

Ethnic differences in the demand incidence of retinal detachments in two districts in the West Midlands

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CLINICAL STUDY

Abstract

Aim To evaluate the epidemiological characteristics of rhegmatogenous retinal detachments (RRDs) in two defined populations in the West Midlands of England.

Methods A 5-year retrospective study of patients who underwent surgical repair of their RRD between April 1994 and March 1999. Statistical analysis was done by the Statistical Program for Social Sciences (SPSS) version 10.0.

Results The total demand incidence of RRD was 11.3 and 6.3 per 100 000 in Wolverhampton and Walsall, respectively. The Asian subgroup had a low demand incidence of 4.6 and 2.0 per 100 000 in each area, respectively.

In Wolverhampton the highest age-specific demand incidence was in the 70 to 79-year age group at 29.1 per 100 000, whereas in Walsall it was 98.6 per 100 000 in the 85+ age group. Nontraumatic phakic detachments had the highest demand incidence of 9.7 per 100 000, whereas nontraumatic pseudophakic and aphakic R/D were much lower at 1.2 and 0.3 per 100 000, respectively.

There was a 1:1.5 female-to-male ratio, with a mean age of 57.8 years (95% CI 54.7–61.0) in females and 55.5 years (95% CI 53.1–57.9) for males.

A total of 41.6% (142) of patients presented initially to the Wolverhampton Eye Infirmary Accident and Emergency Department (A&E).

Conclusion This is the first UK-based study. The demand incidence in Caucasians is similar to worldwide figures. Asians have a three times lower incidence of retinal detachments. The demand incidence increases with age. Females have a higher mean age than males. Males (89.5%) were more likely to suffer from traumatic detachments. Younger patients were more likely to present to the

optometrist initially. Less than half of the patients will present initially to the eye A&E. *Eye* (2003) 17, 63–70. doi:10.1038/sj.eye.6700245

Keywords: epidemiology; rhegmatogenous retinal detachment; demand incidence; age-specific demand incidence; Wolverhampton; Walsall

Introduction

There are a few population-based studies on rhegmatogenous retinal detachment (RRD), mainly from Sweden^{1,2} and Minnesota,^{3,4} and even fewer assessing racial differences.^{5,6}

The demand incidence is of importance to ophthalmologists in planning vitreoretinal services as it specifically involves only patients presenting for medical attention and therefore considers the population creating the work load. This paper examines the demand incidence and ethnic differences of RRD in two defined populations of the West Midlands (Figure 1a).

Wolverhampton is a multicultural city with a population of 248 600.⁷ Approximately 81.4% of the population are Caucasian, 12.3% are Asian (11.4% Indian, 0.8% Pakistani, 0.07% Bangladeshi, 0.6% other), and 5.3% are Black.

Walsall is 8 miles from Wolverhampton (Figure 1b). It is of similar size, population 259 517,⁸ and has a multicultural background with an estimated 90.4% of the population being Caucasian, 7.7% Asian (4.7% Indian, 2.4% Pakistani, 0.6% Bangladeshi), only 0.9% are Black, and 1% other. This provides the opportunity to look at the ethnic differences in the demand incidence of RRD.

