Accuracy of glaucoma referrals: need to report precision of estimates

EDITOR,—Referral accuracy is an important measure of primary care effectiveness. It is defined as the proportion of patients referred for a particular condition who are subsequently diagnosed as having that condition (that is, the true positive proportion). Statistically, it estimates the probability that a patient who is referred will have the disease (positive predictive value). As with all statistical estimates, the value calculated in any sample will be subject to error, the magnitude of which decreases as the sample size increases. In recent years there has been an increase in the number of publications on the accuracy of referrals by optometrists to ophthalmology clinics. This letter has been prompted by reading some of those concerned with referrals for suspected glaucoma, but the issue applies generally to estimates of referral accuracy for any disease condition and, indeed, to all measures of screening effectiveness that involve calculation of sample proportions, such as sensitivity, specificity, and so on.

The majority of reports of estimated referral accuracy give no indication of the precision (standard error) of the estimates. Although some reported estimates of accuracy are obtained from relatively large samples of referrals, roughly one-third are based on only a few samples of 10 patients or less. For example, Dayan et al.1 and Newman et al.2 each report samples of referred patients (sample sizes 11 and 10 respectively) in which these were all statistically diagnosed cases. Using these data to estimate referral accuracy in the population gives 99% confidence intervals of 0 to 38% and 0 to 40% respectively. This means that if one sample of 10 patients shows referral accuracy of zero, then the referral accuracy in 99% of samples drawn from the same population would not necessarily be zero but would be expected to lie between 0 and 40%. Newman et al.2,3 in subdivide referrals according to the type of screening, obtain some accuracy estimates from even smaller samples. They report, for example, that two out of five patients referred on the basis of optic disc + visual field assessment gave a positive diagnosis of glaucoma; referral accuracy of 40%. For this sample the 99% confidence interval ranges from 8 to 99%.

However, a problem with this formula, which is based on a binomial approximation to the normal distribution, is that it can in some circumstances produce confidence limits of less than 0 or greater than 1, when clearly the population proportion must always lie between 0 and 1. This common approximation should therefore be avoided in favour of exact binomial confidence intervals which are available in many statistical software packages. Although the binomial distribution gives confidence intervals within the natural limits of 0 and 1, and is also easy to calculate it is:

\[
\text{CI} = \frac{z}{\sqrt{z^2 + \frac{1}{n}}} \quad \text{and} \quad \text{CI} = \frac{z}{\sqrt{z^2 + \frac{1}{n^2}}} 
\]

where \( z \) is the standard normal deviate; \( z = 1.96 \) for a two sided 95% CI, or \( z = 2.58 \) for a 99% CI. The common simple formula for the standard error, \( s \), of a proportion \( p \) is

\[
\text{SE} = \sqrt{\frac{p(1-p)}{n}}
\]

with

\[
99\% \text{ confidence interval} = p \pm z \times \text{SE}
\]

where \( p \) is the sample size and the confidence interval is then

\[
\text{CI} = p \pm z \times \sqrt{\frac{p(1-p)}{n}}
\]

and

\[
\text{CI} = p \pm \frac{z}{\sqrt{p(1-p) + \frac{1}{n}}}
\]


Orbital lymphangioma

EDITOR,—Tunç et al published a thorough analysis of the course and management of orbital lymphangiomas. They state that besides careful and sometimes repeated surgery there is little convincing evidence of other promising treatment options; “. . . few patients have been treated with other modalities including . . . sclerosing agents but there are sparse data with those approaches”. The latter fact might be the result of failures, which have not been published. Therefore, we would like to communicate our disappointing results. Recently, the intralesional administration of OK 432 (Pichibanli, Chugai Pharmaceuticals Co, Tokyo, Japan) has been used successfully in the treatment of lymphangiomas in various body sites.1 Usually, OK 432 is injected in one of the cystic spaces of the tumour, leading to an inflammatory reaction and finally to complete shrinking of the tumour within 4–8 weeks. Encouraged by our own good experiences in the treatment of childhood lymphangiomas of the neck or trunk, we decided to choose this approach in the case of a 22 year old young woman suffering from a histologically proved lymphangioma of the left conjunctiva and anterior orbit. The tumour initially presented in early childhood but did not show significant growth until end of the second decade. One surgical debulking procedure had not led to a satisfactory result. Therefore, we performed two injections of OK 432 within 4 weeks. Though we observed the expected inflammatory reaction and swelling this was not followed by an involution of the tumour. Three months after OK 432 treatment the prolapse of the conjunctival part of the tumour had even increased. A second and now more successful surgical reduction of the mass was necessary. While we have no explanation for the failure of OK 432 in our case, we believe that, though very successful in other localisations, this treatment might be inappropriate in cases of orbital lymphangioma.

