Blood sample transportation and the erythrocyte sedimentation rate

Sir,

Determination of the erythrocyte sedimentation rate (ESR) is a frequently used blood test,[1] which must be accurately performed, in accordance with international standards.[2] For this reason the reliability of the blood test is an important aspect of its diagnostic value in general practice. Following the example of Norwegian investigators,[3] we recently studied this aspect in the Netherlands.[4] In both studies, centrally prepared blood samples were distributed, and the ESR was determined for each sample in the participating general practice centres. In our study we found a clinically relevant inter- and intra-practice variability. Despite the more standardized conditions in the Norwegian study, it also showed an important interpractice variability. The blood samples were transported by car and this might have influenced the results of the studies. One group of Scandinavian investigators studied the stability of some serum and blood constituents during postal transport[5] and found no significant influence. However, ESR was not included in the study. We found no further studies on this subject, and therefore decided to investigate it ourselves. The study fits in well with attempts at developing a good collaboration between general practitioners and clinical chemists.[6]

Five general practice centres and the local hospital laboratory participated in the study. Blood samples of 10–30 ml were obtained from patients admitted to the local hospital, as well as from blood donors and laboratory personnel, after verbal informed consent. The patients underwent venepuncture for this purpose. The samples were collected by laboratory personnel in the usual way, and the blood was collected in ethylenedia minetetraacetic acid (EDTA) tubes, to prevent clotting. After storage for less than two hours in the laboratory refrigerator, the samples were divided into pairs and placed in small, disposable plastic tubes. One of each pair stayed in the laboratory and the remaining tubes were placed in the boot of a car, in the dark, in a fixed position. The car and its driver did not change during the study. All the general practice centres were visited within a time span of about 30 to 60 minutes. The car then returned to the laboratory.

For each pair of samples the ESR was determined simultaneously in the laboratory. The test was carried out by the normal laboratory staff, following the Westergren method, taking the results in mm after one hour. From the beginning of April to the beginning of May 1988 17 blood sample pairs were collected and analysed in this way. In analysing the data, graphs were constructed in accordance with the recommendations for showing variables without an independent 'gold standard'.[7]

Figure 1 shows to what extent, and in which direction the ESR values changed during the transport for the 17 blood sample pairs. A higher ESR value after transportation is regarded as a positive change, a lower ESR as a negative one. The product moment correlation coefficient R was calculated as 0.98 ($P<0.001$) and the regression coefficient as 1.07 (95% confidence interval 0.96–1.19, intercept −3.0).

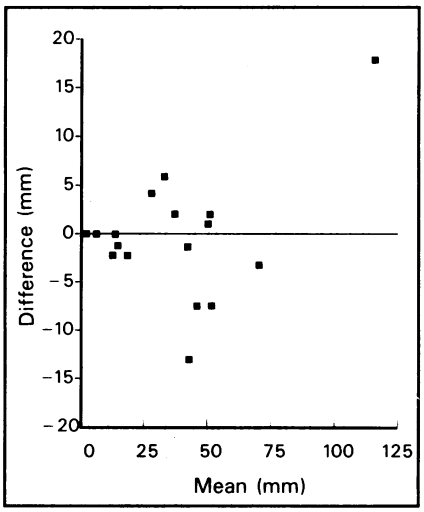

Figure 1. *Differences between ESR determinations for each blood sample pair, before and after transportation (vertical axis), in relation to the mean of the determinations (horizontal axis).*

While in three cases no differences could be established between the ESR values before and after the transport by car, there were two cases in which the differences amounted to 13 and 18 mm. As would be expected, the blood sample pairs which showed no differences were those with a low mean ESR value (one to 15), whereas the highest differences were found for two pairs with a high mean ESR value (44 and 121 respectively). To some extent, then, the differences increased with increasing mean ESR values, but there was no blood sample pair where this became clinically relevant. Moreover, the differences did not point systematically in one direction; in eight cases the ESR value was lower after the transport, in six it was higher. This result is reflected in the extremely high correlation and regression coefficients. Therefore it can be concluded that blood sample transport does not influence the ESR values, and that other factors must be responsible for the variability. There may have been inter-observer variability within the laboratory but the laboratory personnel, knowing that they were involved in a scientific experiment would probably have performed the ESR determinations more accurately than usual.[8]

Comparing these results with the clinically important inter- and intra-practice variability found previously, it can be concluded that blood sample transport by car has no substantial effect on this variability, which therefore needs further investigation in order to discover its origin.

