

A dispersed alarm system for the elderly and its relevance to local general practitioners

MALCOLM MCWHIRTER, MRCP, MFCM
Community Medicine Specialist, Forth Valley Health Board

SUMMARY. *This paper describes the use of a dispersed alarm system for the elderly in the Central region of Scotland. Information from referral forms, questionnaires completed by wardens after a call and client registers were used to investigate the population served, sources of referral and the way the service was used. All the general practitioners working in the area covered by the service were sent a questionnaire asking for their views of the service. In May 1984 the alarm system covered 861 clients in private housing and 1259 in sheltered housing. Over 50% of referrals were from the health services and the most common reasons for referral were poor mobility and falls. False alarms accounted for 40% of calls and they were more likely to be from clients in sheltered housing than in private housing. Of genuine calls 71% were due to illness or disability with 25% due to falls. All of the general practitioners responding to the questionnaire were aware of a patient in their practice covered by the service and considered that the service provided useful 24-hour support for the elderly at risk because of frailty and disability.*

Introduction

DURING the late 1970s Central regional council realized that the needs of the increasing numbers of people aged 75 years and over in the area would not be met by sheltered and residential housing. In 1979 it instituted a dispersed alarm system for the elderly at risk. Forth Valley health board assisted in planning and provided financial support.

The agreed objectives were: (1) To provide a 24-hour support service primarily for responding to emergencies among people living in the community who are at risk because of frailty and disability. The main users would be the elderly, particularly those aged 75 years and over but perhaps also the physically disabled and chronically sick. (2) To help people to live in their own homes for as long as possible. (3) To delay or avoid hospital admission and facilitate hospital discharge.

Those living alone or with a frail relative, and likely to need to call for help for health reasons or because of immobility are eligible to receive the service as are those who are housebound through illness or immobility or those living in an isolated dwelling.

The service

The mobile emergency care service is staffed by 27 mobile wardens, five control operators, a secretary, a coordinator and an assistant coordinator. The alarm system covers approximately 1000 people living in the community in private housing and over 2000 people living in sheltered and community housing.

The system is based on 1000 radio alarm units, the size of large radios, which are plugged directly into a power point. The

alarm unit transmits low frequency radio signals, and each of the 1000 units is interrogated sequentially by a central computer control unit in the service headquarters in Stirling, which is linked directly to aerials on Stirling Castle and on a tower block in Falkirk 14 miles away.

The alarm units in private housing can be activated directly by a switch on the unit or, more commonly, by a battery-operated remote control usually hung from the client's neck. The remote control facility is particularly important in many emergency situations such as falls. Clients in private housing are referred to the service by various agencies.

In sheltered and community housing there is only a single alarm unit which is linked to the internal alarm system activated by pull cords. An indicator board beside the unit indicates the source of the alarm. Those living in sheltered housing are only covered by the radio alarm system when the residential wardens are off duty. All the residents are covered and there is no referral system.

When an alarm unit is activated the unit changes its signal and this is detected by the central computer control unit in Stirling. The alarm code, time, and alarm unit number are printed out and the control operators then contact the mobile wardens via a radio telephone. The mobile wardens are equipped with duplicate keys of all sheltered housing and private houses served and their average response time is less than 20 minutes. No names or addresses are exchanged over the radio telephone; the wardens refer to a register of clients' names and addresses.

Cover is provided 24 hours a day, seven days a week and can be arranged within a few hours if required urgently, for example when a patient is discharged from hospital. The wardens visit the clients regularly both to establish rapport and to maintain and check their equipment.

Method

This study of the mobile emergency care service was carried out between 1982 and 1984. The client registers were used to determine the population served in May 1984. All the referral forms from 1983 were studied to investigate the sources of referral, and the reasons for referral were determined from the referral forms of a 25% random sample of clients covered by the service living in private housing in June 1984. The reasons for genuine and false alarm calls were investigated by a retrospective analysis of routine questionnaires completed by the mobile wardens after every call. The analysis covered the nine-month period September 1982 to May 1983. The time distribution of the calls and the involvement of general practitioners in genuine calls were also studied.

All the general practitioners working in the area covered by the emergency service were sent a questionnaire asking for their opinions about the usefulness of the service.