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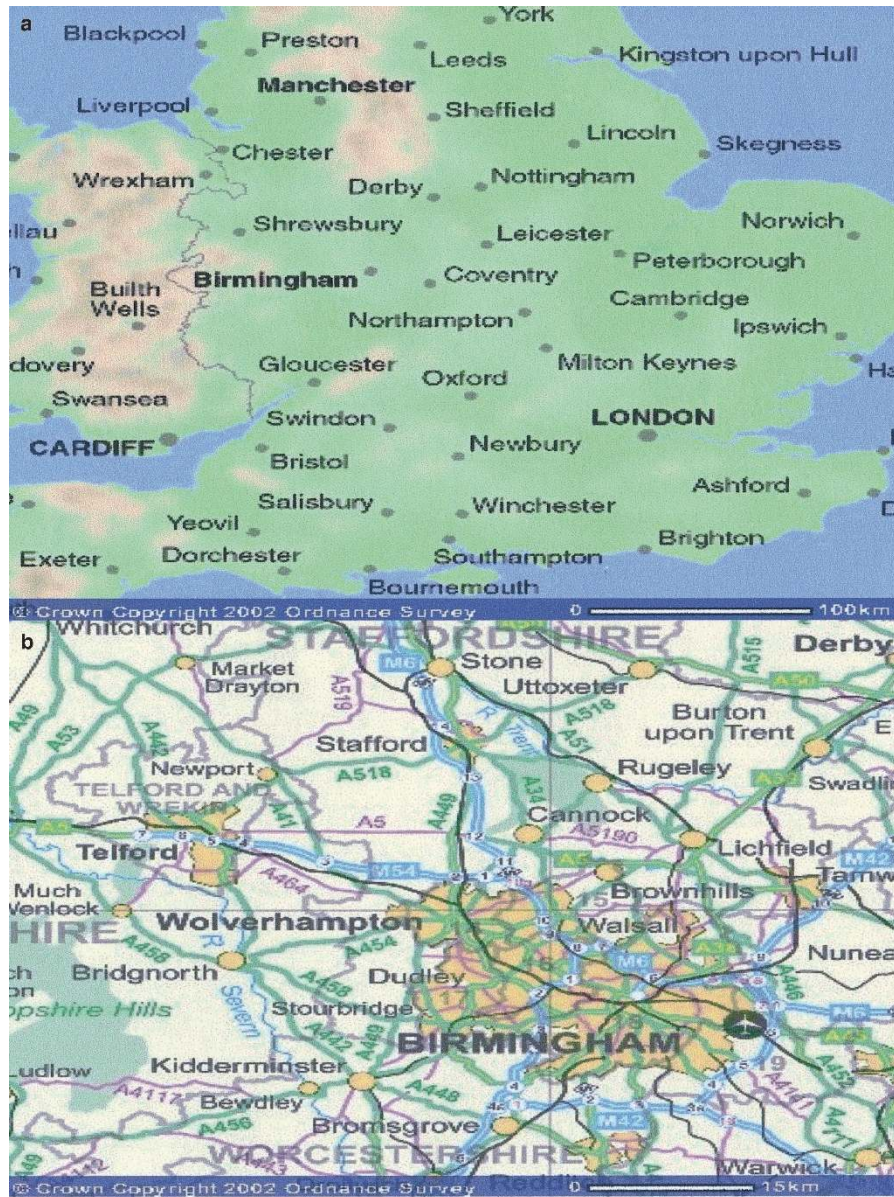


Figure 1 (a) West Midlands. (b) Wolverhampton and Walsall. Reproduced from Ordnance Survey of Northern Ireland mapping with the permission of the Director and Chief Executive, © Crown Copyright.

Materials and methods

This is a retrospective study of Wolverhampton and Walsall patients who underwent RRD surgery at the Wolverhampton Eye Infirmary (WEI) between April 1994 and March 1999.

Patients were identified from the operation codes and the theatre book records. Notes for all patients who underwent vitrectomies or cryotherapy and scleral buckling procedures were analysed and only those with RRD were included. Subjects were excluded if they had associated proliferative retinal fibrovascular disease,

dialysis without a retinal detachment, tractional or exudative detachment, and intraocular foreign body. Blunt and penetrating trauma cases were included.

Data abstracted from the medical records included the patients' age, sex, ethnicity-associated cause (eg trauma), first place of presentation, month of initial symptoms, presence of macula on or off retinal detachment, location of the detachment, surgical procedures, previous surgical operations, and the status of the fellow eye.

The exact population attending WEI (1994–1999) was not well defined as patients attended from as far north as Stoke upon Trent, as far west as Shrewsbury, as far south

as Worcester, and as far east as Coventry (Figure 1a). For this study, only patients from Wolverhampton and Walsall postal district (post codes WV and WS) were studied.

The population of Wolverhampton and Walsall (WEI is the only eye unit for retinal detachment repair for this area) is well defined and therefore the demand incidence on the WEI for Wolverhampton and Walsall was calculated from these statistics from the Wolverhampton and Walsall Health Authority.^{7,8} There are presently two vitreoretinal surgeons who alternate weekly on call; however, at the time of the study, there was only one vitreoretinal surgeon for the Wolverhampton region.