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MATTHIAS DITTRICH

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Reply
EDITOR,—There is a paucity of data on the use of OK 432 in this condition. I have also seen such cases, including CV highlights should be sent to Professor David BenEzra, Secretary for the International Nominating Committee, Pediatric Ophthalmology Unit, Hadassah Hebrew University Hospital, PO Box 12000, Jerusalem 91120, Israel.

Leonard Klein Foundation
The Leonard Klein Foundation in the Donors’ Association for the Promotion of Science and Humanities in Germany is to bestow the Leonard Klein Award 2000 of DM 30 000 for innovative work in the development and application of microsurgical instruments and microsurgical operating techniques. Deadline for applications is 31 March 2000. Further details: Stifterverband für deutsche Wissenschaft e V, Herrn Peter Beck, Postfach 16 44 60, D-45224 Essen, Germany.

American Institute of Ultrasound in Medicine
The American Institute of Ultrasound in Medicine will hold the 44th annual convention in San Francisco, California on 2–5 April 2000. Further details: AIUM Professional Development Department, 14750 Sweitzer Lane, Suite 100, Laurel, MD 20707-5906 (tel: 800-638-5353; fax: 301-498-4100; email: conv_edu@aium.org; website: www.aium.org).

XXII Tuenbingen Detachment Course
The XXII Tuenbingen Detachment Course, retinal and vitreous surgery, will be held in the congress centre Incheba, Bratislava, Slovak Republic 6–7 April 2000 preceding the congress on retinal detachment of the Slovak Ophthalmological Society 8–9 April 2000. Further details: Professor Peter Strmen 81369 Bratislava, Mickeviczicova 13 (tel/fax: 00421-7-52964641; email: strmen@faneba.sk).

1st Afro-Asian Congress of Ophthalmology
The 12th Afro-Asian Congress of Ophthalmology (Official Congress for the Afro-Asian Council of Ophthalmology) will be held on 11–15 November 2000 in Guangzhou (Canton), China. The theme is “Advances of ophthalmology and the 21st century”. Further details: Professor Lezheng Wu, Zhongshan Ophthalmic Center, Room 2605, Tower 5, Sun Yat-Sen University, Guangzhou, China (tel: +86-20-8777 3370; email: lwucz@gzsums.edu.cn).

External eye infections
The latest issue of Community Eye Health (no 30) discusses external infections of the eye. Included are papers on conjunctivitis, corneal ulcer, and transmission and control of infection. For further information please contact Community Eye Health, International Centre for Eye Health, Institute of Ophthalmology, 11–43 Bath Street, London EC1V 9EL. (Tel: (+44) 171 608 6908/6910/6923; fax: (+44) 171 250 3207; email: eyesource@ucl.ac.uk). Annual subscription £25. Free to workers in developing countries.

Residents’ Foreign Exchange Programme
Any resident interested in spending a period of up to one month in departments of ophthalmology in the Netherlands, Finland, Ireland, Germany, Denmark, France, Austria, or Portugal should apply to: Mr Robert Acheson, Secretary of the Foreign Exchange Committee, European Board of Ophthalmology, Institute of Ophthalmology, University College Dublin, 60 Eccles Street, Dublin 7, Ireland.

Joachim Kuhlmann Fellowship for Ophthalmologists 2000
The Joachim Kuhlmann AIDS Foundation, Essen, Germany, is sponsoring a fellowship per year for ophthalmologists at a well known institute, who want to train in CMV retinitis and other HIV related ophthalmological diseases. The fellowships are valued at US$5000 each. Deadlines for applications are 31 January and 31 July. Detailed applications, including CV and publication list, should be sent to the Joachim Kuhlmann AIDS Foundation, Bismarckstrasse 55, 45128 Essen, Germany (tel: 0201 87910-87; fax: 0201 87910-99; email: jk-stiftung@t-online.de).

16th Congress of the International Society for Geographical and Epidemiological Ophthalmology (ISGEO)
The 16th Congress of the ISGEO will be held at the Institut D’Ophthalmologie Tropicale De L’Afrique (IOTA) in Bamako, Mali, on 21–22 February 2000. Further details: Dr Paul Courtirgh, ISGEO Secretary, BC Centre for Epidemiology & International Ophthalmology, University of British Columbia, 601 Popham Street, Vancouver, BC V6Z 1Y6, Canada (email: pcourtirgh@stpaulshosp.bc.ca; website: www.interchange.ubc.ca/bclo/isgeo/).

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