workload dealt with on take in days I am not sure. However, if it is the former then there are implications for medical education. If it is the latter then housemen must be made to realise the importance of making the most accurate clinical diagnosis possible and that the extra time taken to obtain a full history is time well spent.

If information collection can be maximised at a clinical level then negative laparotomy rates, appendix perforation rates, bad management errors, and annual savings to the National Health Service will improve even before the introduction of computerised systems.

D G SWAIN

Department of Medicine,
Selly Oak Hospital,
Birmingham B29 6JD

SIR,—I read with surprise the letter of Dr P N Hall (18 October, p 1025) in response to the article by Dr I D Adams and others. I am prompted to refer back to history and to the people who opposed the introduction of stethoscopes because they thought that this aid to their diagnostic acumen was not warranted.

In this prospective trial there was an improvement in diagnostic accuracy at all stages. There was an improvement when the form alone was used and again when the data were fed in by the examining doctor, who had immediate feedback from the computer. In my speciality of accident and emergency medicine we are bedevilled by most staff being in only their third job. Assuming that they are all intelligent and have been well trained at their medical schools, it is still too much to expect a newly qualified junior doctor to have the span and experience necessary to deal rapidly and with confidence with the variety of disorders facing him in an accident department. The abdomen in particular is notorious for its multitude of traps.

In this trial the use of the computer has improved the performance of the first year senior house officer to that of a registrar, both as regards accuracy of diagnosis and confidence in the management of the patient. It has very significantly cut down mortality and morbidity and, in effect, saved a substantial sum of money to a National Health Service with ever expanding demands for it. I am therefore surprised that anybody should reject outright an aid that, according to the results in this study, has improved the care of patients to such an extent. Even after being qualified for 16 years, I would never reject outright any aid to diagnosis. Dr Hall at least admits that the computer encourages a more careful approach to the management of abdominal pain, and even for that alone I would consider it a very worthwhile tool. It has been shown repeatedly that mistakes are made often not out of ignorance but because of a less than very careful approach to diagnosis.

This machine could, of course, also monitor a doctor's performance and the improvement thereof during his or her stay in a particular department. It would give a rare objective assessment that would add credibility to any reference given to this doctor. The careful doctor has nothing to fear from this modern aid to diagnosis but only points to gain. One is only too aware that sometimes the chemistry between seniors and juniors may not be quite right and this objective assessment of a junior's performance may positively influence the reference that he or she would be given by a consultant.

I would value the opportunity of its introduction in my department and its expansion to other problems such as head injury and chest pains.

MARIO TABONE-VASSALLO

Accident and Emergency Service,
Luton and Dunstable Hospital,
Luton LU4 0DZ

Trace element analysis of hair

SIR,—We read Dr T L Dormandy's leading article (18 October, p 976) with considerable interest as we coincidentally had both just had trace element analysis of our hair performed at the insistence of a family friend, even though we had no symptoms and eat a normal diet.

The analyses suggest that between the two of us we are deficient in 16 trace elements and have "allergic reactions" to 25 common foodstuffs; no reference ranges were included. Enclosed with the report was the advice to correct our vitamin and mineral "deficiencies" by buying supplements from a company recommended by the organisation who did the analysis and to try an elimination diet of its own devising, with subsequent repeated hair analyses.

Two interpretations of our analyses are possible: either our diet is defective and food intolerance is a subclinical problem, or the "allergic reactions" noted are clinically unimportant and the trace element reference ranges have been too rigidly defined. "Normal" ranges generally include 95% of the population, so 1 in 20 people will be "abnormal" based on conventional laboratory practice. However, 20% of the trace element and mineral analysis tests performed on us were abnormal, which makes us seriously wonder what is normal for normal people. If reference ranges are set too low the analysis services are likely to profit, while the individual will suffer much needless anxiety and dietary inconvenience. We strongly support further controlled studies to define the uses and limitations of this technique before its widespread use on an unsuspecting public.