Indo-Asians are defined as people from India, Pakistan, and Bangladesh, who have incidentally been renamed 'Asians' in the UK. Hereafter, in this paper they will be referred to as Asians. The black population includes people of African and West Indian origin (Afro-Caribbean), and 'black other'. The ethnicity of the patients was determined from that documented in their notes from their initial registration.

The demand incidence was calculated by dividing the number of new cases of RRD in each population as obtained by our hospital survey by the population estimates by the appropriate health authorities. The age-specific demand incidence was calculated as the number of new cases in a specific age group divided by the population in that specific age group for each area.

Data were analysed using the Statistical Program for Social Sciences (SPSS) version 10.0.

Results

Demand incidence

There were 140 patients identified with a Wolverhampton address and 83 with a Walsall address. The total demand incidence of RRD was 11.3:100 000 in Wolverhampton, whereas this was lower in Walsall at 6.3:100 000.

Age-specific demand incidence The age-specific demand incidence was calculated by dividing the number of cases by the number of people in the population (for the specific age group) per 100 000 in Wolverhampton and Walsall, respectively. However, direct comparison could not be made as the health authorities had tabulated their residents into different age groups.

There was an increase in demand incidence with age. In Wolverhampton, the highest age-specific demand incidence was in the 70 to 79-year age group at 29.1:100 000. In Walsall, the older age groups had a higher age-specific demand incidence. In the 65–74, 75–84, and 85+ age groups, there was a significantly higher incidence of 44.2, 69.5, and 98.6 per 100 000, respectively (Table 1).

Table 1 Age-specific demand incidence (Wolverhampton and Walsall)

| Age range | Wolverhampton ^a | | Walsall ^b | |
|-----------|-------------------------------|-----------|-------------------------------|-----------|
| | Age-specific demand incidence | Age range | Age-specific demand incidence | Age range |
| 0–14 | 0.8:100 000 | 0–14 | 1.4:100 000 | |
| 15–19 | 2.3:100 000 | 15–24 | 4.5:100 000 | |
| 20–29 | 5.2:100 000 | 25–44 | 6.8:100 000 | |
| 30–39 | 8.7:100 000 | 45–64 | 13.4:100 000 | |
| 40–49 | 10.3:100 000 | 65–74 | 44.2:100 000 | |
| 50–59 | 20.0:100 000 | 75–84 | 69.5:100 000 | |
| 60–69 | 27.4:100 000 | 85+ | 98.6:100 000 | |
| 70–79 | 29.1:100 000 | | | |
| 80+ | 19.5:100 000 | | | |

^aReducing Disadvantage—Improving Health, Report on the Public Health of Wolverhampton 1998.

^bDepartment of Health, Walsall. Compendium of Clinical & Health Indicator Source: Office for National Statistics.

Table 2 Demand incidence (ethnic groups)

| Race | Incidence | Pop. numbers (%) ^a | Annual incidence |
|----------------------------------|-----------|-------------------------------|---------------------------|
| <i>Wolverhampton^b</i> | | | |
| Whites | 132 | 202 300 (81.4) | 13.0:100 000 |
| Blacks | 1 | 12 800 (5.1) | 1.6:100 000 |
| Asian | 7 | 30 700 (12.3) | 4.6:100 000 |
| Total | 140 | 248 600 | 11.3:100 000 |
| <i>Walsall^c</i> | | | |
| Whites | 74 | 234 694 (90.4) | 6.3:100 000 |
| Blacks | 2 | 2426 (0.9) | 16.5:100 000 ^d |
| Asian | 7 | 19 711 (7.7) | 2.0:100 000 |
| Total | 83 | 259 517 | 6.4:100 000 |

^aEthnic pop. (1991 census).

^bOthers 2800=1.1% of pop.

^cOthers 2686=1% of pop.

^dMay be unreliable because of small numbers.

The age-specific demand incidence was low in children, being only 1.2:100 000 in the 0 to 19-year age group in Wolverhampton. Of the population of Wolverhampton, 26.5% is less than 20 years, whereas 39.9% is within the 40 to 79-year age group. The 40 to 79-year-old group had the highest age-specific demand incidence at 20.8:100 000 in Wolverhampton. In Walsall, the age-specific demand incidence was 21.4:100 000 in the 45 to 75-year age group.

