PREHOSPITAL CARE

The acceptability of an emergency medical dispatch system to people who call 999 to request an ambulance

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Objective: To determine the acceptability of an emergency medical dispatch (EMD) system to people who call 999 to request an ambulance.

Methods: Postal questionnaires to two systematic random samples of approximately 500 named callers to one ambulance service before, and one year after, the introduction of EMD.

Results: The response rate was 72% (355 of 493) before, and 63% (297 of 466) after, EMD. There was a reduction, from 81% (284 of 349) to 70% (200 of 286), in the proportion of callers who found all the questions asked by the call taker relevant, although this did not adversely affect the proportion of callers who were very satisfied with the 999 call, which increased from 78% (268 of 345) to 86% (247 of 287). The proportion of callers who reported receiving first aid advice increased from 7% (23 of 323) to 43% (117 of 272) and general information from 13% (41 of 315) to 58% (157 of 269). Satisfaction levels with the amount of advice given increased, while satisfaction with response times remained stable at 76% (254 of 320) very satisfied before and 78% (217 of 279) after EMD. The proportion of respondents very satisfied with the service in general increased from 71% (238 of 336) to 79% (220 of 277). There was evidence in respondents' written comments of two potential problems with EMD from the caller's viewpoint. Firstly, some callers were advised to take actions that were subsequently not needed; secondly, a small number of callers felt that the ambulance crew did not treat the situation as seriously as they would have liked.

Conclusions: Introducing EMD increases the amount of first aid and general advice given to callers, and satisfaction with these aspects of the service, while maintaining satisfaction with response times. Overall satisfaction with the service increased. However, some changes may be needed to prevent a small amount of dissatisfaction directly associated with EMD.

Emergency medical dispatch (EMD) systems can help ambulance services to determine the urgency of an incident, the speed of response necessary, the level of support needed, and offer pre-arrival instructions to callers. This has the potential to increase user satisfaction with the 999 ambulance service by meeting unmet demand for first aid information and general information,¹ and improve patient care by providing vital assistance while awaiting an ambulance,² or the potential to increase dissatisfaction by increasing the interaction time between the operator and the caller. In April 1998, Greater Manchester Ambulance Service introduced the advanced medical priority dispatch system (AMPDS), which is the EMD used by the majority (26 of 32) of ambulance services in England. The views of callers were obtained before, and one year after, the introduction of AMPDS, to determine its effect on callers' satisfaction with the 999 ambulance service.

METHODS

A systematic random sample of primary calls to the Greater Manchester Ambulance Service was taken during one week in January 1998 and one week in April/May 1999. Plans to take a sample in January 1999 were delayed because of the effect of the influenza crisis on the NHS in that period. For each study week, call takers paid special attention to taking the name and address of callers, and a systematic sample of primary calls where the name and address were available was taken. Further details of the sampling technique are described elsewhere.¹ A postal questionnaire was sent to 503 named callers before, and 500 named callers one year after, the introduction of AMPDS. Questionnaires were sent approximately a week after the 999 call, with up to two reminders. The

questionnaire covered views of the number and relevance of questions asked by the ambulance control call taker, whether first aid or general advice were given and the helpfulness of that advice, the speed with which the ambulance arrived, and satisfaction with different aspects of the service. Respondents could make free text comments about the aspects of the service with which they were particularly satisfied or dissatisfied. The incident type and the actual response times for each incident were obtained from the ambulance service computer records. The survey was undertaken as part of a wider study of the implementation of revised ambulance service response time standards. The protocol for the study, which included the caller satisfaction survey, was granted ethics committee approval from the areas in which the wider study was undertaken. The *t* test and χ^2 test were used to test for differences in the two time periods. Logistic regression was used to compare callers who were very satisfied with different aspects of the ambulance service in the two time periods, adjusted to take account of the difference in relationship of caller to patient in the two time periods.