The number of hospital admissions for clients of the service living in private housing over the 11-month period September 1983 to July 1984 was determined from a regularly updated list held by the service.

Results

Population served

In May 1984 the alarm service covered 667 women and 194 men (sex ratio 3.4:1) in private housing; some of the clients were sharing a unit. Of these clients 672 (78%) were aged 75 years or

over and 637 (74%) lived alone. The 26 clients (3%) aged less than 55 years represented the younger disabled with diseases such as disseminated sclerosis. In sheltered housing 923 women and 336 men (sex ratio 2.7:1) were covered by the system. In May 1984 850 alarm units were in use.

Source of referral

During 1983 there were 526 referrals to the mobile emergency care service for clients in private housing, over 50% from health service sources (Table 1). Of these 526 referrals 347 (66%) were accepted.

Reasons for referral

Among a 25% random sample of 225 clients covered by the service living in private housing in June 1984 the most common reasons for referral were poor mobility (46%), repeated falls (43%) and recent or impending hospital discharge (20%). Several reasons were usually given on the referral forms and a profile of the disability of this group is shown in Table 2.

Alarm calls

During the nine-month period September 1982 to May 1983 3200 alarm calls were made. Of these calls 1286 (40%) were false alarms in which the individual denied using the alarm and 1914 (60%) were genuine calls.

Table 1. Sources of referral for the 526 clients referred to the mobile emergency care service during 1983.

Source of referral	Number (%) of clients referred
Social work department	134 (25.5)
Home help organizer (social work)	40 (7.6)
Hospital social work department	71 (13.4)
General practitioner	87 (16.5)
Health visitor	67 (12.7)
Community nursing service	62 (11.8)
Other	39 (7.4)
Not known	26 (4.9)
Total	526 (100.0)

Table 2. Reasons for referral for 225 clients living in private housing in June 1984.

Reason for referral	Number (%) of clients for which reason given ^a
Problems with mobility	103 (45.6)
Falls	98 (43.4)
Recent or impending hospital discharge	45 (19.9)
Arthritis	36 (15.9)
Cerebrovascular disease	35 (15.5)
General debility	33 (14.6)
Ischaemic heart disease	27 (11.9)
Visual problems	19 (8.4)
Social isolation	15 (6.6)
Recent fracture	15 (6.6)
Recent bereavement	15 (6.6)
Diabetes mellitus	14 (6.2)
Deafness	11 (4.9)
Cancer	8 (3.5)
Disseminated sclerosis	5 (2.2)
Miscellaneous	14 (6.2)

^aMore than one reason was given on most referral forms.

Reasons for false calls

Of the 1286 false alarms 4% were attributable to malfunctions of the equipment and 15% were due to pull cords or switches being activated by visitors. Pull cords were often confused with light switches. For the remaining 81% of false alarms the reasons were not obvious, but remote controls can easily be accidentally activated and electrical surges from domestic equipment such as vacuum cleaners can activate the alarm. However, mobile wardens believed that many people simply wanted human contact, or needed help for some simple task to which they would not admit.

Of all the calls from sheltered housing 51% were false alarms and from community housing the corresponding figure was 68% while from private houses only 36% of calls were false alarms. Clients in private houses were most likely to make genuine calls if they had been referred by a hospital social worker or a general practitioner, had been referred because of falls or problems of mobility, or were male.

Reasons for genuine calls

Of all 1914 genuine calls 71% were due to illness or disability, with a striking 25% due to falls (Table 3). Calls owing to problems of mobility illustrated the difficulties which some individuals faced such as the inability to rise from a chair, bed or toilet. A number of individuals living on their own appeared to be completely bed bound, with only intermittent visits from statutory services. The community help required included replacing light bulbs, lighting gas fires, communicating with neighbours, giving reassurance after knocks on the door, and solving other simple problems. The essential services required were gas, electricity, plumbing, housing and the police. For example, the police were involved in 72 calls, usually to lift heavy clients who had fallen, but occasionally to arbitrate in domestic disputes. A considerable number of calls resulted from burst waterpipes during severe winter frosts; early action reduced the distress of clients and the water damage.

