ECG interpretation in the NHS

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Key words

assessment, ECG, training

The first human electrocardiogram (ECG) was recorded over 125 years ago. Despite the development of many new investigative techniques, the ECG remains an essential part of any cardiovascular assessment, whether in relation to acute or chronic health issues, to insurance assessment or to the assessment of risk in critical occupations or in sports professionals. In terms of interpretation, it is fair to say that the ECG occupies a unique and unsatisfactory position. Unlike pathology specimens and the images produced by modern techniques (both of which are always formally reported by trained and tested professionals), and unlike biochemical data (which are usually presented to the user clinician with the normal values displayed), ECGs are most commonly reported and acted upon by front-line users who have had no formal training in, and no assessment of competency in, ECG interpretation, and who generally proceed with no clear guidelines about the limits of normality or the precise criteria for specific abnormalities. There is no formal, national programme for training in ECG interpretation, or for the assessment of ECG interpretation skills. Inevitably, therefore, the standard of ECG interpretation (both in general practice and also in hospital) is highly variable, and is often extremely poor.

Moreover, the quality of ECG interpretation remains completely obscure to the patient. When any healthcare professional speaks to a patient about that patient's ECG, the patient automatically assigns to the healthcare professional a degree of competence in the said professional's ability to read the ECG, which the patient (very reasonably) presumes the professional to have. Sadly, this confidence is usually misplaced. Furthermore, the healthcare workers themselves are often completely unaware of their lack of competence.

Possible solutions

There are three possible approaches to the alleviation of this problem: (i) the use of computers in ECG interpretation; (ii) the provision of a system of rapid access to ECG recording and to a central area of skilled ECG interpretation; and (iii) the widespread formal training, testing and re-training of healthcare professionals, at all levels, in relation to their ECG interpretation skills.

Computer interpretation of ECGs

This sounds the most obvious solution, but, with currently available equipment, it is totally unsatisfactory. All studies of computer interpretation of the ECG have revealed very significant error rates. Not infrequently, the errors involved are serious with potential consequences in relation to patient management. Official bodies (e.g. the American College of Cardiology and the American Heart Association) consistently counsel against the use of this strategy.

Provision of rapid access to skilled interpretation

This can only be achieved by immediate telemetric access to a central reporting facility. Such organisations do currently exist, successfully providing a service under contract to specific National Health Service (NHS) purchasers.

Training, testing and re-training of the ECG interpretation skills of healthcare professionals

Training for NHS healthcare workers in ECG interpretation is desperately needed across the board. In 2004, the authors, working with the (then) Greater Manchester and Cheshire Cardiac Network, initiated a series of ECG training and assessment programmes within the NHS. Further such courses have since been given in Liverpool (with the then Cheshire and Merseyside Cardiac Network) and in Hertfordshire (with the then Bedfordshire, Hertfordshire & Milton Keynes Heart & Stroke Network). A total of 30 courses have been given, so far, to approximately 2,000 delegates. The principles underlying these courses are given below.

The features of a satisfactory training programme

Commitment and effort

Learning to read the ECG is like learning a language, but is considerably simpler since the 'grammar' is less complex and the 'vocabulary' is very much smaller. Nevertheless, success still requires considerable effort and commitment, both on the part of the teachers and also on that of the students. Anything less than full commitment is unsatisfactory. Casual courses, severely limited in time (e.g. one-day courses), undoubtedly make the delegates feel better, but this is not, or at

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least should not be, the objective. Professionals who feel better, but are not actually better at ECG interpretation (or at anything else, for that matter), are likely to prove *less* reliable in practice because their confidence/competence ratio will have increased.

Type of training

It follows, from the above, that modern teaching techniques, typically involving group discussions and the mutual sharing of difficulties, will have no significant impact on the fundamental problem. What is required is rigorous, didactic teaching and training combined with committed learning and subsequent assessment. Experience with these courses has shown how much the delegates appreciate this approach.

Duration of training

There is no realistic possibility of achieving worthwhile training in ECG interpretation in a day – even if the delegates already have some ECG interpretation skills. The single most important question to be answered in respect of any ECG is whether or not the record is within normal limits. Our experience has shown that a minimum of one whole day of teaching is required in order to deal satisfactorily with the formidable range of possible appearances of the normal ECG. The absolute minimum time requirement to teach basic competence is three days of full-time effort, and such a period leaves no time for consolidation of topics learned. Our basic course is, therefore, a five-day course.

The '3+1+1' course

Our five-day introductory course is split up into an initial three consecutive days followed, about four weeks later by day 4, and after a further four weeks by day 5. Day 1 deals exclusively with the normal ECG, day 2 with morphological abnormalities and day 3 with arrhythmias. Days 4 and 5 involve consolidation and formal testing, day 4 in relation to morphology and day 5 in relation to arrhythmias. Delegates are expected to revise the relevant topics during each of the four-week gaps. Comprehensive supporting documentation is provided on each of the five days.

Testing

Formal testing is carried out on days 4 and 5. In all, each delegate is required to report 100 ECGs. Certificates of 'Basic Competence' are awarded to those delegates obtaining 80% or more in the combined assessments. The pass threshold is inflexible and is rigorously maintained.

Re-training

A two-day 'revision and consolidation course' is also provided. Admission to this course is, however, restricted to those who have previously completed the '3+1+1' course.

Mix of delegates

Our experience has shown that there is no need to design courses specifically directed towards individual groups of healthcare professionals. Groups including nurses, physiologists, junior hospital doctors, consultants, paramedics and others have produced no problems related to the mix. Delegates from all of these occupations have expressed their appreciation. Our experience is that the paramedics are among the most acquisitive (in relation to the soaking up of knowledge) of delegates. They are also, very clearly, one of the most important groups to train, with benefit both to patients and to the NHS.

Conclusions

The standard of ECG interpretation is generally poor. Brief teaching sessions designed to ensure the comfort of those taking part will do nothing to address this issue. ECG teaching, training and assessment should be rigorous and committed, both on the part of the trainers and also on the part of the trainees. Such training and assessment should be extensively available ●

Conflict of interest

None declared.