criterion applied. This figure will be an overestimate of the true prevalent requirement as a proportion of these individuals would not tolerate or accept surgery. If the approximately 15% of such individuals are removed from this estimate, the prevalent requirement becomes some 325 000.

Further support for the validity of the findings comes from routine NHS data. The prevalence of operable morbidity observed during the period of the study summarises the relationship between incident disease on the one hand, and exit from the prevalence pool through treatment, death, the development of co-morbidity or unwillingness to undergo treatment on the other. The numbers leaving the prevalence pool through treatment are now in excess of 163 000 receiving cataract extractions in the NHS in England[7] as well as the unknown number performed in the private sector. Some 50% of ophthalmic surgery is cataract extraction.[33] The median waiting time for cataract surgery was 152 days, compared with the overall median waiting time for all ophthalmic surgery of 88 days.[34] Waiting list figures by diagnosis are not routinely available, but these statistics are consistent with cataract contributing some 100 000 of the 174 400 people known to be waiting for admission for ophthalmological elective surgery in June 1998.[7] The discrepancy between our estimate and the numbers known to be receiving treatment or known to be waiting for treatment will comprise those not presenting for treatment and those moving directly into the private sector.

Recently the current 'backlog' of people aged 65 years and older in England and Wales with vision-impairing cataract was estimated to be 2.36 million, based on results from the North London Eye Study (NLES).[35] It is not possible to compare the NLES directly with the present study because of differences in cataract grading,

but in those aged 65 years and older in the present study, the prevalences of cataracts by various criteria were reduced by a factor of approximately 7.5 to 9.5 when ocular co-morbidity, dissatisfaction with vision (or VCM1 score > 2.0), willingness to undergo surgery and uncorrected refractive error were taken into account. If such additional considerations were applied to the estimate from the NLES, the backlog identified in the NLES would become approximately 248 000 to 315 000, much closer to the estimates from the present study. The residual smaller discrepancies between the results of the two studies could easily have arisen from differences in vision testing, cataract grading and the method of dealing with ocular co-morbidity.

Matching cataract surgery rates to population requirements

International comparisons may be of interest. The total number of cataract extractions performed in English NHS hospitals during 1996/7 was 163 000,[7] eqiuvalent to a crude rate of 3.3/1000. The numbers performed in the private sector are not known. Comparisons with other industrialised countries shows a considerable range of operative activity, though these estimates differ in the extent that they capture private activity and the extent to which demand is regarded as being met. Reported rates are 3.8/1000 in Denmark in 1995,[36] 4.6/1000 in Finland in 1995,[36] 6.1/1000 in Germany in 1996,[37] 6.6/1000 in Belgium in 1995,[36] 7.0/1000 in the USA in 1996,[38] 7.1/1000 in Australia in 1995/6,[36] 7.6/1000 in Holland in 1995[36] and 8.3/1000 in Canada in 1995/6.[36] The New Zealand crude rate was 1.8/1000 in 1996/7 (New Zealand Information Service, personal communication 1999). The rate published for Sweden of 4.5/1000 in 1992[39] had risen to 6.5/1000 in 1998 (U. Stenevi, personal communication 1999). It is not possible to infer a desirable rate from such comparisons as over-treatment can occur as well as under-treatment.

The incidence estimate from the NLES was approximately 1 million new cases over 5 years,[35] which is similar to the current national surgical capacity and less than the intended surgical capacity of 250 000 operations per year by 2003.[40] Because the NLES incidence estimate was modelled from the prevalence result, the incidence figure is almost certainly an overestimate, for the reasons given above. This means that the current national surgical capacity may already be sufficient for managing incident disease. These findings underline the need for future population-based epidemiological data on the incidence of surgically defined cataract. Assuming adequate precision such data would refine the estimates of population needs.

Assuming that both the modest backlog of severe cataracts and also new incident disease can reasonably be accommodated within existing surgical capacity, the only remaining issue is the size of the backlog of mild cataracts where quality of life is minimally impaired, where intervention is less imperative and where the length of the waiting time for surgery is less important.

It should be emphasised that many cataracts progress extremely slowly: for example, of those eyes in a 3 year longitudinal study with an increase in nuclear opacity the corrected visual acuity decreased by only 0.068 logMAR (SD 0.152). Of those eyes with an increase in cortical opacity the corrected visual acuity decreased by only 0.022 logMAR (SD 0.063).[41] These changes amount to a decline of less than one line of chart letters over 3 years.

If, as the findings suggest, there is little disparity between capacity and population requirements for surgical intervention for moderate to severe cataract, the current high levels of anxiety about the total volume of cataract surgery provision may be exaggerated. Expansion of services in some geographic areas is likely to be necessary according to local needs, but should be based on secure epidemiological data. Given the current moves to expand cataract surgery provision in the UK[40] it seems likely that in the medium term rationing or similar measures will be unnecessary despite the anticipated rise in demand due to demographic and other shifts.

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