acute illness, a specific training programme and competency criterion with national guidelines should be developed to educate doctors and allied healthcare professionals to integrate focused portable echocardiography into their existing clinical and resuscitation protocols. By using a limited number of specific scenarios applicable to the acute care setting a didactic syllabus (with a standardised reporting algorithm) and focused "rule in, rule out" questions, the simplified nature of these studies could be emphasised (potentially reducing false positives and negatives). Equally importantly, the limitations of the method should be taught, including the absolute requirement for images to be acquired and stored for urgent consultation with an expert where doubt remains.¹² Portable echocardiography should be used not to facilitate discharge but to trigger timely referral to a specialist and conventional detailed departmental echocardiography.

Ultimately if emergency doctors are educated under the auspices of this targeted tuition they will acquire a realistic appreciation of the role of portable echocardiography in acute care and the importance of continuous audit and assessment, and this will represent a major advance in the care for patients with acute conditions. Acquiring the requisite skills (com-

parable to the performance of a minimum of 150 studies) will require ongoing personal practice supported by feedback from local specialists and experienced seniors informally or as part of formal echocardiography rounds. Without this mentorship the intended dissemination of this technology will not be practicable and an opportunity will be missed. With it diagnostic abilities will be enhanced, facilitating rapid initiation of treatment and improving the outcome for patients.

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Screening without evidence of efficacy

Screening of unproved value should not be advocated

Screening has intuitive appeal. Cancer, for example, causes a quarter of all deaths, and a doctor does not diagnose many incurable cancers without wanting some means of bringing forward the diagnosis. Before any screening for cancer is introduced, however, large randomised trials with mortality end points should be conducted to establish and quantify any benefit. But there is a view that there must be some gain from earlier diagnosis; awaiting trial results is a needless delay. The scientific rigour applied to other areas of medicine may not always be applied to screening.

Cancer of the prostate is an example. The serum concentration of prostate specific antigen can predict mortality from prostate cancer.¹⁻⁴ There are no published randomised trials that the earlier detection

improves prognosis, yet in the United States and Italy a third or more of healthy men aged over 50 have had prostate specific antigen measured in the past two years.⁴⁻⁵ In Britain, on the other hand, only 5% have,⁵ and the available evidence on prostate specific antigen testing in reducing mortality indicates that the British are right to reject it.

A problem with using prostate specific antigen (or any chemical produced by a cancer) as a marker for screening is that the serum concentration will increase with the volume of tumour, so high levels will tend to indicate extensive disease. Data from cohort studies showed that serum concentrations of prostate specific antigen, expressed as a multiple of the age specific median concentration, was 40 in men who died of prostate cancer within three years of the collection of the

blood sample, but only 6 in men who died after three to six years and 4 in those who died after six to 10 years.¹ In the randomised trials of mammography no reduction in mortality was seen until several years after the first screen. A cancer that is within three years of killing a person may be too extensive for treatment to be curative.

Of concern in this respect is the result of a study of men found to have prostate cancer on prostate specific antigen testing who underwent surgical staging.⁶ Using a prostate specific antigen cut off level of 10 µg/l, which makes the false positive rate in men over 70 about 4% (that is, 4% of men without cancer were screen positive—similar to the value in screening for breast or cervical cancer), 15 of the 16 men found to have prostate cancer had extra-prostatic tumour. Even using the commonly advocated prostate specific antigen cut-off level of 4 µg/l, 22 of 33 had extra prostatic spread, and this generated a false positive rate as high as 18% in men over 70.⁶ This is an unacceptably high rate in asymptomatic men considering that screen positives have a transrectal biopsy. The false positive rate was lower in younger men, but men over 70 are the relevant target group—84% of deaths due to prostate cancer in England and Wales are in men over 70.

Prostate specific antigen is a good screening test only for prostate cancers that cause death within three years; after this time the cut-off of 4 µg/l detects only about half of prostate cancers that would cause death or serious morbidity.¹⁻⁴ Detecting more would require an even higher false positive rate: the test has poor specificity.⁷

A further problem with screening for cancer is that the cancers detected may include low grade tumours that would never have presented clinically. This was illustrated in a randomised trial of screening for cancer of the lung. There was an excess of 46 cancers diagnosed in the screened group over the control group (206 v 160); these 46 were early stage cancers that were resected, but despite 11 years of follow up their counterparts never appeared as more advanced cancers in the control group, and there was no reduction in lung cancer mortality in the screened group.⁸ Anecdotes of men who were found on screening to have prostate cancer that was localised and easy to treat, and did well (such as Norman Schwarzkopf of Gulf war fame), have been interpreted as favouring screening, but this could be misleading. Many prostate cancers are not destined to be fatal,⁷ and histologically less aggressive tumours can elevate prostate specific antigen.² Overdiagnosis of indolent cancers in asymptomatic patients is an unresolved problem. Studies grading archived biopsy material and linking this to mortality are under way, but histological appearance may at best only partly predict clinical outcome. Evidence against screening also came from the similar mortality from prostate cancer in two districts in which prostate specific antigen testing was common in one and uncommon in the other.⁹

At present the one certainty about prostate specific antigen testing is that it causes harm. Some men will receive treatment that is unnecessary (because the cancer is too extensive for the treatment to be curative or because the cancer would never have presented clinically), and the treatment will cause incontinence, impotence, and other complications.¹⁰ In one study over two thirds of men receiving either radical prosta-

nectomy or radiotherapy were affected.¹¹ Whether there is any compensatory benefit is uncertain; there are no grounds for assuming that there must be. Only a randomised trial can answer this.

Breast self examination and testicular self examination are further examples of the failure to apply scientific rigour to screening. Both have been widely advocated on an assumption that they must be beneficial and cannot do harm; neither should be advocated.¹²⁻¹⁵ Breast self examination was shown in a recent large trial (266 000)¹² and a meta analysis¹³ to be ineffective (the malignant breast lumps are presumably noticed anyway, on washing and dressing). But it caused harm: the self examination group had more surgical biopsies (3627 v 2398) and undoubtedly more anxiety. This result should discourage prostate and testicular screening.

Public health authorities should not advocate screening of unproved value. Giving information to people considering screening (on prostate specific antigen testing, for example) when the only honest information is complete uncertainty is useless. Encouraging people to decide for themselves is ducking the issue. For any cancer screening of unproved value it is unreasonable to expect that the investigation of screen positives or treatment of screen detected cancers should be funded when healthcare resources are limited. For a new drug a rigorous set of experimental data must be presented before it is licensed for use, and until it is licensed patients cannot obtain it. The same rigour should apply to medical screening.

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