COLM LANIGAN
LUMINA LANIGAN

London N18 1SU

Use of serum cotinine to assess the accuracy of self reported non-smoking

SIR,—We were asked by Professor N Wald and colleagues (8 November, p 1217) whether we had any data on cotinine, a marker of tobacco smoke exposure, in self reported smokers and non-smokers to see how often people who say they are non-smokers in fact do smoke and, if they do, to see how much they smoke in comparison with people who report themselves to be smokers. Such estimates are needed for interpreting studies on

Cotinine values according to self reported smoking category

Serum cotinine	Non-smokers	Smokers
$\mu\text{g/l}$	No (%)	No (%)
<1.0	93 (40)	1† (2)
1.0–	94 (41)	2† (3)
2.0–	26 (11)	0
4.0–	12 (5)	2† (3)
8.0–	2* (1)	0
16.0–	2* (1)	3† (5)
32–	2* (1)	0
64–	0	5 (8)
128–	1* (0.4)	14 (22)
256	0	29 (45)
≥ 512	0	8 (13)
All	232 (100)	64 (100)
	$\mu\text{g/l}$	$\mu\text{g/l}$
Mean	2.9	304
Median	1.1	305
10th centile	0.4	19
90th centile	3.2	618

*Highest 7 cotinine values for non-smokers were 8, 14, 22, 28, 43, 48, 208 $\mu\text{g/l}$.

†Lowest 7 cotinine values for smokers were 0.5, 1.3, 1.9, 4.3, 5.2, 19.4, 19.6 $\mu\text{g/l}$.

lung cancer in self reported non-smokers in relation to exposure to other people's smoke.

We did have such data, based on a study of the smoking habits of 296 women attending a well person screening examination in Portland, Maine, USA, in 1983. The women were asked, through a self administered questionnaire, whether they smoked cigarettes and, if so, how many. A serum sample was also collected and tested for cotinine.¹ The table shows the distribution of serum cotinine values in the self reported non-smokers and smokers. There was very little overlap in the distributions. Eight per cent (5/64) of the self reported smokers and 98% (227/232) of the self reported non-smokers had values of 10 $\mu\text{g/l}$ or less. Four of the five self reported non-smokers with higher values had only slightly raised cotinine concentrations, suggesting that they were either heavily exposed to other people's smoke or themselves smoked occasionally. The fifth was almost certainly a smoker.

These data, which are similar to those published from a British series,² indicate that in a sample of the general population the reliability of self reported smoking habits is high and that most self reported non-smokers who do in fact smoke do so only to a small extent.

JAMES E HADDOW
GLENN E PALOMAKI
GEORGE J KNIGHT

Foundation for Blood Research,
Scarborough,
Maine, USA

1 Knight GJ, Wiley P, Holman M, Haddow JE. Minimizing the problem of bridge recognition with 125-iodine labeled haptens: improved assay for cotinine by selective removal of bridge antibodies. *Clin Chem* 1985;31:118.

2 Wald NJ, Boreham J, Bailey A, Ritchie C, Haddow JE, Knight GJ. Urinary cotinine as a marker of breathing other people's smoke. *Lancet* 1984;i:230.

Private nursing homes: contribution to long stay care of the elderly

SIR,—Dr J Bennett's report (4 October, p 867) of nursing home patients in Brighton agrees with many of our findings in Edinburgh.¹ In contrast, however, we found that our long term care geriatric patients were more dependent at every level than those in nursing homes. We were also aware that some nursing home owners were reluctant to accept heavily dependent patients. One hundred and twelve (28%) of the 400 nursing home patients in our study were largely independent for self care (range in individual homes 14–62%); Dr Bennett notes 23% in the low dependency category. We would be interested to know just how many of these low dependency patients were receiving DHSS supplementation at nursing home rates.

Dr Bennett does not mention the desirability of assessing patients. This is surely advisable before admission to any long stay facility, private or otherwise, and should be mandatory if public funding is to be provided. Assessment is necessary not only to determine suitability but also to screen for the presence of treatable disease.

In Edinburgh we noted wide variations between nursing homes, not only in fees and dependency of patients but also in the facilities provided.² Even in the 50% of homes with day rooms, access by the patients was restricted by poor mobility and the lack of lifts in most homes. The maintenance of standards in the independent sector remains a source of concern, and we agree with Dr Bennett that there is much scope for improving staff training and increasing the availability of physiotherapy and occupational therapy. This is particularly important for the growing number of patients dependent on DHSS support who cannot afford additional fees.