1991 that half of 999 calls resulted in the patient being discharged with no follow up.[3]

Campaigns to educate the public about making more appropriate use of the service may help to reduce the burden on emergency ambulances, but with attitudes such as "It's free—why shouldn't I call an ambulance?" then perhaps the only way forward is to implement a tiered system.

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Misleading meta-analysis

"Fail safe N" is a useful mathematical measure of the stability of results

EDITOR,—Matthias Egger and George Davey Smith[1] have responded to our letter[2] about their editorial on meta-analysis[3] by pointing out that measurement of the heterogeneity of, or variability in, study results (as a guide to the likely robustness of the averaged finding) is plagued with statistical problems, notably low statistical power. The power of tests for heterogeneity improves considerably, however, when larger numbers of studies are used in the computation.[4]

Egger and Davey Smith are also right to call for wider use of funnel plots in meta-analyses as a way of detecting whether selective publication of small studies with positive results and non-publication of small studies with negative results unduly influence the outcome of meta-analyses. However, the importance of precise mathematical measures of the likely influence of this possibility on the result obtained, as well as visual methods such as funnel plots, should surely be emphasised.

One example of such a statistic is the "fail safe N,"[5] which can be calculated in any meta-analysis and may be defined as the number of new, unpublished, or unretrieved non-significant or "null result" studies that would be required to exist to lower the significance of a meta-analysis to some specified level—for example, to barely significant or non-significant.

An example of a fail safe N calculation found that for a meta-analysis in which 300 studies showed a large average effect size it would take 32 960 unpublished null result studies to bring the new combined P to a non-significant level.[5] The existence of that many unpublished studies is improbable, and hence this fail safe N adds greatly to the confidence it is possible to attach to that particular result of meta-analysis.

Hence this statistic indicates the stability of results of meta-analysis when additional findings are included, no matter what their source. The interpretive usefulness of the fail safe N is analogous in some ways to that of the confidence interval: the fail safe N aids in the assessment of the degree of confidence that can be placed in a particular result of meta-analysis, which is what funnel plots try to do visually. The fail safe N therefore communicates information about the stability of the obtained results in the face of systematic non-randomness of the effects not measured—in other words, a mathematical estimation of the same problem that the funnel plot investigates, but with the additional advantage of arithmetic precision over visual subjectivity.

If the fail safe N is relatively small, particularly in comparison with the number of studies in the meta-analysis, then only tenuous conclusions should be drawn, regardless of the magnitude of the effect size—hence the recent call for all meta-analyses to include a calculation of the fail safe N.[5]

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Statistician's comment

EDITOR,—The idea of the "fail safe N" is to some degree sound, but there are two problems with it as an approach to the issue of publication bias. Firstly, it is a crude method for testing whether a significant result of meta-analysis can be made not significant by the addition of N studies that have an average null effect. This overemphasises the importance of statistical significance, which is a disadvantage. Secondly, the method will always have a resultant effect in the same direction as the observed result of the meta-analysis. There are circumstances in which the unpublished studies have an average effect that is in the opposite direction to the observed meta-analysis, and when this happens the fail safe N is misleading.

R Persaud is wrong when he states that "the fail safe N therefore communicates information about the stability of the obtained results in the face of systematic non-randomness of the effects not measured." It in fact allows only for one form of non-randomness of the obtained results. He is correct in saying that it is analogous to the confidence interval, and this is more useful for readers. What is required in this instance is not another new statistic but better understanding of the meaning of confidence intervals.

Persaud has confused two entirely separate issues—namely, heterogeneity and publication bias. He refers to the problem of heterogeneity in his initial paragraph, in which the last sentence is tautologous: obviously, power increases as sample size increases. He is wrong when he implies that it is the larger number of studies alone that has an effect: it is a function of the size of those studies as well. With regard to publication bias, no simple statistical summary can deal with this.

I am not sure that Rosenthal still thinks that the fail safe N is a useful approach, although I have no direct evidence of this. He has not cited it in his recent work on meta-analysis, and it has been criticised by others.[1]

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1 Cooper H, Hedges LV, eds. *The handbook of research synthesis.* New York: Russell Sage, 1994.

Incidence of HIV infection decreases because of nature of epidemics

EDITOR,—Daan Mulder and colleagues' report of a decrease in the seroprevalence of HIV-1 among young adult Ugandans is heartening.[1] It is also consistent with reports of a decreasing prevalence in young Thai men[2] and with the overall decrease in incidence in Germany[3] and probably the United States[4] (changes in the definition of AIDS in the United States in 1993 led to some confounding).

Although the decrease has been attributed to government intervention programmes,[1,2] some reflection on the natural course of epidemics is in order. Epidemics generally follow a bell curve of incidence by time (albeit with highly variable kurtosis and skewness). They abate because of changes in the infecting pathogen and in the host.[5] This is apparent in the study by Mulder and colleagues as few people in the survey area availed themselves of treatment for sexually transmitted disease or other interventions. In other countries there may be an illusory effect (also known as superstitious learning) of massive public health campaigns promoting the use of condoms and a reduction in the number of sexual partners.

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1 Mulder D, Nunn A, Kamali A, Kengeya-Kayondo J. Decreasing HIV-1 seroprevalence in young adults in a rural Ugandan cohort. *BMJ* 1995;311:833-6. (30 September.)
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People's cultural beliefs should be respected

EDITOR,—David Berger should indeed lie down when he is in his canoe and sees something fiery coming at him, for some sea devils may be more rational than he realises.[1] His description of Elizabeth's rash does not suggest the fern-like burns of lightning, but his nurse's description of the behaviour of Tamalokolo, the sea devil, fits that of tropical lightning.

Lightning will certainly "fly through the air in a fiery form and strike people out in canoes," particularly if they stand up or raise a wet paddle. Tonic extensor spasm may flip the victim backwards into the water, almost invariably dead. The exit current may leave charred marks where the victim's knees or feet were touching the hull and may even leave splinter holes through a hardwood dugout canoe at the water line. Fellow travellers may be flipped over, stunned, or momentarily paralysed but usually survive to tell the tale, bearing flash-like or fern-like burns: the marks of Tamalokolo?

"Lie down quietly in your canoe" if caught in an electric storm is good public health advice; standing or kneeling up to paddle for the shore carries a high mortality.

But even if some sea devils are lightning, Berger's conclusions about respecting the cultural beliefs of other people remain sound. A rational scientific explanation may be taken by a Western mind as a statement of cause, whereas in other cultures it is seen as a description of process. Hence an attempt to substitute a river spirit with rational lightning as the cause of deaths of people in canoes in Papua New Guinea met the equally rational response: "All right, we accept that the deaths are caused by lightning. But who sends the lightning?"

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1 Berger D. Of sea devils and things. *BMJ* 1995;311:730. (16 September.)