Ethnic demand incidence There is a great difference in the demand incidence according to ethnicity in the two populations (Table 2). However, a common trend has been identified. Asians have a lower demand incidence of 4.6 and 2.0 per 100 000 in Wolverhampton and Walsall, respectively.

The demand incidence of Caucasians in Walsall was almost half that in Wolverhampton, despite a slightly higher percentage in the former. The black population

Table 3 Demand incidence for types of retinal detachments (phakic, pseudophakic and aphakic detachments): traumatic and nontraumatic classification (per 100 000 pop.)

| | Wolverhamp | Walsall | Kumamoto, Japan, 1990 ⁴ | Iowa 1976 ⁷ | Rochester, Minnesota, 1977–1978 ¹² |
|---------------------|--------------|-------------|------------------------------------|------------------------|---|
| <i>Nontraumatic</i> | | | | | |
| Aphakia | 0.3:100 000 | 0.1:100 000 | 0.5:100 000 | 4.9:100 000 | 2.8:100 000 |
| Pseudophakia | 1.2:100 000 | 0.9:100 000 | Not stated | Not stated | Not stated |
| Phakia | 9.7:100 000 | 5.4:100 000 | 9.8:100 000 | 6.1:100 000 | 10.1:100 000 |
| Total | 10.5:100 000 | 5.9:100 000 | 10.4:100 000 | 12.4:100 000 | 12.9:100 000 |
| <i>Traumatic</i> | | | | | |
| Aphakia | Nil | Nil | Not stated | 0.4:100 000 | |
| Pseudophakia | 0.5:100 000 | Nil | Not stated | Not stated | |
| Phakia | 0.6:100 000 | 0.5:100 000 | Not stated | 1:100 000 | |
| Total | 0.7:100 000 | 0.5:100 000 | 0.2:100 000 | | |

had a very low incidence of 1.6:100 000 in Wolverhampton. In Walsall, unfortunately the incidence appears skewed as the black population is so small encompassing only 0.9% (Walsall) compared with that of 5% in Wolverhampton.

Demand incidence of type of RRD The type of RRD was classified into two subgroups: traumatic and nontraumatic. This was further subclassified into phakic, pseudophakic, and aphakic detachments.

Wolverhampton: Nontraumatic phakic detachments had the highest demand incidence of 9.7:100 000, whereas the demand incidence of nontraumatic aphakic RRD was very low at 0.3:100 000 (Table 3).

The demand incidences of traumatic pseudophakic and phakic were 0.5 and 0.6 per 100 000, respectively, in Wolverhampton.

Walsall: The demand incidence of nontraumatic phakic detachments was the highest at 5.4:100 000, with nontraumatic aphakic R/D at a very low value of 0.1:100 000.

The demand incidence of traumatic phakic detachments was 0.5:100 000. There were no traumatic cases of aphakic or pseudophakic detachments within Walsall during this 5-year period (Table 3).

Age and sex

Wolverhampton There were 140 patients with a Wolverhampton address who had their retinal detachment surgery at WEI between April 1994 and March 1999. The ages ranged from 8 to 85 years (mean age 55.9 years (95% CI 53.0–58.8)) (Table 4).

The female-to-male ratio was 1:1.3. The ages of the females ranged from 8 to 85 years, whereas the males ranged from 12 to 84 years (Table 4). The number of males peaked in the 50–59 age group, whereas that of the females peaked in the 60–79 age group, (Figure 2).

The right eye was affected in 53.6% (75) of the cases, whereas the left eye was affected in 46.4% (65).