Distribution of calls

Although there was a fairly steady level of genuine and false calls during the day following a peak at 7.00 hours, genuine calls continued throughout the small hours, unlike false calls which almost disappeared at night (Figure 1). There was a steady level of false calls throughout the week, while genuine calls increased at the weekends, perhaps owing to the lower level of domiciliary services at weekends.

Table 3. Reasons for genuine alarm calls over the nine-month period September 1982 to May 1983.

Reason	Number (%) of calls
Fall	479 (25.0)
Required community help	431 (22.5)
Problem with mobility	282 (14.7)
Dizziness with debility	259 (13.5)
Chest pain and shortness of breath	147 (7.7)
Abdominal pain, vomiting and diarrhoea	115 (6.0)
Required essential services	90 (4.7)
Confusion	58 (3.0)
Problem with appliances	27 (1.4)
Incontinence	19 (1.0)
Death of client	7 (0.4)
Total	1914 (100.0)

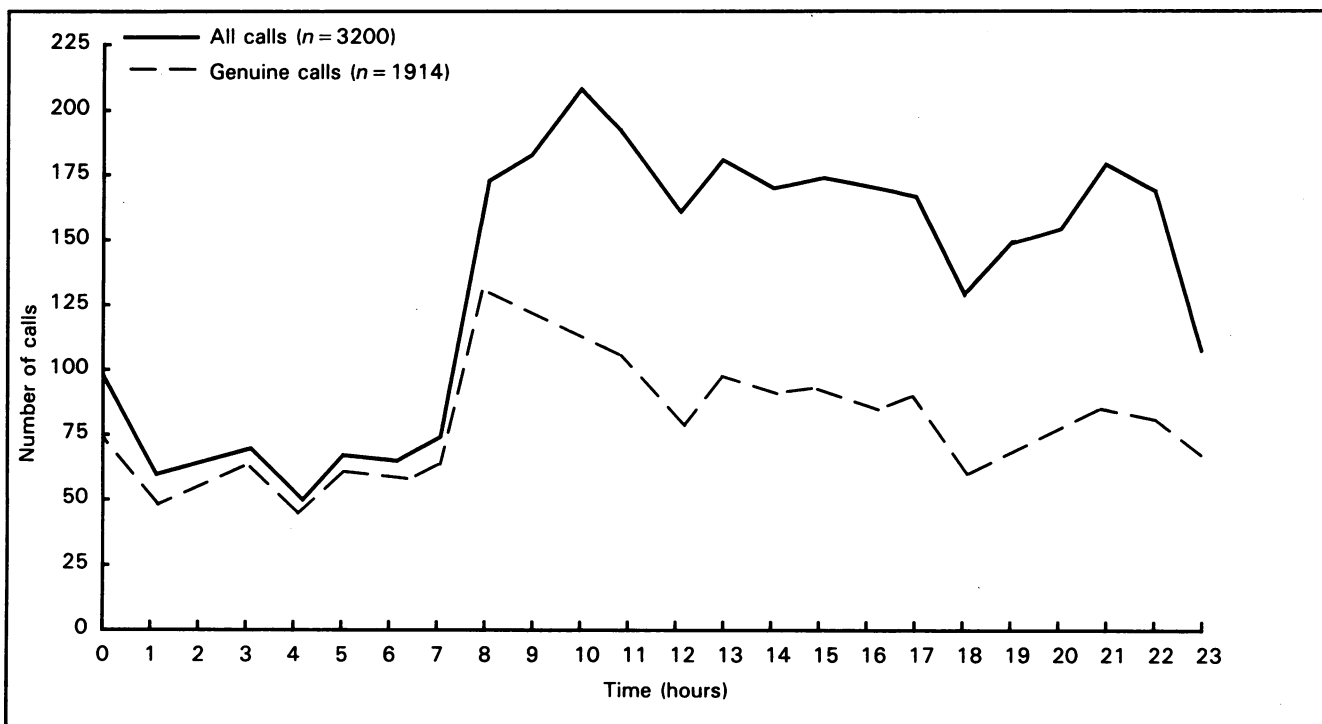


Figure 1. Distribution of alarm calls over 24 hours for calls in the period September 1982 to May 1983.

Involvement of general practitioners in genuine calls

In 261 (14%) of the 1914 genuine calls a general practitioner was asked to attend as soon as possible. Most of the urgent calls were to individuals living in private housing, and 55 (21%) occurred between midnight and 7.00 hours. The reasons for these urgent calls to general practitioners are shown in Table 4. In a further 189 (10%) calls, a routine visit was requested.

