skin cancer and melanoma in particular.[4] In view of such evidence the risk-benefit ratio of using ultraviolet A sunbeds should be re-examined, and the medical profession should be more critical of sunbed salons that operate purely for financial gain. The Health Education Board in Scotland and the Department of Health are unequivocal in their advice that sunbeds should not be used for cosmetic tanning.

Disturbingly, a considerable number of sunbeds are still operated by local councils, often in the incongruous setting of a health and fitness suite in a leisure centre. The promotion of machines whose only function is to produce radiation damage to the skin, which may ultimately promote skin cancer, should play no part in the operational policy of modern local councils professing to have the best interest of their constituents at heart. Councils may argue that they are catering for a demand for sunbeds by the public, but this demand is led by ignorance and should be rejected. Caradon District Council removed the sunbeds from one of its leisure centres last February, and Dumfries and Galloway Council removed the sunbeds in five locations from south west Scotland in June. These councils are to be congratulated for putting the health of their constituents ahead of financial gain.

Now that a precedent has been set, all local authorities should seriously consider closing their sunbed facilities. Doctors, and dermatologists in particular, should pressure them to do so.

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1 McGregor JM, Young AR. Sunscreens, suntans, and skin cancer. *BMJ* 1996;**312**:1621-2. (29 June.)
2 Ko CB, Walton S, Keczkes K, Bury HPR, Nicholson C. The emerging epidemic of skin cancer. *Br J Dermatol* 1994;**130**: 269-72.
3 Mackie RM. The march of melanoma. *Clin Exp Dermatol* 1993;**18**:2-4.
4 WHO International Agency for Research on Cancer. Solar and ultraviolet radiation. *IARC Monogr Eval Carcinog Risks Hum* 1992; No 55.

People do not apply enough sunscreen for protection

EDITOR,—Despite the conventional wisdom that sunscreens should be recommended to prevent cutaneous malignant melanoma, evidence supporting this is lacking. J M McGregor and A R Young[1] comment on the apparent increased risk of melanoma in people who use sunscreens.[2] They suggest that people who use sunscreens containing ingredients that mainly absorb ultraviolet B spend longer in the sun because of the reduced risk of sunburn and so increase their dose of ultraviolet A radiation and that this may increase their risk of melanoma. An alternative explanation why use of sunscreens might be linked to the risk of melanoma may simply be that consumers do not apply sunscreens correctly to achieve the expected protection and subsequently overexpose themselves to the sun. The protection offered by a sunscreen is indicated by the sun protection factor, which is assessed after phototesting in vivo at an internationally agreed application thickness of 2 $\mu l/cm^2$. To achieve the rated protection over the whole body a typical adult of surface area 1.73 m^2 would therefore need to apply 35 ml of the sunscreen—roughly one third of a bottle per application. Not surprisingly, several studies have shown that consumers apply much less sunscreen than this—typically an average of 0.5-1.3 $\mu l/cm^2$.[3,4] Consequently, the protection received will be considerably less than that expected and in many cases will be closer to half that indicated by the sun protection factor. Furthermore, a study that used the intrinsic fluorescence of sunscreens as a surrogate for application thickness found pronounced variations in thickness (and hence protection) within relatively small anatomical regions, such that many areas to which sunscreen had been hurriedly spread over the skin were protected to a very minor extent, while further areas were left unprotected.[5]

The reported relation between sunscreens and melanoma might be explained more reasonably by the fact that people are underprotected owing to careless application of the sunscreens and then overexpose themselves to the sun. Attention should be given to applying sunscreens liberally and uniformly and allowing them to dry. Products applied too thinly or rubbed vigorously into the skin will not provide adequate protection. Sunscreens should continue to be used in combination with clothing, shade, and appropriate behaviour to prevent excessive exposure to sunlight.

