

AN EVALUATION OF THE PHARMACIST'S ROLE ON A CARDIAC ARREST TEAM

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- **OBJECTIVE** — To evaluate the usefulness of clinical pharmacist attendance at cardiac arrests.
- **DESIGN** — Questionnaire based evaluation.
- **SUBJECTS AND SETTING** — Clinical pharmacists, resuscitation officers, nurses and medical staff attending 164 arrests over eight months in an acute hospital.
- **OUTCOME MEASURES** — Number of infusions prepared, contributions made at cardiac arrests, and results of a satisfaction survey.
- **RESULTS** — 28 infusions were prepared and advice was given in 17 cases. Completed questionnaires were received from 76 nurses and 27 doctors with the highest response from staff in cardiac services. 89% of all staff responding agreed or strongly agreed that the pharmacists should continue to attend cardiac arrests at the hospital. Pharmacists were valued most for their role in preparation of medicines and calculation of flow rates for inotropes. Nine pharmacists completed questionnaires to identify the advantages and disadvantages of being on the arrest team. Despite some difficulties encountered in the pilot study, the majority of pharmacists were in favour of continuing to attend cardiac arrests.
- **CONCLUSIONS** — The results were in keeping with work carried out in other centres and raise the question as to whether this area should be more widely explored in the UK, particularly in the current climate of risk management and clinical governance.

Pharmacists have developed and extended their role in many areas over recent years and are now routinely involved in activities such as discharge planning and attending preadmission clinics. However, few hospitals in the United Kingdom have pharmacists as members of the cardiac arrest team, even although this is an area with potential for serious drug-related problems. Published reports and local experience have highlighted problems in the following areas: administration errors; limited choice of drugs; lack of knowledge on preparation, administration and compatibilities; and poor documentation of arrest proceedings.¹⁻⁴

The potential benefits of pharmacists attending cardiac arrests include preparation of drugs by a highly trained, dedicated person, which frees nurses' time to carry out other duties, availability of a wider range of drugs, readily available drug information, accurate record keeping and reduced wastage of stock through expiry.

It would, therefore, seem a logical risk management initiative to incorporate clinical pharmacists into the cardiac arrest team, as is common practice in the United States.⁵ The role of British pharmacists in this area was first investigated by Cousins in the late 1980s.⁶⁻⁸ Although pharmacists are now established members of the cardiac arrest team in the Derby Hospitals, this area remains largely unexplored in most other UK hospitals.⁹ To investigate this further, a pilot study was carried out in conjunction with the resuscitation officers in Glenfield Hospital, Leicester, to equip pharmacists for participation on the adult cardiac arrest team and evaluate their usefulness in this role.

Glenfield Hospital is a 500-bedded teaching hospital. In the year before the study, 258 valid cardiac arrest calls occurred in the hospital. Of these, 141 (55 per cent) had an initial successful outcome. Thirty-eight per cent were ventricular fibrillation (VF) arrests

(including pulseless ventricular tachycardia), 49 per cent were non-VF (asystole and electromechanical dissociation) and 13 per cent were bradycardia or of unknown origin.

Twenty-three per cent of resuscitated patients were eventually discharged from hospital.

The initial impetus for the study was a medication error in the hospital that resulted in the wrong drug being given to a patient. Although this did not affect the outcome of the cardiac arrest, guidelines drawn up in response to the error stated that a nominated person should be responsible for the medicines in cardiac arrest situations.

The experience and knowledge of personnel at a cardiac arrest varies. There may be highly experienced people present as well as those who may have only a basic understanding of the drugs used. The hospital advanced life support (ALS) training for nurses includes a one-hour lecture on drug administration, and junior medical staff receive a 30-minute talk.

Therefore it was proposed that the nominated person should be a clinical pharmacist. This proposal was also intended to resolve other difficulties that had occurred at cardiac arrests. The first of these was the need for certain additional agents in the immediate post-arrest period. The ward emergency boxes contained only adrenaline, atropine, lignocaine, calcium and sodium bicarbonate. Second line antiarrhythmics were not stocked in all areas, and ward staff often had difficulty finding them, or did not know how to prepare and administer them. Time could be wasted in obtaining these drugs from the pharmacy or another ward, and in trying to work out how to make up the infusion.

The second problem concerned the documentation of events at cardiac arrests. The forms were often not fully completed by the person in charge of the arrest, which meant that the resuscitation officers had to complete them in retrospect, and therefore could not always obtain accurate details. Timings of defibrillation and administration of adrenaline (needed to ensure adherence to ALS guidelines) were especially difficult to determine after the event.

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METHOD

The project was supported by the consultants and members of the resuscitation committee at Glenfield Hospital who agreed to an eight-month pilot study, which began in June 1999 with attendance at daytime arrests.

