total of 1083 patients.[6] All placebo controlled trials were positive and all comparative trials indicated equivalence with other active therapies. The effects included a reduction in leg volume and leg circumference as well as symptomatic improvements. In all, about 40 systematic reviews or meta-analyses of herbal drugs are available today (a full list provided by the author is available on the *BMJ*'s website).

With many of these herbal medicines we do not fully understand how they work. Nor do we always know which component is pharmacologically active. For example, hypericin was originally thought to be the active ingredient in St John's wort, but evidence is now accumulating that hyperforin may be equally important.[7] Similarly, we assumed until recently that its mode of action was that of a monoamine oxidase inhibitor, but its actions may be due, at least partly, to serotonin uptake inhibition.[3]

Even though herbal remedies may be effective, do their benefits outweigh the risks? Most herbal remedies in the United Kingdom and United States are sold as food supplements. Thus they evade regulation of their quality and safety. The UK's minister for public health recently pointed out that "the regime for unlicensed medicines does not give systematic protection to the public against low quality and unsafe unlicensed herbal remedies."[8] Two recent British cases of severe nephropathy caused by Chinese herbal tea administered to treat eczema[9] illustrate this. Huge variations exist in the quality of herbal medicinal preparations. When, for example, German commercial products of devil's claw were tested, an unacceptable variability of quality was noted.[10] Yet Germany is often praised for the exemplary standard of quality control of herbal medicines. A recent study of herbal creams in the United Kingdom showed that 8 of 11 preparations contained undeclared dexamethasone at a mean concentration of 456 mg/g.[11]

The possibility of herb-drug interactions is a further important—and under-researched—issue. On its own, for instance, ginseng has few serious adverse effects. When combined with warfarin, its antiplatelet activity might cause overanticoagulation.[12] Many other interactions between herbal remedies and synthetic drugs are conceivable, even likely.[13] This issue is destined to play an increasingly important part in the debate about the safety of phytomedicines.

With rationing looming in virtually all healthcare systems, the question whether herbal medicines can save money is important. Not all plant based medicines are cheap. A standard daily dose of St John's wort, for instance, will cost more than that of a tricyclic antidepressant. However, such comparisons are oversimplistic, particularly in view of the fact that St John's wort is associated with only about half the incidence of adverse effects of a conventional antidepressant.[2]

As more and more herbal medicines are being used by more and more people, doctors should consider changing their often negative attitude towards them. Doctors, pharmacists, and other healthcare professionals need to be knowledgeable to advise their patients responsibly, and there is an unquestionable need for reliable information on herbal medicines, a demand that must be met adequately by undergraduate and postgraduate education. Doctors also have to realise that detailed questions about use of herbal drugs form an essential part of taking a medical history. Finally, doctors should monitor the perceived benefits and adverse effects of self prescribed herbal treatments consumed by their patients and bear in mind the possibility of herb-drug interactions. The minister for public health has emphasised the need for better protection and information for the public on herbal medicines,"[8] and doctors should take an active part in this process.

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The increasing use of peripheral bone densitometry

Better at assessing fracture risk than diagnosing osteoporosis

Osteoporotic fractures are a major cause of excess mortality, morbidity, and expenditure worldwide. There is a strong inverse relation between bone mineral density and the risk of fracture, with a doubling in fracture incidence for each standard deviation reduction in bone mineral density.[1] The World Health Organization has defined osteoporosis as a bone mineral density of more than 2.5 standard deviations (T score < -2.5) below the mean value for young adults.[2] This definition was made for epidemio-

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logical reasons to compare female populations and not as a threshold for intervention. However, the WHO definition has been used increasingly for the diagnosis of osteoporosis in individuals, based on the measurement of bone mineral density at the hip and spine using dual energy *x* ray absorptiometry. Recently, newer peripheral densitometry devices have been developed, which have the advantage of low cost and portability. It is likely that these will be used increasingly for the diagnosis of osteoporosis and assessment of fracture risk in the community.

The commoner forms of these devices in Europe and North America include heel and forearm dual energy *x* ray absorptiometry and quantitative ultrasound at the heel. The various devices have similar overall predictive value for estimating fracture risk regardless of the skeletal site measured or technique used, although measurement at any particular site best predicts fracture at that location.[3] Ultrasound devices cannot diagnose osteoporosis as they do not measure bone mineral density (on which the WHO definition is based) but measure other factors related to bone strength (broadband ultrasound attenuation, speed of sound, and stiffness). Nevertheless, ultrasound measurements at the heel have been shown in large longitudinal studies to predict future fractures in older subjects, in some cases as accurately as measurement of central bone mineral density.[4 5] It is essential to understand the limitations of these devices because of the potential for misclassification, which may lead to inappropriate reassurance or unnecessary alarm to patients.

For the diagnosis of osteoporosis, it is important to realise that bone mineral density is not the same throughout the skeleton. This "discordance" can be caused by several factors, including differences in bone accretion and loss at various sites, variations in the accuracy of measuring bone mineral density by different techniques, and differences in the normal ranges for young adults between devices. Recent studies have shown significant variation in the prevalence of osteoporosis with measurements at different peripheral and central sites, suggesting potential for misdiagnosis if the WHO criteria are applied at all sites.[6 7]

Discordance, and therefore the risk of misclassification, is greater in the early postmenopausal population than in women aged over 65 years. It may therefore be appropriate to measure more than one site in younger women, to reduce the chances of missing a diagnosis of osteoporosis.[8] In older women, where discordance is less of a problem, the likelihood of missing a diagnosis of osteoporosis when measuring only one skeletal site—such as the wrist, heel, or hip—is reduced. The exception in the elderly is a single measurement of the posterior anterior spine by dual energy *x* ray absorptiometry, where artefacts such as osteophytes can spuriously increase the value of bone mineral density measurements.

