Current ECG telemetry practice in the UK: a national audit

ANALIE GRIMSHAW, EUGÉNIE DI STEFANO, STEPHEN SALTISSI

Abstract

Electrocardiographic monitoring by telemetry has become commonplace throughout the UK. This survey was designed to assess its availability, to determine current practice and so to inform future recommendations for optimal telemetry working practice.

Data were collected via postal questionnaire followed by telephone contact. Questionnaires were completed by 280 (99.3%) of the 282 coronary care units (CCUs) contacted.

Telemetry is now widely available, with 77.3% of CCUs offering a service, though practice varies widely from unit to unit. Only 15% of telemetry services were supported by written protocols, telemetry duration was routinely set in only 17.4% and interrogation was haphazard, with fewer than 27.2% of units investigating each symptomatic event.

Overall responsibility for the service was unclear, and routine medical input occurred in only 48.6% of services. The task of telemetry monitoring was delegated to relatively junior CCU nursing staff (94% D/E grade). Verbal information was commonly given to patients, but written information was very rare (2.75%). Some 70% obtained no formal patient consent (written or verbal) prior to commencing telemetry. Nonetheless, CCU staff felt strongly that the service was valuable and affected patient care positively.

UK telemetry practice is haphazard, variable and poorly supported by adequate protocols. The potential for missing arrhythmias and/or for mismanaging them is evident, making a strong case for practice guidelines defining the responsibilities of staff involved, identifying best practice and outlining supportive educational requirements.

Faculty of Health and Applied Social Science, School of Nursing and Healthcare Studies, Liverpool John Moore's University, 79 Tithebarn Street, Liverpool, L2 2ER.
Analie Grimshaw, Senior Lecturer in Cardiology

Cardiology Department, Royal Liverpool University Hospital, Prescot Street, Liverpool, L7 8XP.
Eugénie Di Stefano, Cardiac Research Nurse
Stephen Saltissi, Consultant Physician and Cardiologist

Correspondence to: A Grimshaw
(email: a.grimshaw@livjm.ac.uk)

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Introduction

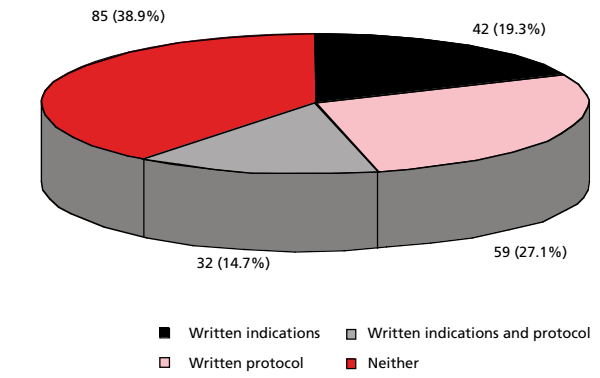
Prolonged continuous ECG monitoring at the bedside has been employed in Coronary Care Units (CCUs) since the late 1950s. Recently, advances in technology have made it possible to expand this in order to monitor the ECG of ambulatory patients continuously away from the bedside, for example in non-critical areas or general wards. This technology is referred to as cardiac telemetry. It involves a miniature transmitter attached to the patient by surface electrodes: it transmits an ECG signal via radiofrequencies which are picked up by wall- or ceiling-mounted receivers distributed over the area to be monitored. This allows patients to be monitored whilst they remain mobile within the signal transmission range and has the benefit of freeing up expensive and scarce high-dependency CCU beds.

The rationale for ECG monitoring by telemetry, as for bedside monitoring on the CCU, is the immediate recognition of relevant cardiac arrhythmias, allowing prompt appropriate treatment.

Rapid proliferation of telemetry services has occurred throughout the UK over the last 15 years, with little comprehensive guidance, audit or outcome assessment. During this period, a number of problems with telemetry have become apparent. First, concerns have been raised that advanced computerised monitoring apparatus may be less efficient than trained personnel in the recognition and interpretation of arrhythmias. Indeed, Funk *et al.*[1] showed that the presence of a person detailed to watch the monitor improved accuracy in detecting clinically important arrhythmias compared to reliance solely on automated systems, strongly implying that the latter may allow significant arrhythmias to be missed. Secondly, Hannah *et al.*[2] drew attention to the inappropriate use and duration of telemetry, which unnecessarily consumed resources and restricted the availability of monitoring to other patients requiring it.