Survey of general practitioners

A questionnaire was sent to all 147 general practitioners working in the area covered by the service — 131 returned the questionnaire after the first mailing (89% response rate). All of these doctors were aware of a patient in their practice covered by the

Table 4. Reasons for urgent calls for a general practitioner over the nine-month period September 1982 to May 1983.

Reason	Number of calls from clients		All
	In private housing	In sheltered housing	
Chest pain and shortness of breath	67	19	86
Dizziness and debility	62	6	68
Fall	35	13	48
Abdominal pain, vomiting and diarrhoea	34	10	44
Death of client	2	2	4
Confusion	3	0	3
Incontinence	2	0	2
Problem with appliances	0	2	2
Problem with mobility	2	0	2
Required essential services	2	0	2
Total	209	52	261

service, 114 (87%) had personally requested an alarm unit for one of their patients and 129 (98%) had been called out to a patient by a mobile warden. All 131 considered the mobile emergency care service to be a useful 24-hour support service for the elderly at risk in their practice and 128 (98%) indicated that it had, at least once, been useful in summoning help in an emergency when the patient would otherwise have been unable to seek help within a reasonable period. Forty-eight doctors (37%) considered that the service had, at least once, prevented or delayed hospital admission of patients in their practice and 117 (89%) considered that calls were usually appropriate.

However, 11 general practitioners (8%) were aware of episodes when the system did not benefit their patients, and 44 (34%) considered that the presence of the alarm unit had reduced the support of friends, relatives and neighbours. On the other hand 123 doctors (94%) thought that the service had reduced the stress of the patients' carers. Several general practitioners pointed out that remote control units were not being worn when they should be.

Hospital admissions

During the 11-month period in 1983–84 342 admissions to hospital were made for clients in private housing — 85 (25%) to acute medical wards, 75 (22%) to acute surgical wards, 77 (22%) to geriatric wards, 80 (23%) to long stay, convalescent and psychiatric beds, and 25 (7%) to hospital beds outside the area.

Discussion

As a result of the increasing number of elderly people and the constraints on local authority and health board/family practitioner committee resources many innovative care systems based on dispersal alarm systems are being introduced. They vary from radio-based systems, as described here, to telephone based systems which automatically dial either a single contact point¹ or a sequence of pre-arranged numbers of friends or relatives.²

In some systems two-way speech is possible so that the client can speak to the warden or control operator.³ Various responses result from the alarm call — teams of wardens,⁴ community nurses⁵ or volunteers⁶ may be called out or telephone operators⁷ or automatic telephone exchanges may contact carers.¹

Such systems are often costly: the present cost of the mobile emergency care service is approximately £300 000 per year. Some researchers have questioned the value of such systems, and have expressed concern that they may generate a false sense of security.^{8,9} In some schemes the objectives have not been clear, monitoring has been poor, and reliance has been placed on volunteers, who have not known what was expected of them.¹⁰ In such cases the system may be worse than useless. The Consumers' Association has demonstrated that some alarms for sale to individuals are potentially dangerous electrically, and others will cut off the telephone in the event of a power cut.¹¹

In the case of the system described here it is clear that, although emergency use is important, the simple communicative role of the service is very important to the disabled, isolated and housebound. The regular visits and even some of the false alarms help to establish rapport between wardens and the elderly, making it more likely that alarms will be used when needed.

The 24-hour cover provided by this service is particularly important. Isaacs¹² has shown that many solitary elderly individuals, with minimal domiciliary services available only between 9.00 and 17.00 hours, had numerous episodes of acute need throughout the 24-hour period. Long periods of unmet need occur for such individuals and the findings of this study illustrate this point clearly.

The disability of those living in private houses in this study was striking. Many may, in fact, be too disabled and frail for sheltered housing, and would be more appropriately placed in long stay hospital care, even though a number may wish to continue living in their own homes. The misplacement of disabled elderly in the community when fitter elderly are placed in sheltered housing and residential care has been previously demonstrated in Aberdeen.¹³

Dispersed alarm systems cannot be seen in isolation. The contribution of caring relatives, neighbours, home helps, community nurses, general practitioners and others is essential to keep the elderly and disabled living in the community. The well administered service described here has been shown to have direct relevance to health services in Forth Valley and is well accepted and utilized by local general practitioners.

