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) and, 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 all 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 referred patients, others are based on samples of 10 patients or less. For example, Dayan et al. and Newman et al. each report samples of referred patients (sample sizes 11 and 10 respectively) in which referral accuracy was 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., in sub-dividing referral accuracy according to the mode of screening, obtain some accurate estimates from even smaller samples. They report, for example, that two out of five patients referred on the basis of optic disc or visual field assessment gave a positive diagnosis of glaucoma; referral accuracy of 40%. For this sample the 99% confidence interval ranges from 8 to 83%. Awareness of the lack of precision in small sample estimates of referral accuracy is important for correct clinical interpretation. The comparative effectiveness of different referral strategies or modes of screening should not be judged on the basis of estimates from very small samples. Clinicians should keep in mind the fact that population values for referral accuracy may in some situations be much higher, or indeed lower, than those observed.

It is therefore recommended that authors should routinely report 95% or 99% confidence intervals (CI) for all measures of diagnostic accuracy. When these measures are simple proportions, as is referral accuracy, the general equation for the confidence interval is CI = proportion ± (z × standard error of proportion). In this equation 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 formulae for the standard error s of a proportion p are:

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

where n is the sample size and the confidence interval is then

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

where the distribution of z is normal. 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. Alternatively, a formula which always gives confidence intervals within the natural limits of 0 and 1, and is also easy to calculate is:

\[ CI = \frac{\text{number of patients referred with disease}}{\text{number of patients referred}} \times \left(1 + \frac{1}{n}\right) \]

where n is the sample size.

JIM GILCHRIST
Department of Ophthalmology, University of Bradford, Bradford, West Yorkshire BD7 1DP

5 Harrison RJ, Wild JM, Hobley AJ. Referral patterns to an ophthalmic outpatient clinic by general practitioners and ophthalmic opticians and the role of these professionals in screening for ocular disease. BMJ 1988;297:1162–7.

Topical steroid use in the treatment of ocular alkali burns

EDITOR,—The article by Davis et al. mentions the use of 10% vitamin C eye drops with a pH 5.5–6.5 and the authors specify potassium ascorbate. Preparing for a future emergency I made vitamin C eye drops in my office by putting ordinary Norwegian vitamin C tablets in 10 ml saline and found the pH to be 3! I then realised that my vitamin C tablets were ascorbic acid. Therefore, ophthalmologists should be warned: vitamin C could be

ascorbic acid or acetate. The ophthalmologist need not prepare homemade vitamin C eye drops in the emergency room. The pharmacist should prepare the eye drops, using either potassium or sodium ascorbate.

ANDERS OETHER
Aarhus Gate 3, Box 776, N-6501 Kristiansund, Norway


Reply

EDITOR,—Dr Oether makes two important points with regard to the treatment of ocular alkali burns. We would agree that it is crucial to optimise outcome that topical potassium ascorbate drops are readily available for emergency use. Equally, we would agree that pharmacists should be involved at an appropriately controlled environment, should prepare the manufacture of these drops.

ALISON DAVIS

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’ (Tunç et al 1999). The latter fact might be the result of failures, which have not been published. Therefore, we would like to communicate our own disappointing results. Recently, the intralesional application of OK 432 (Picibanil, Chugai Pharmaceuticals Co, Tokyo, Japan) has been used successfully in the treatment of lymphangiomas in various body sites (Tunç et al 1999). 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 big, 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 shrinking of the tumour, 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 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.

SUSANNE PITZ
Department of Ophthalmology, University Hospital, Langenbeckstrasse 1, 55311 Mainz, Germany

MATTHIAS DITTRICH
Department of Paulstradies
Correspondence to: Dr Pitz
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) 171 259 1503; email: eyeresource@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 Acherson, 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 two fellowships 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 $US5000 each. Deadlines for applications are 31 January and 31 July. Details 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 Courtiright, ISGEO Secretary, BC Centre for Epidemiologic & International Ophthalmology, University of British Columbia, 217–200 Hospital Drive, Vancouver, BC V6Z 1Y6, Canada (email: pcourtiright@stpaulshosp.bc.ca; website: www.interchange.ubc.ca/bceio/isgeo/).

Leonhard Klein Foundation
The Leonhard Klein Foundation in the Donors’ Association for the Promotion of Sciences and Humanities in Germany is to bestow the Leonhard 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 die 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 Tiebingen Detachment Course
The XXII Tiebingen Detachment Course, retinal and vitreous surgery, will be held in the congress centre Incheba, Bratislava, Slovak Republic 6–7 April 2000. The main topics will be "Intraocular lens implantation and nucleus removal", "Retinal detachment", "Angiography and Retinablot's test", "Retinal and vitreous surgery", "Fundus fluorescein angiography", "Macular surgery", and "Macular hole surgery". Further details: Professor Peter Strmen, 81369 Kopavogur, Iceland (tel: +39 02 430071; fax: +39 02 3931621; email: doerflinger@mcn-nuernberg.de).

VIIIth Mediterranean Ophthalmological Society
The combined meeting of the VIIIth Mediterranean Ophthalmological Society and the VIIIth Michaelson Symposium on Ocular Circulation and Neovascularisation will be held in Jerusalem on 21–26 May 2000. Further details: Secretariat, c/o Unitours Israel Ltd, PO Box 3190, 61031 Tel Aviv, Israel (tel: +972-3-5290999; fax: +972-3-5239099; email: meetings@unitours.co.il).

The VIIIth Michaelson medal and award will be delivered on 24 May 2000 in Jerusalem. The medal and award ($15 000 monetary prize) are sponsored by the Israel Academy of Sciences and Humanities and by the Hadassah Hebrew University Hospital and Medical School of Jerusalem, Israel. Nominations are sought from the ophthalmic community at large. Suggestions and reasons for choice and CV highlights should be sent to Professor David Ben Ezra, Secretary for the International Nominating Committee, Pediatric Ophthalmology Unit, Hadassah Hebrew University Hospital, PO Box 12000, Jerusalem 91120, Israel.


NOTICES

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