RESULTS

Response rate

Before EMD, 503 questionnaires were posted, with 19 questionnaires returned unanswered because the caller was deceased or unknown at that address (10 questionnaires) or the caller did not wish to complete the questionnaire (9 questionnaires). Completed questionnaires were returned from 355 of the 493 people who received them, giving a response rate of 72%. After the introduction of EMD, 500 questionnaires were posted, with 33 questionnaires returned unanswered because the caller was deceased or unknown at that address

Table 1 Comparison of respondents before and after the introduction of EMD. Results are numbers (%) unless otherwise stated

	Before	After	p value
Mean age in years (SD)	49.6 (17.65)	48.1 (16.82)	0.271
Gender			0.328
Male	113 (32)	105 (36)	
Female	237 (68)	187 (64)	
Relationship to patient			0.037
Family/friend	219 (62)	199 (68)	
Self	49 (14)	49 (17)	
Warden/social services	44 (12)	15 (5)	
Neighbour/lodger	13 (4)	12 (4)	
Stranger	11 (3)	7 (2)	
Other, (including customer, patient, work colleague)	15 (4)	10 (3)	

(30 questionnaires) or the caller did not wish to complete the questionnaire (3 questionnaires). Completed questionnaires were received from 297 of the 470 people who received them, giving a response rate of 63%. As questionnaires returned as "unknown at this address" represent only a small proportion of the questionnaires that do not reach the person to whom they are addressed, it is possible that response rates differed in the two time periods because of the increase in the numbers of questionnaires not reaching callers in the second survey. The two samples were taken from different computer systems in the two time periods because of the introduction of EMD and there seemed to be a difference in the quality of address taking in the two time periods. Some respondents did not complete all items on the questionnaire. Results are reported as a percentage of respondents who completed the item under consideration.

Comparability of respondents in the two time periods

Respondents in the two time periods were similar in terms of age and sex (table 1). However, the relationship of the caller to the patient differed in the two time periods, with a smaller proportion of wardens of residential homes/social services in the second set of respondents. There were problems comparing incident type in the two time periods because the two computer systems classified incident type differently. In the first time period calls were classified by location of incident: 62% (219) calls were sudden illness in the home, 24% (85) accident in the home, 5% (18) in a public place and 9% (33)

elsewhere/ unspecified. In the second time period they were classified by symptom: 21% (61) respiratory distress, 15% (46) chest pain, 13% (40) traumatic injuries, 7% (20) faint, 6% (18) abdominal pain, 5% (15) haemorrhage, 4% (13) fall, 28% (84) others.

Callers' experiences and views of the call

The proportion of callers reporting that the telephone was answered promptly, and that the right number of questions were asked, did not differ significantly before and after the introduction of EMD (table 2). However, there was a statistically significant reduction, from 81% to 70%, in the proportion of respondents reporting that all the questions asked were relevant, and a statistically significant increase from 14% to 52% in the proportion told to call back if necessary. These changes had a combined effect of increasing satisfaction levels with the call from 78% to 86% of callers saying they were very satisfied with the call, a difference of 8% (95% confidence intervals 2% to 14%). Written comments made by respondents supported this finding. Although there was a small increase in the number of negative comments about the call, from 1% (3 of 355) to 2% (6 of 297), there was a larger increase in positive comments about the call taker and the call, from 5% (16 of 355) to 12% (37 of 297). Negative comments were about the perceived irrelevance of questions asked; positive comments were mainly about the calming, reassuring and comforting manner of the call taker and the advice given.

Table 2 Callers' views of the 999 telephone call. Results are numbers (%)

	Before	After	p value
Promptness of telephone being answered			0.474
Very	299 (85)	242 (84)	
Quite	52 (15)	44 (15)	
Not very/not at all	1 (<1)	3 (1)	
Number of questions asked			0.581
Too many	22 (6)	24 (8)	
Right number	327 (93)	261 (91)	
Too few	2 (1)	2 (1)	
Relevance of questions asked			0.005
All relevant	284 (81)	200 (70)	
Most relevant	57 (16)	77 (27)	
Few/none relevant	8 (2)	9 (3)	
Told to call back if necessary			0.001
Yes	48 (14)	149 (52)	
No	241 (71)	88 (31)	
Do not know	51 (15)	49 (17)	
Satisfaction with the telephone call			0.020
Very satisfied	268 (78)	247 (86)	
Satisfied	63 (18)	35 (12)	
Acceptable/dissatisfied	14 (4)	5 (2)	

Table 3 Callers' experiences and views of advice given. Results are numbers (%)