Table 4 Age and sex relationship in Wolverhampton and Walsall

| | Age range (year) | Mean (year) | 95% CI |
|--------------------------|------------------|-------------|-----------|
| <i>Females (numbers)</i> | | | |
| Wolverhampton (60) | 8–88 | 56 | 51.4–60.6 |
| Walsall (33) | 20–88 | 63.6 | 57.4–69.8 |
| <i>Males (numbers)</i> | | | |
| Wolverhampton (80) | 12–84 | 55.9 | 52.2–59.6 |
| Walsall (50) | 13–89 | 55.9 | 50.3–61.5 |

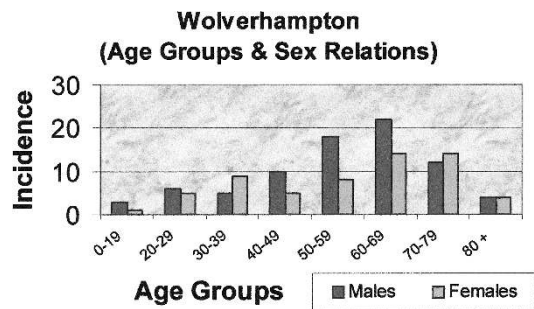


Figure 2 Incidence according to age and sex in Wolverhampton.

Walsall There were 83 patients with a Walsall postal code who underwent retinal detachment surgery in the 5-year period. The female-to-male ratio was 1:1.5. The ages of the females ranged from 20 to 88 years, whereas the males ranged from 13 to 89 years (Table 4). In both populations, the mean age for females was slightly higher than that for males.

There were no females in the 0–19 and 40–49 age group in Walsall. However, there were more females in the 80+ age group compared with the males (Figure 3).

The right eye was affected in 49.4% (41) of the cases, whereas the left eye was affected in 50.6% (42) of the cases.

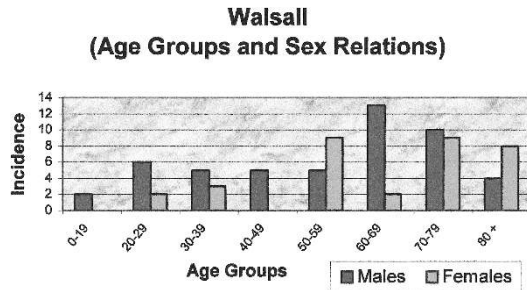


Figure 3 Incidence according to age and sex in Walsall.

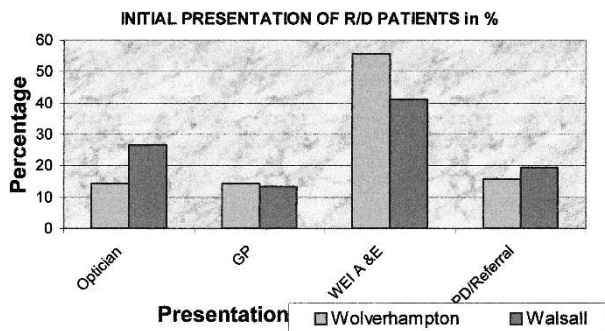


Figure 4 Initial presentation of patients with RRDs.

Referral route

A total of 55.7% (78/140) of patients in the Wolverhampton area presented initially to WEI A&E with symptoms of retinal detachment. A total of 14.3% (20) presented initially to their optometrist. A further 15.7% (22) were either referred from a district general hospital, private ophthalmologist, or were an outpatient of WEI at the time of the diagnosis (Figure 4).

A total of 41.0% (34/83) of Walsall patients presented initially to WEI A&E. However, 26.5% (22/83) of the Walsall patients visited their optometrist first, which is almost twice that of the Wolverhampton patients (14.3%). Interestingly, similar to Wolverhampton, 13.3% presented

initially to their GP; 19.3% of the Walsall patients were already patients in the clinic or referrals from private ophthalmologists (Figure 4).

Discussion

Demand incidence

Wolverhampton and Walsall are of a similar population size. The centre of Walsall is 8 miles away from WEI. The data from the two towns were kept separate for comparison.

The total demand incidence of RRD in Wolverhampton was 11.3:100 000, which is comparable to results from Minnesota (12.9:100 000),⁴ Iowa (12.4:100 000),¹¹ Sweden (10.6:100 000),² and other studies.^{3,7,10,16,17} The earlier study done in Zurich¹⁵ had a very low incidence of 3.8:100 000, likewise the Croatia¹⁴ study (which included only nontraumatic cases) of 5.4:100 000 (Table 5). The annual demand incidence of Walsall was comparable to that of the Finnish population of Helsinki (1978–1981)¹³ which was 6.9:100 000. The total demand incidence of Walsall is lower. This does not appear to be because of a different ethnic mix, as Wolverhampton has the higher percentage of Asians.