This problem of each person having a different T score depending on the device used needs to be solved urgently. For hip sites, common reference data from the National Health and Nutrition Examination Survey (NHANES III) have been incorporated into the databases of the three major central bone densitometry machines, which has reduced the potential for variation between machines in diagnosing osteoporosis.[9] For sites other than the hip, however, a common reference database does not exist. With regard to the peripheral devices, one short term solution could be to define "equivalent T score thresholds" for any site or device, which would identify the lowest quintile of the bone mineral density for 60-69 year olds.[10] The WHO definition of osteoporosis was based on identifying people in the lowest quintile of bone mineral density. Specific equivalent device and site thresholds can be obtained by setting the prevalence of the condition at 20% based on 65 year old Caucasian females. A more radical longer term solution being debated is to abandon the WHO definition of osteoporosis in favour of criteria based on absolute values for bone mineral density and risk of fracture for individual sites and devices. Bone mineral density is not the only important determinant of fracture risk, and the ideal method of predicting fracture should incorporate other important factors such as age, history of low trauma fractures, and propensity to fall. The concepts of "absolute risk" (calculated from the relative risks of the relevant factors) and "remaining lifetime fracture risk" could fulfil this role and may be superior to T scores in fracture prediction. However, few studies of sufficient duration exist to examine how bone mineral density and other factors affect the lifetime risk of fracture, and many assumptions are required to extrapolate from short term risk to lifetime risk.[11]

The role of peripheral devices in monitoring treatment remains unclear, and few data exist on the usefulness of the peripheral devices in men. The case for universal screening for osteoporosis has not been proved, and both peripheral and central bone densitometry are therefore likely to be restricted to those who have risk factors for osteoporosis.[12] It remains to be shown whether peripheral densitometry techniques, which could easily be applied in primary care, can be used in screening to reduce fracture rates in older people.

Although portable peripheral bone densitometry techniques are now available, the diagnosis of osteoporosis is complicated by the issue of discordance between sites which has emerged as a major problem causing misclassification of individuals. While optimal methods for defining osteoporosis and predicting fracture risks are debated, it is imperative that users understand the limitations of these techniques: in the short term, using the device-specific equivalents of T scores in conjunction with other risk factors such as previous fractures and the propensity of a person to fall seems a sensible approach.

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Cheating at medical school

Justice must be done and seen to be done

Recently the *BMJ* received the following anonymous letter.

"Dear Sir,

I am a graduating student of Royal Free and University College London Medical School. During the finals of clinical exams I was witness to one of the most ugly scenes in my short but eventful life. One of my colleagues had in a brazen attempt to obfuscate the examiners made use of her *Oxford Clinical Handbook* during her long case. Unfortunately (or fortunately) for her, she was caught red handed. The deed was not looked on kindly by the authorities, especially when she attempted to extricate herself by claiming she had also done this in a previous examination and not been caught—thereby (or so she believed) justifying her act.... My colleagues and I were convinced that she would receive her comeuppance.

After meeting the disciplinary board, however, she was allowed to pass her exams without further ado. Fair play and honesty—two virtues I have always believed in—have been made monkeys of again. In future perhaps we should all do as she did. After all, look where it's got her."

We rang the medical school, and the subdean confirmed that the facts in the letter were correct except that the student did not say that she had used a book in a previous examination. The examining committee had decided to allow her to graduate but had held back distinctions and prizes that she might have won. She had been an exemplary student, and there was no indication that she had done this before.

It's easy to understand why the committee took the decision it did. The student would have been distressed. Some of the committee members must have known the student and themselves have been upset to find a star student cheating. They are no doubt kindly people, some with children the same age as the student. A few minutes with a book probably made little difference to her performance. The committee may have done the right thing to pass her, but it also made some mistakes.

The problem with cheating is that it destroys trust. Somebody who can cheat can also lie. Suddenly everything is uncertain. Perhaps they have cheated in previous exams. Perhaps they cheated in course work. Perhaps they've invented data in experiments. Perhaps achievements described in their curriculum vitae are false. When the police find somebody guilty of financial fraud they assume that everything else is fraudulent until proved otherwise. They investigate. Doctors, whose business is helping people not punishing them, are inclined to assume the opposite, but it is the police who have more experience of fraud.

The biggest mistake of the committee or the school was to fail to ensure that justice was not only done but seen to be done. It seems unlikely that the student who wrote to the *BMJ* is the only student who knows. It seems much more likely that all the students know. The gossip would spread fast in the highly charged atmosphere that accompanies final exams. The students expect the cheating student to "get her comeuppance"—but nothing happens. It seems unfair. Why should they play by the rules if nothing happens to those who cheat? Perhaps others are cheating and getting away with it. Maybe they are being disadvanatged by not cheating. What is a qualification worth if somebody can cheat and still be awarded it? To avoid a corruption of the whole process and the school, the school needed to explain its actions to the students—and it would need to be a very convincing explanation.

The committee has also failed to consider the broader context. The medical profession is in the dock. Self regulation is suspect. The public worries that doctors cover up for each other. It needs its confidence in doctors restored. Passing a student who is found cheating and failing to offer an adequate explanation for the action damages the culture of medicine.

Has the *BMJ* done the right thing to publicise this episode? The school thinks not. We understand that it thinks it has dealt justly with the student. But it has done so privately, and justice is not a private matter. It has not shown the rest of the students that it has dealt justly and therefore it has not dealt justly by them. We understand too that there is a risk that the student herself may end up being punished more by public exposure than she would have been had she been failed in her examination. But the actions of the school potentially undermine the credibility of medical education and so of medicine. The issue needs exposure and debate.

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