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1 McGregor JM, Young AR. Sunscreens, suntans, and skin cancer. *BMJ* 1996;**312**:1621-2. (29 June.)
2 Westerdahl J, Olsson H, Måsbäck A, Ingvar C, Jonsson N. Is the use of sunscreens a risk factor for malignant melanoma? *Melanoma Res* 1995;**5**:59-65.
3 Stenberg C, Larkö O. Sunscreen application and its importance for the sun protection factor. *Arch Dermatol* 1985;**121**:1400-2.
4 Bech-Thomsen N, Wulf HC. Sunbathers' application of sunscreen is probably inadequate to obtain the sun protection factor assigned to the preparation. *Photodermatol Photoimmunol Photomed* 1992;**9**:242-4.
5 Rhodes LE, Diffey BL. Quantitative assessment of sunscreen application technique by in vivo fluorescence spectroscopy. *J Soc Cosmetic Chem* (in press).

Knowledge about sunscreens is inadequate

EDITOR,—J M McGregor and A R Young highlight important concerns about the ability of sunscreens to prevent skin cancer.[1] A further problem with sunscreens may be inappropriate application. We conducted a questionnaire survey of 656 parents of schoolchildren in Glasgow in May 1995 to assess their "sun awareness"—that is, their knowledge, attitudes, and behaviour—before a national sun awareness educational initiative. Parents of schoolchildren aged 5-11 were approached by three interviewers in a local shop that sold children's clothes and at parent-teacher evenings in eight local comprehensive primary schools. The parents were asked to complete a questionnaire containing 36 multiple choice questions and a single free text question and to give their age, sex, and occupation. Seven questions related specifically to knowledge of use of sunscreens. The participation rate was 97% (636/656). Table 1 shows the parents' responses.

Table 1—*Parents' responses to questions about their knowledge of use of sunscreens*

	Yes	No	Don't know
Sunscreens			
Work well for up to five hours	339	185*	112
Work better after swimming	59	501*	76
Work better if used with aftersun lotion	189	313*	134
Work better when you are sweating	12	482*	142
Factor 8 sunscreen			
Is stronger than factor 4 sunscreen	526*	49	61
Is the weakest sunscreen recommended for young children	129	335*	172
Is eight times more protective than no sunscreen	444*	76	116

*Most suitable answer.

Our findings show that, at least in our local population, there is confusion over the most suitable sunscreen to use in young children, the most appropriate interval for reapplication of sunscreen, and the use of aftersun lotion. This is a further indication that campaigns to prevent skin cancer should concentrate on changing attitudes towards getting a suntan and behaviour.

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Much effort is spent on treating drug misusers in prison

EDITOR,—Chris Ford writes about the allegedly poor treatment that a patient received during his stay in a remand prison.[1] As a former general practitioner, I can both appreciate and sympathise with Ford's feelings when a patient does not receive the treatment that Ford deems necessary. Nevertheless, I find Ford's diatribe against the professionalism and clinical acumen of prison medical staff to be unfounded, inflammatory, and at best an oversimplification of a problem that is all too common and affects the NHS as well as the prison medical service.

Health care standards for the prison medical service have been amended since 1994 to include full detoxification programmes for all substance misuse that is encountered in prisons. These documents are exhaustively researched with full NHS backing and have been thoroughly implemented throughout the prison service. I am interested that Ford asks for a review of these policies: I wonder whether Ford has read them in the first place. For 37% of my admissions, dependence on injected heroin is a substantial problem. A great deal of time, effort, and dedication is spent helping these prisoners with withdrawal and harm reduction; we do not just prescribe methadone, courting overdose or inadequate treatment, as Ford implies. Tabloid reportage about less than optimal health care of prisoners should be viewed with as much scepticism as would befit similar reportage of incompetence in general practice.

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1 Ford C. Drug users and people with HIV infection need better care in prison. *BMJ* 1996;**312**:1671. (29 June.)

Community leg ulcer clinics

Data were missing from paper

EDITOR,—Deborah A Simon and colleagues report encouraging data from their study of healing of leg ulcers treated in community clinics.[1] Several omissions, however, make interpretation of their findings difficult. The initial size of a leg ulcer has considerable influence on the time to healing. The authors should have indicated the size of the leg ulcers in each group at the onset of each study period and whether significant differences were present. The authors state that if healing did not progress the patient was immedi-

ately referred for vascular surgical or dermatological care. They do not state how many patients were in this category, what their definition of failure of progression of healing was, and whether these more difficult patients referred elsewhere were included in the final analysis of healing rates. If patients with an ankle-brachial pressure index of <0.5 were referred on, were they considered to have severe ischaemia and therefore excluded from the analysis?