In July 1999, 24-hour cover was introduced with the resident pharmacists attending arrests overnight and at weekends. The pharmacists were responsible for drug preparation at cardiac arrests, and recording events on the hospital cardiopulmonary resuscitation (CPR) record forms. They also provided second-line antiarrhythmics, aminophylline, doxapram, magnesium and inotropes, any of which may be required at a prolonged or complicated arrest. All pharmacists who attended cardiac arrests received four hours' training in basic life support and eight hours' training in advanced life support, in addition to education on the preparation and administration of drugs which may be used in the peri-arrest period.

Records were kept regarding number of arrests attended, infusions prepared, advice given and any other contributions made by the pharmacists at arrests.

In October 1999, a questionnaire was distributed to medical and nursing staff who had been involved in a cardiac arrest where the pharmacist was present. The aim was to gain their opinion on the usefulness of having a pharmacist in attendance at cardiac arrests. The questionnaires contained statements regarding the value of the pharmacist in certain drug-related activities at the cardiac arrest. The respondent was asked to state whether they strongly disagreed, disagreed, were neutral, agreed, or strongly agreed with each statement. The format was similar to that used by Ludwig and Abramowitz in Chicago and Cousins in Derby.^{5,9,10}

A separate questionnaire was given to the pharmacists to obtain their views.

RESULTS

A total of 164 arrests were attended during the eight months from June 1999 to January 2000 inclusive. Most of these (63 per cent) were on medical and cardiac wards.

Twenty-eight infusions were prepared by the pharmacists (mainly adrenaline, amiodarone and dopamine) and advice was given in 17 cases. Information was provided about treatment of hypokalaemia, choice of antiarrhythmic agent, lignocaine dose, compatibilities, treatment of bradycardia, administration of electrolytes, calculation of flow rates for inotropes, use of flumazenil and esmolol dosage.

Medical and nursing staff questionnaires Questionnaires were sent to all medical staff from specialist registrar grade down, and to nurses from all the wards where a pharma-

Table 1: Response to questionnaire from medical staff (n=27)

Statement	SD	D	N	A	SA
<i>Pharmacists in cardiac teams:</i>					
Contribute towards organisation of medicines	-	4%	22%	37%	37%
Prepare medicines efficiently	-	4%	7%	52%	37%
Assist in calculation of flow rates	-	7%	11%	41%	33%
Provide dosage advice	-	4%	15%	41%	37%
Provide drug information	4%	4%	26%	30%	37%
Record events/drugs accurately	-	4%	11%	44%	37%
Are valuable overall	-	4%	7%	44%	41%

SD=strongly disagree, D=disagree, N=neutral, A=agree, SA=strongly disagree
Not all medical staff provided a view, so percentages may not add up to 100%

Table 2: Response to questionnaire from nursing staff (n=76)

Statement	SD	D	N	A	SA
<i>Pharmacists in cardiac teams:</i>					
Contribute towards organisation of medicines	3%	5%	22%	38%	32%
Prepare medicines efficiently	3%	4%	22%	37%	33%
Assist in calculation of flow rates	1%	1%	13%	43%	38%
Provide dosage advice	1%	1%	13%	47%	34%
Provide drug information	3%	1%	18%	46%	32%
Record events/drugs accurately	1%	4%	25%	41%	26%
Are valuable overall	3%	3%	10%	49%	34%

SD=strongly disagree, D=disagree, N=neutral, A=agree, SA=strongly disagree
Not all nursing staff provided a view, so percentages may not add up to 100%

cist had attended a cardiac arrest. It was requested that these only be completed by staff who had attended a cardiac arrest where a pharmacist had been present.

A total of 103 completed forms were received, 76 from nurses and 27 from doctors. Tables 1 and 2 show how they responded to each statement.

Of all staff responding, 89 per cent agreed or strongly agreed that pharmacists should continue to attend cardiac arrests.

Other comments received from medical and nursing staff indicated that the following aspects of the service were useful: recording of drugs administered, availability of second-line agents such as the antiarrhythmic drugs, source of drug information, dedicated person preparing the drugs, someone familiar with more unusual drugs, nursing staff being released to carry out other duties, advice on dose and preparation of infusions, calculation of flow rates, and treatment advice when first-line drugs fail.

Pharmacist questionnaires Nine clinical pharmacists who had attended cardiac arrests completed the questionnaire, which contained mainly open-ended questions to allow expression of individual views and opinions. Pharmacists were asked about the advantages and disadvantages of being on the team, if they had made any significant contributions, difficulties encountered at

arrests, if they had any additional training requirements, and if they had any suggestions that might enhance their role or improve the service.

