

of our data including school holiday periods as a potential confounding factor did not appreciably alter our results in either the continuous (revised incidence rate ratio [IRR], 1.26; 95% CI, 1.12–1.41, compared with original IRR, 1.20; 95% CI, 1.09–1.34) or categorical analysis (see Table).

1. Johnston FH, Kavanagh AM, Bowman DMJS, Scott RK. Exposure to bushfire smoke and asthma: an ecological study. *Med J Aust* 2002; 176: 535–538.
2. Schwarz J, Spix C, Touloumi G, et al. Methodological issues in studies of air pollution and daily counts of deaths or hospital admissions. *J Epidemiol Community Health* 1996; 50: S3–S11.
3. Gill AM, Moore PHR, Williams RJ. Fire weather in the wet dry tropics of the World Heritage Kakadu National Park, Australia. *Aust J Ecology* 1996; 21: 302–308.
4. Lumley T. Statistical training for epidemiologists: a view from afar. *Australas Epidemiologist* 2001; 8(4): 5–7.
5. Storr J, Lenney W. School holidays and admissions with asthma. *Arch Dis Child* 1989; 64: 103–107. □

## Work-related stress: care and compensation

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**TO THE EDITOR:** The editorial by Steven and Shanahan on work-related stress<sup>1</sup> indicated that claiming Medicare benefits for a workers compensation injury is specifically precluded. It also identified a need for guaranteed certainty of cost reimbursement for treatment.

Medicare benefits are payable for professional services that are wholly covered by workers compensation, unless there is a reimbursement arrangement with the insurer.<sup>2</sup> The patient may be bulk billed or given a private account. The recovery of any benefits paid once a settlement or judgement is made does not involve the practitioner.

It is not claiming the benefit which is precluded, but keeping it if an outcome favourable to the plaintiff ensues. My understanding is that unsuccessful claims are rebatable under Medicare for clinically relevant medical services. The medico-legal expenses incurred, for example for reports, do not qualify, as they are not medically necessary. The fees are a private matter, as are any treatment charges in excess of the Medicare rebate. Herein lies the uncertainty.

1. Steven ID, Shanahan EM. Work-related stress: care and compensation [editorial]. *Med J Aust* 2002; 176: 363–364.
2. Medicare benefits schedule book. General explanatory notes. Section 3.6. Canberra: Department of Health and Aged Care, 1 November 2001. □

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**IN REPLY:** What Carroll says is correct, but Section 3.6 of the general explanatory notes of the *Medicare benefits schedule book* also states that "The only exception to this is where a person has entered into a *reimbursement arrangement* with a compensation insurer. In such cases a Medicare benefit is not payable".<sup>1</sup>

While it may be arguable as to what actually constitutes a *reimbursement arrangement*, the situation is further clarified by Section 13.2.1 of the same schedule, which states:

"Medicare benefits are not payable in respect of a professional service in the following circumstance:

(b) where the medical expenses for the services are in relation to a compensable injury or illness for which the patient's insurer or compensation payer has accepted liability. However, if medical expenses relate to a compensable injury or illness and the insurer or compensation payer is disputing liability, Medicare benefits are payable until liability is accepted".

1. Medicare benefits schedule book. General explanatory notes. Section 3.6. Canberra: Department of Health and Aged Care, 1 November 2001. □

## The Avoid Stroke as Soon as Possible (ASAP) general practice stroke audit

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**TO THE EDITOR:** In an article in the 1 April issue of the Journal,<sup>1</sup> Sturm et al reported

on a GP-based stroke audit ("ASAP") and stated that "the information obtained is likely to be representative of most Australian general practice environments". Without further information, we cannot be as confident.

First, their sampling strategy was unconventional. Of all registered GPs from five Australian States and one Territory who were initially approached in May 2000, only 10.2% ( $n = 1850$ ) of eligible GPs expressed interest in participating in the study. From each of 22 "geographical regions", up to 18 GPs were recruited, initially by random sampling and then by replacement, to obtain a sample of 396 GPs, of whom 321 (81%) provided data. No GP data by State and Territory or "geographical region" were provided to allow readers to judge the possibility of sampling bias. Unpublished data from our own GP survey about stroke issues in New South Wales raise this possibility. We conducted a postal survey of 490 randomly selected GPs from November 2000 to February 2001 (response rate, 60%). None of the 296 participating GPs stated they were enrolled in a stroke clinical audit.

Second, although patients were clustered within GPs, no intracluster correlations (ICCs) were reported. Outcomes (eg, disease morbidity and risk factors) for patients recruited from general practices tend to be correlated at the GP level.<sup>2</sup> ICCs quantify the extent to which individuals within clusters (such as a GP's practice) are similar to each other relative to individuals from other clusters. Conventional formulas for calculating confidence intervals assume that the ICC is zero (ie, no clustering). Yet, where correlation within clusters does exist (ie,  $ICC > 0$ ), the effective sample size is reduced and the associated CIs are inevitably wider. For any given ICC greater than zero, larger cluster sizes also further reduce the effective sample size. Applying appropriate formulas,<sup>3</sup> we calculated effective sample sizes for risk factors in the ASAP

### Effective sample size, assuming three different magnitudes of intracluster correlation (ICC)

Risk factor	Actual $n$	Effective $n$ if ICC = 0.015	Effective $n$ if ICC = 0.05	Effective $n$ if ICC = 0.1
Total				
Hypertension	14 280	8643	4499	2670
Hypercholesterolaemia	12 516	7973	4317	2608
Smoking	14 297	8649	4500	2670
Diabetes	13 767	8455	4449	2653
Atrial fibrillation	14 194	8611	4490	2667
Stroke/transient ischaemic attacks	14 321	8657	4502	2671

study, assuming three different magnitudes of ICCs, ranging from relatively modest (0.015) through more substantive (0.1) (see Box). Given the large denominator of the ASAP study, our methodological concern may be only minor in terms of the width of the CIs reported, but the reader is unable to judge whether or not this is the case, as no ICCs were reported. As sample-size calculations for future interventional studies would be informed by publication of ICCs,<sup>4</sup> we encourage such reporting in future.