Studies that purport to show improvements in care and financial savings for the health service are most welcome, but if this is evidence based medicine we should be permitted to see the evidence.

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1 Simon DA, Freak L, Kinsella A, Walsh J, Lane C, Groarke L, *et al.* Community leg ulcer clinics: a comparative study in two health authorities. *BMJ* 1996;**312**:1648-51. (29 June.)

Early vascular assessment should be carried out

EDITOR,—Deborah A Simon and colleagues' study provides further evidence supporting the role of community based clinics in the management of leg ulcers.[1] These specialised local clinics provide skill in managing leg ulcers close to patients' homes and have influenced healing and cost effectiveness.[2]

Our only concern with this study is that no patient was referred for venous investigation or surgery. We, like others, have shown that superficial venous disease alone is present in about half of patients with venous ulceration.[3] The underlying pathophysiology here is potentially treatable by surgery, which may reduce recurrence rates as high as 69% at one year.[4]

In 1995 we established five community based leg ulcer clinics in East Gloucestershire, where early non-invasive vascular assessment is carried out (measurement of the ankle-brachial pressure index and colour venous duplex scanning). This assessment helps to define the aetiology of the ulcer and directly influences management by identifying superficial and deep components of venous disease. All patients with non-arterial ulcers are treated with four layer compression bandages until the ulcers are healed. Patients with superficial disease alone are also offered surgery to reduce venous hypertension. All patients are then recommended grade 2/3 community compression stockings.

In the first year 179 consecutive ulcerated limbs were assessed. In 123 limbs without arterial insufficiency (ankle-brachial pressure index <0.85) duplex scanning identified 59 with superficial venous disease alone. All 59 limbs were considered for surgery. Follow up data are at an early stage, but of the first 20 legs with superficial venous disease that was operated on and healed, only one (in a patient with rheumatoid disease) showed recurrence during a mean follow up of seven months. Of the 40 limbs with deep or uncorrected superficial venous disease that healed, nine showed recurrence over the same period. Simon and colleagues did not refer any patients for duplex scanning or surgery. If recurrence is reduced in the group with superficial venous disease alone (48% of limbs in our clinics) this would have major long term cost implications for health resources.

We believe that in studies of the outcome and cost of care of leg ulcers an extended study period is needed, with a programme to assess recurrence rates. Like Simon and colleagues, we have found that community clinics improve healing rates when four layer compression is used. We enthusiastically support early vascular assessment with venous duplex scanning to identify patients who may sustain lasting benefit from simple venous surgery.

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1 Simon DA, Freak L, Kinsella A, Walsh J, Lane C, Groarke L, *et al.* Community leg ulcer clinics: a comparative study in two health authorities. *BMJ* 1996;**312**:1648-51. (29 June.)
2 Moffatt CJ, Franks PJ, Oldroyd M, Bosanquet N, Brown P, Greenhalgh RM, *et al.* Community clinics for leg ulcers and impact on healing. *BMJ* 1992;**305**:1389-92.
3 Blair SD. Imaging to select patients with venous ulceration. In: Greenhalgh RM, ed. *Vascular imaging for surgeons.* Philadelphia: Saunders, 1995:503-11.
4 Monk BE, Sarkany I. Outcome of treatment of venous stasis ulcers. *Clin Exp Dermatol* 1982;7:397-400.

Authors' reply

EDITOR,—R Sheehan-Dare wishes to know the size of the ulcers in our study. The mean size was virtually identical in the two study populations at the start of our study (22.0 cm^2 in Trafford and 22.7 cm^2 in Stockport in 1993) but was much smaller in Stockport after the introduction of the specialist community clinics (19.0 cm^2 and 13.7 cm^2 respectively in 1994).