All nine pharmacists completed and returned questionnaires. Some of the difficulties and disadvantages identified were as follows:

- Heavy time commitment resulting in disruption to routine work
- Nervousness and anxiety about the situation to be faced when the bleep goes off
- Having to detour to collect the bag and hence not arriving early enough
- Knowing where to stand at busy arrests
- Having to organise drugs, draw up flushes and complete the form all at the same time
- Other team members' lack of awareness of the pharmacist's role
- Not feeling valued or useful
- Bags not always refilled after arrests
- Disturbed sleep

Pharmacists also identified several advantages for the patient and the department, as well as themselves personally, associated with being on the cardiac arrest team. Benefits to the patient included accurate drug administration and, in some cases, improved peri-arrest management. Many of the pharmacists believed that the profile of

pharmacy within the hospital was raised as a result of attending arrests and that their working relationship with doctors improved. They valued the opportunity to work closely with other health care professionals, and liked the feeling of being part of the team and having a defined role and responsibility. On a personal level, although it was stressful at times, most pharmacists felt their confidence grow as they became more experienced. Eight of the nine pharmacists agreed or strongly agreed that pharmacists should continue to attend cardiac arrests.

Pharmacists were in favour of continuing to attend arrests but identified several problems with the current situation. Some of the difficulties which were encountered are as follows: length of time taken to reach the arrest; difficulty in knowing what is happening (either because of arriving late or because of the large number of people around the bed); and lack of awareness by others on the team of the pharmacist's role. Also, there was a large variation in the number of arrests attended by individual pharmacists, from less than five to more than 20. This resulted in some pharmacists becoming more confident with the new role than others.

DISCUSSION

The overall response to the pilot project was positive and there was strong support from medical and nursing staff for the pharmacists to continue attending cardiac arrests. Our results support the work carried out in Chicago in 1983⁵ and Derby in 1998.¹⁰

In Leicester, the medical staff were most positive about the pharmacists' role in the preparation of medicines and in recording of events.

The quality of the documentation was not assessed in a formal comparison of forms before and after the pilot. The assessment by medical and nursing staff was subjective, based on their observations, as the pharmacist would usually go through the form with the team leader after the event to ensure that all details were complete and accurate. This made it easier for the resuscitation training officers to process if they had not actually attended the arrest themselves.

The questionnaires showed that the nurses valued the pharmacists most for their advice on dosage, and calculation of flow rates for inotrope infusions.

Simplification of the ALS algorithm has resulted in a reduction in the number of

drugs used at cardiac arrests. Calcium and sodium bicarbonate are no longer recommended for routine use, and adrenaline, atropine and lignocaine are now available as prefilled syringes.

The pharmacist's contribution is probably less significant when attending straightforward arrests where a limited number of drugs are used. However, in complicated arrests or in the immediate post-arrest period, pharmacists are able to contribute by making up IV infusions, recommending doses and giving advice on compatibilities. This is particularly useful in wards where the staff are less familiar with the drugs that may be required. Arrests on cardiac wards can often be prolonged or complicated, particularly if inotropes or second-line antiarrhythmic agents are used. The pilot study showed that pharmacists were able to make most contribution in this area. This was reflected in the positive response received from the cardiac nurses.

In areas such as the intensive therapy unit, nurses are familiar with making infusions and may therefore value the pharmacist's contribution to a lesser degree although advice was given on doses and compatibilities at some ITU arrests.

Resource implications The main resource implications related to pharmacists' time. The service was provided by existing staff of five senior clinical pharmacists for daytime arrests and five resident pharmacists covering out of hours. The three pharmacists' bags including contents are each valued at around £400. Although the initial set-up costs were expensive it was hoped that it would be possible to cut back on stock at ward level where a substantial amount of medicines expire unused. Initially when pharmacists started attending arrests it was noted that there was a substantial amount of wastage of drugs from the emergency boxes which were being opened and then not used. This situation improved when pharmacists were in charge of the medicines.

CONCLUSIONS

As a result of this study, the resuscitation committee in Glenfield Hospital agreed that the role should become established. Pharmacists attended cardiac arrests until May 2001, when recruitment difficulties made it impossible to sustain the service. However, some senior pharmacists continue to attend daytime arrests within their own directorate.

It is interesting to note that the response to the pilot study was as positive as the responses obtained in Chicago and Derby. The expectation that more structured training and simplification of the ALS algorithm would negate the need for pharmacist involvement has not been confirmed. The stressful atmosphere of arrest situations coupled with the use of unfamiliar drugs increases the risk of error. In the current age of clinical governance and risk reduction, it may be beneficial to use the specific skills of the clinical pharmacist more widely in cardiac arrest situations.

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