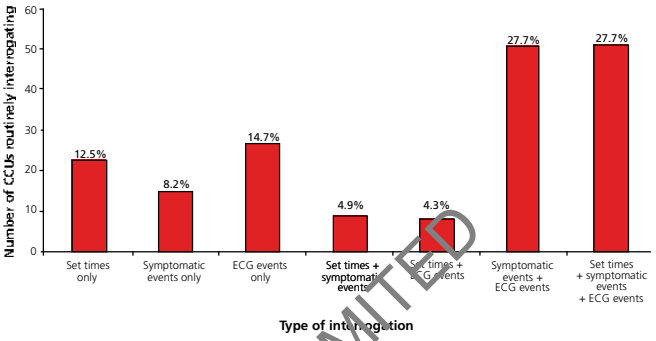
As telemetry monitoring becomes more common, a need for standards, policies and protocols (evidence-based where possible) to improve monitoring practice has become apparent. This audit constitutes a first step in this process. Its aims were to document the current availability of cardiac telemetry, to establish the current cardiac practice throughout the UK and hence to determine the need for additional guidance and supportive measures in order to optimise the service.

Figure 1. Availability of formal written telemetry protocols in CCUs



Key: CCUs = coronary care units

Figure 2. Timing of and indications for routine telemetry interrogation



Key: CCUs = coronary care units; ECG = electrocardiogram

Methods

In September 2002 a brief questionnaire was sent to the nursing manager of each of the 282 adult CCUs listed in the United Kingdom and Ireland Directory of Critical Care 2001[3] together with a covering explanatory letter and stamped addressed return envelope. A two-week deadline was given for return of the questionnaire. The questions were designed to elicit facts rather than opinions and their number was deliberately limited to encourage a larger response rate. For the same reason, it was decided in advance that after the two-week return deadline, the ward manager of non-responding units would be contacted by phone and asked both to confirm receipt of the questionnaire and, if agreeable, to complete it by phone.

As this was a descriptive study, no specific hypotheses were identified at the outset, nor were any tested by statistical analysis.

Results

Of the 282 units, 232 (82.3%) returned the postal questionnaire and a further 48 (17%) responded to the questions following telephone contact. Thus overall 280 (99.3%) units completed the audit, with only two unwilling to participate.

Telemetry facilities were present in 218 of the 280 units (77.3%). The number of available telemetry channels, however, varied considerably: 12.5% of units had 10 or more such channels though the majority had 4–8 channels. There was very wide variation in the provision of formal management protocols (figure 1), with 39% having neither a written list of indications nor a written protocol covering patient management whilst on telemetry.

The duration of telemetry appeared to be largely ad hoc since 180 units (82.6%) reported the absence of any agreed or pre-set monitoring period. On 38 units (17.4%) a routine telemetry duration was used, which in just over three-quarters of cases (76.3%) lasted between 24 and 48 hours. Of these 38 units, 5.3% routinely stopped telemetry in less than 24 hours whilst 18.4% continued it routinely for longer than 48 hours. Telemetry channels and the derived database were not monitored routinely by staff. Only 54 of the 218 telemetry services (25%) allocated a specified member of staff to oversee the telemetry channels and in only nine (4.1%) was this a dedicated role (with no other responsibilities). Monitoring staff, when used, were usually either E grade (70%) or D grade (24%) CCU nurses. The use of a dedicated telemetry watcher bore no relationship to the number of telemetry channels offered within that service. The majority (184 units, 85%) of respondents claimed to interrogate the telemetry database routinely. However, the timing of and indications for such interrogation varied widely (figure 2), with 27.2% of respondents not investigating each symptomatic arrhythmic event.

Overall responsibility for the telemetry monitoring service lay in 76.6% of cases with CCU. In only 4.6% was a consultant responsible for the service, though routine medical review of patient data occurred in 106 units (48.6%). Retention of some form of hard copy of the telemetry data was reported by the great majority of units (188, 86.2%). This most commonly consisted of simply mounting the rhythm strips in the hospital notes (48.9%) or in CCU (8.5%). Few sites (10.1%) undertook more comprehensive analysis.