The demand for dispersed alarm systems for the elderly will continue. It is important that before such schemes are set up objectives should be clearly determined; the evaluation of such schemes is difficult even when objectives are stated. For example, the objective of the mobile emergency care service was to avoid hospital admission and to facilitate hospital discharge but it was not possible to measure the achievement of this objective because no appropriate control group was available and information such as date of birth of the clients was not available to allow comparison with hospital based information. Furthermore, benefits such as the increased sense of security of clients and their relatives are not readily quantified.

The high level of hospital admissions demonstrated in this study may at first appear to indicate the failure of the system to prevent hospital admission. However, it is more likely that this is a reflection of the marginal nature of the highly selected group of disabled elderly people.

The criteria for the acceptance of individuals referred to such a service are broad. As there are often waiting lists measurements

of disability such as the rapid disability rating¹⁴ and Katz scales¹⁵ could be used with good effect at initial assessments and at reassessments. Such measurements would also help in determining the value and use of dispersed alarm systems.

References

1. Dibner AS, Lowy L, Morris JN. Usage and acceptance of an emergency alarm system by the frail elderly. *Gerontologist* 1982; **22**: 538-539.
2. Davis M. Stand-in call service provides relief for warden. *Housing* 1979; **15**: 16-17.
3. Thomson L. The role of central control in dispersed alarm systems. In: Butler A, Oldman C (eds). *Alarm systems for the elderly*. Leeds: Leeds University, 1981: 39-49.
4. Day JB. Rescue service for the elderly. *Housing* 1979; **15**: 12-17.
5. Bamford T. Security is an alarm. *Health and Social Services Journal* 1981; **91**: 297-298.
6. Brenner D. Community support. *Health and Social Services Journal* 1981; **91**: 322-324.
7. Rixon J. Help at the pull of a cord. *Health and Social Services Journal* 1983; **93**: 1474.
8. Butler A. Dispersed alarm systems for the elderly. *Social Work Service* 1981; **25**: 17-22.
9. Butler A, Oldman C. The ringing of false alarm bells. *Health and Social Services Journal* 1979; **89**: 1112-1114.
10. Sewel J. Highland help call. A case study of a dispersed alarm system. In: McGarry M (ed). *Community alarm systems for older people*. Edinburgh: Age Concern Scotland, 1983: 14-22.
11. Consumer's Association. Sounding the alarm. *Which* 1986; July: 318-321.
12. Isaacs B, Neville Y. *The measurement of need in old people*. Edinburgh: Scottish Home and Health Department, 1976.
13. Mooney GH, Russell EM, Weir R. *Choices for health care*. London: Macmillan, 1980: 76-91.
14. Linn MW, Linn BS. The rapid disability rating scale-2. *J Am Geriatr Soc* 1982; **30**: 378-382.
15. Katz S, Ford AB, Moskowitz RW, et al. Studies of illness in the aged. The index of ADL: a standardised measure of biological and psycho-social function. *JAMA* 1963; **185**: 94.

Acknowledgements

I would like to thank Mr Douglas McNaughton, the coordinator of MECS and his staff for their assistance during this study, and local general practitioners who completed the questionnaire. Thanks are also due to Dr J.L. Graham, Chief Administrative Medical Officer, to Dr C.J.M. Bentley, Community Medicine Specialist and to Forth Valley Health Board for their support of, and interest in this study.

Address for correspondence

Dr M. McWhirter, Forth Valley Health Board, 33 Spittal Street, Stirling FK8 1DX.



The Royal College of General Practitioners INFORMATION TECHNOLOGY CENTRE

The Centre aims to provide general practitioners with experience and practical advice on computers and computer software. This can range from specialized general practice systems to general business applications. Some specialist systems are maintained within the Centre and demonstrations can be arranged upon request. The Centre also organizes monthly computer appreciation courses which are open to general practitioners and their practice staff.

Information Technology Manager: Mr Mike Hodgkinson, RCGP, 14 Princes Gate, London SW7 1PU. Telephone 01-581 3232.