G.J. DINANT
J.A. KNOTTNERUS

University of Limburg
Department of General Practice
Maastricht, The Netherlands

J.W.J. VAN WERSCH

De Wever Hospital
Laboratory for Haematology
Heerlen, The Netherlands

References

1. Kelly MH, Barber JH. Use of laboratory services and communication of results to patients in an urban practice: an audit. *J R Coll Gen Pract* 1988; **38:** 64-66.
2. International Committee for Standardization in Hematology. Recommendation for measurement of erythrocyte sedimentation rate of human blood. *Am J Clin Pathol* 1977; **68:** 505-507.
3. Landaas S, Juell A. Quality of laboratory analyses in primary health care. *Scand J Prim Health Care* 1986; **4:** 169-173.
4. Dinant GJ, Knottnerus JA, Van Wersch JWJ, Dolhain JPH. De bezinkingssnelheid der erythrocyten; een onderzoek naar de reproduceerbaarheid van deze bepaling in de huisartspraktijk. (Abstract in English). *Ned Tijdschr Geneeskd* 1988; **132:** 680-684.
5. Berg B, Estborn B, Tryding N. Stability of serum and blood constituents during mail transport. *Scand J Clin Lab Invest* 1981; **41:** 425-430.
6. Horder M. Current trends in the collaboration of primary health care and clinical chemistry in the nordic countries. *Ups J Med Sci* 1986; **91:** 189-192.
7 Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986; **1:** 307-310.
8. Mortimer PP. 'Blind' laboratory analysis. *Lancet* 1988; **1:** 471.

Surveillance of iron deficiency, anaemia and hypercholesterolaemia in rural pre-school children

Sir,

With reference to James and colleagues' study of iron deficiency in inner city pre-school children[1] our practice reviewed its data on the prevalence of iron deficiency, anaemia and cholesterol level in a selec-

tive study of rural pre-school children aged one to four years. This has been accumulated as a base line for a prospective surveillance programme.

Screening was offered to 485 pre-school children in the practice. Indices including haemoglobin concentration, mean corpuscular volume, serum ferritin level and serum cholesterol level were estimated. Haemoglobin concentration less than 11 gdl^{-1}, mean corpuscular volume less than 75 fl or serum ferritin level less than 11 μgl^{-1} denoted anaemia or iron deficiency. If the random serum cholesterol level was greater than 6mM a subsequent fasting level was determined and appropriate management initiated. Growth centiles, birth and dietary history, social class distribution and immunization record were noted from a questionnaire sent to every parent.

Parents were invited to bring their child to the health centre and prior to the venepuncture every child received local anaesthetic cream.[2] The questionnaire was returned at this stage. At the initial interview, usually with the mother, the questionnaire was examined and the direct relationship between iron deficiency and delayed psychomoter development explained.[3,4] It was felt that this education would increase future compliance should any abnormality be detected. The follow up schedule was explained and where possible it included determination of haemoglobin concentration, mean corpuscular volume and reticulocyte count two weeks after starting therapy, to confirm response to iron therapy. Dietary advice was given by the dietician. A prolonged course (three months) of oral iron was prescribed to those children diagnosed as iron deficient to ensure adequate repletion of body iron. Three months after the diagnosis, growth parameters would be measured and blood levels monitored.

At all stages parents were given the opportunity to discuss any problem they might have regarding their child. On non-attendance, a further two invitations to attend at any time were sent to the parents. There are no ethnic minorities in the practice area and middle and lower social classes predominate.

Over a four month period, 312 children were screened — 64% of those to whom screening was offered. The overall prevalence of iron deficiency was 21% but the prevalence of iron deficiency anaemia was much lower at 6%. The incidence of iron deficiency varied with age — 24% in one year olds, 25% in two year olds, 19% in three year olds and 15% in four year olds. For anaemia there was a similar variation — 5% in one year olds, 9% in two year olds, 2% in three year olds and 7% in four year olds. Analysis of venous blood for serum cholesterol levels was possible for 97% of the children screened. Only 3% had random serum cholesterol levels above normal and only one child had a subsequently raised fasting serum cholesterol level, requiring dietary manipulation.