Almost all services gave some prior information about telemetry to patients before initiating it, though three units (1.4%) stated that they gave no instruction. Only six services (2.75%) gave the patient written information leaflets. In those services giving verbal information only, it was delivered by general ward staff in 55.9%, CCU staff in 30.3% and by both in 12.4%. Written informed consent for telemetry monitoring was not required or obtained by any unit. Sixty-six respondents (30.3%) indicated that they took verbal consent and on three units this verbal consent was documented within the notes.

Of the respondents, 189 (86.7%) perceived their current

Key messages

- Cardiac telemetry practice is highly variable and rather haphazard in the UK, with few units having written protocols
- Responsibility for the service is often unclear, lacks medical input and relies heavily on relatively junior nursing staff
- Informed consent is rarely obtained
- The potential exists for missing clinically significant arrhythmias, suggesting a need for more formal telemetry practice guidelines

telemetry service to impact positively on patient management to some degree: 42% believed telemetry to be beneficial in at least half of cases.

Discussion

This national survey has demonstrated that ECG telemetry services are widely available in the UK. The varying number of channels presumably reflects the size of the institution, its patient throughput and the number of monitored CCU beds. The development of telemetry facilities appears to have been ad hoc, with practice varying widely from institution to institution. This may reflect the lack of medical input and of strategic overview. Current telemetry practice is thus characterised by the absence of written protocols or specific indications; ad hoc duration of monitoring, possibly determined by convenience rather than need; the reliance on automated recording and alarms without any human monitor; and rather haphazard interrogation of the database which neither occurs at routine intervals nor is reliably triggered by symptomatic events. There is currently a heavy reliance on rhythm strips for hard copy but these rhythm strips are routinely reviewed by a doctor in fewer than 50% of cases.

The current lack of rigour in telemetry practice may stem from lack of clarity about responsibilities of individual staff within the service. In the absence of formal protocols, the parts played by ward nursing staff, CCU staff and the patients' medical attendants are ill-defined and variable. Who initiates telemetry, who informs and consents patients, who terminates monitoring and what outcome is obtained all appear to be highly variable as well. The findings of this audit support the belief that there is a need for agreed formal guidelines in order to ensure more effective organisation and management, to guarantee quality standards and to optimise the cost-effectiveness of the service.

The efficiency of detection of ECG abnormalities by current UK telemetry services is open to question bearing in mind that in over a quarter of services, even symptomatic events are not investigated routinely. This may again reflect poor communication between ward staff, CCU staff who generally oversee the monitoring and the doctors responsible for clinical care.

This survey has raised a number of concerns. One such relates to the delegation of the task of monitor watching, where not solely automatic, to D and E grade CCU staff, many of whom may lack the requisite skills. Whilst exposure provides the experience which leads to expertise, staff may welcome the support of both formal guidelines and targeted training in basic cardiac electrophysiology, arrhythmia analysis and management.

The current practice of not giving written patient information or obtaining written consent is debatable. Further, the perception that patients on telemetry need less intensive observation is erroneous. Telemetric ECG monitoring needs to be just as comprehensive as bedside monitoring if arrhythmias are to be correctly identified and medical treatment to be started early. Only in this way will the principles of bedside cardiac monitoring be usefully and safely extended from CCUs to a wider hospital setting.

Conclusion

This audit indicates that current telemetry services would benefit from clear protocols defining optimal management practice and covering selection of patients, database interrogation and data recording. Such guidelines need to be reinforced and supported by educational packages aimed at enhancing the expertise of CCU staff in ECG rhythm analysis and management. Most importantly perhaps, the relative roles and responsibilities of ward staff, medical staff and CCU nurses need to be defined and communication between them optimised.

The strength of this survey lies in the fact that it was comprehensive, with 99.3% of questionnaires being completed. Potential weaknesses were, first, the prior belief that guidelines or protocols might be required, leading to questions being framed with that in mind. Secondly, we did not undertake validation of the accuracy of responses, particularly those received by phone.

Conflict of interest

None declared.

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