Referral route

Although patients from Wolverhampton and Walsall were more likely to present to the A&E initially, a higher percentage from Walsall (26.5%) than Wolverhampton (14.3%) presented to their optometrist first. This may be explained by the distance they would have to travel to the Eye Infirmary and the convenience of visiting their local optometrist.

Age-specific demand incidence

We have consistently shown that the demand incidence is very low in the younger populations which has been borne out by previous studies. Rosner *et al*⁹ showed that

Table 5 Population studies on retinal detachments

| Study | Annual incidence |
|--|---|
| Olmsted County, Minnesota, 1976–1995 ³ | 17.9:100,000 (total) (95% CI 15.9–19.9) 12.6:100,000 (idiopathic) (95% CI 10.9–14.3) 1.3:100,000 (traumatic) (95% CI 0.8–1.7) |
| The Swedish Retinal Detachment Register ¹ | 14:100,000 |
| Wolverhampton, 1994–1999 | 11.3:100,000 |
| Sweden, 1971–1981 ² | 10.6:100,000 |
| Singapore, 1993–1996 ⁵ | 10.5:100,000 (95% CI 10.2–10.9) |
| Israel, ¹² 1962–1969 | 8.9:100,000 |
| Finnish population, ¹³ 1978–1981 | 6.9:100,000 |
| Walsall, 1994–1999 | 6.4:100,000 |
| Croatia, 1988–1998 ¹⁴ | 5.4:100,000 (nontraumatic) |
| Zurich, Switzerland, ¹⁵ 1949–1955 | 3.8:100,000 |

Table 6 Ethnic differences in incidence of RRD

| Ethnicity | Singapore, 1993–1996 ¹⁵ | South Africa ⁶ | Jamaica ¹⁶ |
|-----------|------------------------------------|---------------------------|-----------------------|
| Chinese | 11.6:100 000 | – | – |
| Malays | 7.0:100 000 | – | – |
| Indians | 3.9:100 000 | – | – |
| Blacks | – | 0.46:100 000 | 0.36:100 000 |

the age-related annual incidence of retinal detachments in patients aged 10–19 years was 2.9:100 000, which compares with 0.4:100 000 in the Wolverhampton area in the 10–19 age group in this study.

The age-specific demand incidence increases steadily with age, then by significant geometric proportions after age 50 years in Wolverhampton and 65 years in Walsall.

There is a significantly high age-specific demand incidence in the 40 to 79-year-old group and the 80+ group of 20.8 and 19.5 per 100 000 in the population age group for Wolverhampton. This compares with Haimann *et al*'s age-specific incidence of the 70 to 79-year age group which was 24.2:100 000.¹¹

The number of patients over 75 years is increasing, with 40% more to be expected by 2026.¹⁸ Planning of vitreoretinal services needs to take into account the age structure of the local population.

Ethnic demand incidence

England is a multicultural society. A knowledge of ethnic-specific incidence of diseases is important in planning health services, as some pathologies are more prevalent and have a higher incidence in certain ethnic groups.

RRDs have been shown to be of a low incidence in Indians in Singapore at 3.9:100 000.⁵ This has been confirmed in our study in both populations with a demand incidence of 4.6 and 2.0 per 100 000 for Wolverhampton and Walsall, respectively (Table 2).

Likewise for the Wolverhampton black population, the low incidence of 1.6:100 000 was similar to that of 0.36–0.46 per 100 000 quoted by other studies.^{6,16} It has been postulated that a stronger adherence of the retina to the retinal pigment epithelium may result in the low incidence in the black population.⁶ The demand incidence for black people in the Walsall population was unreliable as the population is very small.

There have been few studies^{5,6} analysing racial differences in the incidence of retinal detachment. Wong *et al*⁵ have shown a three-fold higher incidence of retinal detachment in Chinese compared to Indians, and alluded to the cause being the increased prevalence of myopia in Chinese compared to Malays. Interestingly, in this study, their highest incidence was in the 40 to 50-year age group

unlike the Western studies, with their males being twice more likely to require RRD surgery (age-adjusted relative risk of 2.0 (95% CI 1.7–2.4)).