Third, we believe the authors' quantitative findings would have been most useful if they had been age-adjusted in line with Australian community norms.

1. Sturm JW, Davis M, O'Sullivan JG, et al. The Avoid Stroke as Soon as Possible (ASAP) general practice stroke audit. *Med J Aust* 2002; 176: 312-316.
2. Campbell MK, Mollison J, Steen N, et al. Analysis of cluster randomized trials in primary care: a practical approach. *Fam Pract* 2000; 17: 192-196.
3. Donner A, Klar N. Design and analysis of cluster randomisation trials in health research. London: Arnold, 2000.
4. Campbell M, Grimshaw J, Steen N. Sample size calculations for cluster randomised trials. *J Health Serv Res Policy* 2000; 5: 12-16. □

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**IN REPLY:** We thank Middleton et al for their interest in our article. As 96% of questionnaires in our ASAP study<sup>1</sup> were completed by September 2000, their study (as yet unpublished) and ours were not concurrent. Statistically, based on the information given by Middleton et al, we would expect 5.5 GPs (296 x 333/18066) to

be involved in both studies. Chance, or because direct involvement in the ASAP study had finished months earlier, may explain why none of the doctors in the survey by Middleton et al stated that they were involved in a stroke audit.

In answer to the claim that "no GP data by State and Territory" were provided, we did in fact indicate in our article how many GPs from each State and Territory participated.

Intracluster correlations (ICCs)<sup>2</sup> for each risk factor in our study are shown in the Box. ICCs have a greater effect on sample size than on CIs, because CI width is inversely proportional to the square root of the sample size. The large sample size of ASAP means that the study has acceptable precision, even after allowing for ICCs.

Overall estimates for risk factors were provided for the population of people consulting GPs, which is the relevant population. We would not necessarily expect the same distribution of risk factors in people not attending GPs. Age- and sex-specific risk-factor prevalences, shown in Box 3 of our article,<sup>1</sup> can be used to calculate age- and sex-standardised rates for any desired population.

We are confident that the information obtained in our study is likely to be representative of most Australian general practice environments.

1. Sturm JW, Davis M, O'Sullivan JG, et al. The Avoid Stroke as Soon as Possible (ASAP) general practice stroke audit. *Med J Aust* 2002; 176: 312-316.
2. Ridout MS, Demetrio CBG, Firth D. Estimating intraclass correlation for binary data. *Biometrics* 1999; 55: 137-148. □

## Itching bites may limit Ross River virus infection

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**TO THE EDITOR:** Reactions to insect bites are unpleasant and can be dangerous.<sup>1</sup> Kumar<sup>2</sup> commented that people who react to mosquito bites with local itching and inflammation appeared less likely to develop malaria than those with no reaction. In a later personal communication, he gave me unpublished data showing an inverse linear relationship between the severity of the reaction to mosquito bites and the incidence of clinical malaria.

Ross River virus infection is endemic in all Australian states. A specific serological test is available to confirm suspicious clinical illnesses. Some people have serolog-

### Reactions to mosquito bites among people with and without evidence of Ross River virus (RRV) disease

	No reaction	Moderate to severe reaction
Past RRV disease	7	0
No past RRV disease	0	18

ical signs of past infection without any history of clinical disease. With Kumar's findings in mind, I asked people with a past history of clinical Ross River virus infection, proven by serology, whether they reacted to mosquito bites. All seven asked said that they had had no reaction. Their main complaint was the noise made by predatory mosquitoes. I then asked patients who were in the same age range and general social class, who lived in the same area and were attending clinics with other diseases, whether they had had any clinical illness diagnosed as Ross River virus infection. Of the 18 asked, none had had the clinical disease or serological tests for the disease. All 18 had moderate to severe reactions and itching with mosquito bites. The Box shows these results

Fisher's exact test gives the probability of this finding as 0.0000003. These observations have not explored all aspects of the problem, so this level of probability may be optimistic, but, even so, it makes pointless any further informal collection of data. These findings justify a formal epidemiological study, including antibody titres. It should include those who react to mosquito bites and those who do not, and those with and without a past history of the clinical illness.

This informal study suggests that reactions to mosquito bites protect against Ross River virus infection, and parallels Kumar's findings in malaria. There may be behavioural and biological explanations for this finding. People who itch with mosquito bites may take greater precautions to avoid them. Conversely, people who do not itch may spend more time outdoors and be more likely to be bitten. Biologically, reactions to bites may be examples of a generalised protective effect of local reactions against insect-borne diseases. The inflammatory reaction with itching may be a factor in defence against infection<sup>3</sup> by limiting or destroying injected parasites and viruses locally or through a more vigorous generalised response that prevents disease or limits infection to a subclinical level. Investigation of local inflammatory response might provide clues to effective prevention and treatment.

### Intracluster correlations (ICCs) for stroke risk factors in the ASAP stroke audit<sup>1\*</sup>

Risk factor	All	Men	Women
Current smoker	0.07	0.09	0.08
Hypercholesterolaemia	0.06	0.06	0.07
Hypertension	0.06	0.05	0.07
Diabetes	0.04	0.05	0.07
Past TIA/stroke	0.018	0.024	0.013
Atrial fibrillation	0.016	0.017	0.023

TIA = transient ischaemic attack. \*Calculated using the analysis of variance (ANOVA) method.<sup>2</sup>