We did not send patients for vascular surgical or dermatological care; instead we obtained an opinion from specialists as required. During the study there were no such patients, but if there had been they would have remained within the study, as would any patient referred elsewhere (of which there were also none). We are pleased that Sheehan-Dare welcomes studies showing cost effective improvements in care; to see the rest of our evidence it is more realistic for Sheehan-Dare to visit our unit than to expect the *BMJ* to publish the evidence.

We share Saboor Ghauri and colleagues' disappointment that none of our patients wanted to be referred for venous assessment and agree that early venous assessment and surgery might have resulted in even better healing rates. Elderly people in the community are, however, reluctant to attend a hospital. Nevertheless, as the confidence of both staff and patients in the community leg ulcer clinics is constantly increasing we are sure that if the study was repeated now there would be more referrals.

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Reference range for potassium concentration is lower in Barbados than Europe

EDITOR,—P W Masters and colleagues observed an increase in the number of cases of hypokalaemia among patients seen in general practice during the summer of 1995.[1] They suggest that this increase could have been due to high ambient temperatures, as shown in their figure.

In 1987 I presented a thesis entitled "Changes in clinical chemistry seen in a developing country—Barbados" as part of the final examination for membership of the Royal College of Pathologists. In my thesis I reported a reference range for potassium concentrations in the Barbadian population of 2.8-4.1 mmol/l. The samples had been collected in the blood collecting centre and then transported to the laboratory. The average temperature during the day in Barbados is about 27°C, with a maximum of about 32°C. This ambient temperature, together with nutritional factors, may explain the 0.5 mmol/l downward shift in the potassium concentration in the Barbadian population compared with the concentration reported in most European texts.

Interestingly, Walmsley *et al* reported a reference range of 3.2-4.8 mmol/l for potassium concentrations. Presumably this was established in the Australian population, who experience similar climatic conditions to those in Barbados.

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1 Masters PW, Lawson N, Marenah CB, Maile LJ. High ambient temperature: a spurious cause of hypokalaemia. *BMJ* 1996;**312**:1652-3. [With commentary by M D Buckley-Sharp and D A Gardner.]
2 Walmsley RN, Watkinson LR, Koay ESC. *Cases in chemical pathology: a diagnostic approach.* 3rd ed. Singapore: World Scientific, 1992:39.

Misdiagnosing the persistent vegetative state

Persistent vegetative state should not be diagnosed until 12 months from onset of coma

EDITOR,—Keith Andrews and colleagues draw attention to an important issue—namely, the correct diagnosis of patients who remain apparently unaware months after sustaining acute brain damage.[1] Some caution is needed in interpreting their data.

The authors use the term "persistent vegetative state" loosely. Although a persistent vegetative state cannot be diagnosed until at least 12 months have passed from the onset of coma,[2] nine of the 16 patients whom the authors consider to have been misdiagnosed and whose details they give had been in a coma for less than 12 months. Therefore over half of the misdiagnoses in the study may simply reflect careless and incorrect use of the term persistent vegetative state by referring clinicians, with the patients' recovery coinciding with admission to the Royal Hospital for Neurodisability.

The security of the original diagnosis was not established in the remaining seven cases. One cannot assume that a neurologist is correct: in one case in which a persistent vegetative state had been diagnosed by an eminent neurologist, simple perusal of the notes showed recorded evidence of awareness and responsiveness (confirmed by my examination).

The first message from this study is that the clinician making the diagnosis of a persistent vegetative state must approach the task thoroughly and be experienced in assessing a patient's level of consciousness and awareness. Every clinician confronted with this difficult task should always obtain data from at least four sources: reading the notes thoroughly, interviewing at least one nurse who knows the patient well, interviewing at least one relative who has been close to the patient, and undertaking examination and observation. Throughout this process the clinician should consider whether there is an acceptable cause for the patient's state, whether drugs have a substantial role, and whether there is or has been any evidence of a meaningful response to meaningful external stimuli. It is imperative to take seriously all observations made by staff and relatives, who are usually the best witnesses.