The incidence of iron deficiency and iron deficiency anaemia in this practice is comparable with other studies.[5] This would suggest the need for routine paediatric surveillance for iron deficiency. The low prevalence of hypercholesterolaemia precludes its routine screening, except where there is a significant family history.

GERALDINE A. GRANT

The Medical Centre
10a Lineside, Coalisland
Co Tyrone BT71 4LP

References

1. James J, Evans J, Male P, *et al.* Iron deficiency in inner city pre-school children: development of a general practice screening programme. *J R Coll Gen Pract* 1988; **38:** 250-252.
2. Anonymous. Iron deficiency — time for a community campaign? *Lancet* 1987; **1:** 141-142.
3. Walter T, Kovalaskys J, Steel A. Effect of mild iron deficiency on infant mental development scores. *J Pediatr* 1983; **102:** 519-522.
4. Oski FA, Honig AS. The effects of therapy on the developmental scores of iron deficient infants. *J Pediatr* 1978; **92:** 21-25.
5. Aukett MA, Parks YA, Scott PH, Whorton BA. Treatment with iron increases weight gain and psychomotor development. *Arch Dis Child* 1986; **61:** 849-858.

Dispensing costs

Sir,

Neville and colleagues conclude that there is a major role for the pharmacist in preventing prescription errors (March *Journal,* p.110). Their results in fact clearly demonstrate that most of these errors are caused by the current system which separates the tasks of prescribing and dispensing in time, place and person. It is reassuring that in their study the overall error rate was so small, that there were no errors which were potentially serious to the patient and that there were no illegible scripts. Naturally they found that some doctors had higher error rates than others. They also found that feedback failed to reduce these errors yet they propose an increasing role for the pharmacist whose major role is in providing feedback.

The single commonest error was a prescription for the wrong pack size, accounting for 37% of all errors. A failure to state the strength of a preparation prescribed produced a further 32% of errors. These two errors clearly illustrate the doctor's poor knowledge of drug presentation. I believe this is a direct consequence of a system which prevents doctors from handling the drugs they prescribe. It would be interesting to compare these error rates with those in dispensing practices.

In their classification of error types words such as nuisance, inconvenience, annoying and delays are used. These highlight major features of the present system for the provision of medicines. In 34% of cases the chemist found it necessary to contact the doctor. It would have been useful for the authors to have quantified the inconvenience caused to the patient in these cases by measuring waiting time, the number and distance of any extra journeys made, and what extra costs the NHS incurred; for example the cost of telephone calls.

I believe the authors have misinterpreted the implications of the Daonil (Hoechst) case. It highlights the benefits to be gained from allowing dispensing to take place within the surgery building since it is highly unlikely that a dispensing technician employed within a practice would misread familiar handwriting.

In Suffolk, dispensing doctors were able to provide patients with medicines for half the cost of the prescriptions provided by chemists. The total drugs bill for FP10 dispensing in Suffolk for the past financial year was £176 million. The average cost of doctor dispensed items was £3.49 while chemist dispensed items at £6.51 were almost twice the price. Because of the chemists' monopoly only 5.4% of dispensing in Suffolk was by doctors. There is therefore a potential saving to the exchequer of £81 million per annum for Suffolk alone if all dispensing were done by general practitioners. It is therefore surprising that the current regulations give the chemists every encouragement to open new businesses in competition with rural general practitioners and that the new rural pharmacies attract considerable subsidies from the essential small pharmacies scheme (Regulations for the NHS medical and pharmaceutical services 1988).

Neville and colleagues' study illustrates some of the major disadvantages of the current system. I fail to see why modern medicines, most of which are in original packs, cannot be dispensed from the surgery by a trained dispenser working for the general practitioner on site, and why pharmacists are protected by a monopoly which is counter to the interests of all but the chemists themselves. In order to reduce errors in the provision of medicines, whenever possible dispensing should be performed by the same person in the same place at the same time as prescribing.

P.D. THOMAS

Newell Rise, Claydon
Ipswich IP6 0AQ