Type of R/D

Nontraumatic phakic detachments were the most common type of detachments and again the results were similar to previous studies. In Wolverhampton, the demand incidence of phakic nontraumatic RRD was 9.7:100 000, which was comparable to the Kumamoto¹⁰ (9.8:100 000) and Minnesota⁴ (10.1:100 000) studies.

Tornquist *et al*² had 18.6% pseudophakic detachments, based on population-based material in Sweden (1971–1981). However, the later study by Algreve *et al*¹ in 1999 had 30.8% pseudophakic detachments. This reflects the increasing number of cataract operations being performed since the 1970s.

Aphakic detachments are becoming less common with a demand incidence rate of 0.1, 0.3, and 0.5 per 100 000 in the Walsall, Wolverhampton, and the Kumamoto, Japan study¹⁰ (1990), respectively. This contrasts with the relatively high 4.6 and 2.8 per 100 000 in the Iowa study (1976)¹¹ and Rochester, Minnesota (1977–1978),⁴ respectively. Haimann *et al*¹¹ had the highest incidence of 42.7% of aphakic detachments in Iowa in 1976. Sasaki *et al*¹⁰ had the lowest previously reported cases of aphakic detachment of 4.7%, that is, an annual incidence of 0.5:100 000. However, our incidence of aphakic detachments in both Wolverhampton and Walsall of 0.3 and 0.1 per 100 000 (1994–1999), respectively, is the lowest reported to date. This again reflects the declining incidence of aphakia since the 1970s.

The demand incidence in both populations was low, which is in keeping with the 0.2–1.3 per 100 000 of other studies.^{3,12} The incidences of traumatic detachment, although low, are important as they may be associated with other injuries. Of note is the fact that the traumatic detachment in this study did not include those associated with intraocular foreign bodies. Traumatic detachments occurred in the younger population and of note is the fact that there were no traumatic aphakic detachments in either area.

Sex

The incidence in the females was consistently lower than that in the males. However, their mean age was slightly higher than the males ($P = 0.052$). This has been substantiated in other studies.^{1,10,19} The female-to-male ratio was 1:1.5.

Males also had a younger mean age in the traumatic group in our study, which has also been substantiated by Haimann *et al*¹¹ (Iowa, 1976) ($P > 0.05$) and Rowe *et al*³ in

their study in Olmsted Country, Minnesota (1976–1995). The right eye was more commonly affected as seen in the Swedish-based study ($P < 0.001$)² and other studies.^{4,10,20}

There are several possible sources of error in this study. The referral population of WEI covers a wide area. Patients from peripheral areas may be referred elsewhere. We, therefore, chose to limit our study to the WV and WS postal districts, which are near WEI. Cases of RRD that were miscoded could be missed. However, we tried to minimise this by using the hospital coding and double checking with the theatre register. One could argue that an ethnic minority may be reluctant to seek medical advice. However, a study from Leicester (25% of whose population is of Asian origin) has shown that the demand incidence for cataract surgery was five times greater for Asians than for Caucasians.²⁵

Population studies in the UK have looked at the demand incidence of ophthalmic disease including the demand incidence of cataracts, age-related macular degeneration, open-angle glaucoma, diabetic retinopathy, and eye casualty referrals.^{21–25} However, to date there has been no such study on RRDs.

Demand incidence underestimates the true incidence of the disease, as we have not determined how many retinal detachments were not operated upon, although this may be small. However, demand incidence allows one to plan and allocate resources.

Understanding patterns of disease, the incidence, initial presentation, and knowing the demographic characteristics of a community is essential in planning health care.²⁶

This study was done when there was only one VR surgeon at this hospital. Since 1999, a second VR surgeon has been appointed in order to meet the demands of the service. Our study suggests that patients further away from an eye unit will visit their optometrist for advice and diagnosis rather than their general practitioner. Close collaboration between ophthalmologists and optometrists is important.

This is the first study of the epidemiology of RRD in the UK and will be of use in planning vitreoretinal services.

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