	First aid advice			General advice		
	Before	After	p value	Before	After	p value
Advice given			0.001			0.001
Yes	23 (7)	117 (43)		41 (13)	157 (58)	
No	303 (93)	155 (57)		274 (87)	112 (42)	
Advice not given but needed			0.019			0.278
Yes	77 (27)	23 (17)		68 (28)	22 (22)	
No	210 (73)	116 (83)		178 (72)	78 (78)	
Satisfaction with amount of advice			0.001			0.001
Very satisfied	60 (35)	113 (56)		94 (43)	143 (60)	
Satisfied	41 (24)	57 (28)		56 (26)	65 (27)	
Acceptable/dissatisfied	72 (42)	31 (15)		69 (32)	32 (13)	
Helpfulness of advice, if given			0.154			0.224
Very helpful	17 (77)	65 (60)		22 (61)	94 (61)	
Quite helpful	3 (14)	37 (34)		13 (36)	43 (28)	
Some ways/not	2 (9)	6 (6)		1 (3)	18 (12)	
Carried out advice, if given			0.992			0.030
All	16 (76)	86 (78)		28 (78)	139 (90)	
Some	4 (19)	20 (18)		8 (22)	12 (8)	
None	1 (5)	5 (4)		0 (0)	3 (2)	

Callers' experiences and views of the advice offered

Callers were more likely to receive first aid advice and general advice when EMD was in use (table 3). There was a statistically significant reduction in the percentage of respondents who felt that they needed first aid advice and did not get it. However, even with EMD in use, approximately 7% of respondents felt that they needed first aid advice (23 of 297) or general advice (22 of 297) and did not get it. Overall, satisfaction with the *amount* of first aid advice increased significantly by 21% (95% confidence intervals 11% to 31%), and satisfaction with the *amount* of general advice increased significantly by 17% (95% confidence intervals 8% to 26%).

Although there were no statistically significant differences in the proportion of callers finding advice helpful, there was some evidence of a reduction in helpfulness of first aid advice. This did not influence callers to ignore the advice, as there was no change in the proportion of respondents carrying out first aid advice and a statistically significant increase in the proportion of people carrying out the general advice they were given. When respondents made written comments about advice given they did not differentiate between first aid advice and general advice. Positive comments about advice increased from 0.3% (1 of 355) to 3% (10 of 297) and negative comments about advice decreased from 3% (11 of 355) to 1% (3 of 297). However, negative comments about following the advice increased from 0% (0 of 355) to 2% (5 of 297). Three of these dissatisfied respondents mentioned being told to write down

their doctor's details for the ambulance crew only to find that the information was already held or not needed.

Callers' views of the response time

The difference in mean response times in the two time periods was not statistically significant (table 4). There was no evidence of changes in respondents' views about the importance of getting a quick response, whether the response was quick enough, and satisfaction with the response time.

Satisfaction with the service

There was a statistically significant increase in satisfaction with the service generally, from 71% very satisfied to 79% very satisfied (table 5). The increase in satisfaction was 8% (95% confidence intervals 1% to 15%). Satisfaction with the way the crew handled the situation was not statistically significantly different in the two time periods. Seventy six per cent (270 of 355) of respondents before EMD, and 76% (225 of 297) after EMD, made positive comments about the service. The caring behaviour of the crew was the most common comment in both time periods, made by 45% (159 of 355) of respondents before EMD and 42% (124 of 297) after EMD. Nine per cent (31 of 355) of respondents before EMD, and 13% (40 of 297) after EMD, made negative comments. After EMD, 2% (5 of 297) of comments were about the lack of seriousness with which the crew took the problem compared with 0.3% (1 of 355) before EMD.

Adjusting for differences in the two time periods

The results reported above did not change when satisfaction levels with different aspects of the service were compared in

Table 4 Callers' experience and views of response times. Results are numbers (%) unless otherwise stated

	Before	After	p value
Mean response time (SD)	7.9 (3.08)	8.4 (3.38)	0.069
Importance of ambulance arriving quickly			
Very important	163 (47)	152 (52)	0.253
Important	159 (46)	126 (43)	
Not very/not at all	24 (7)	13 (4)	
Did ambulance arrive quickly enough?			
Yes	325 (95)	274 (96)	0.538
No	18 (5)	12 (4)	
Satisfaction with response time			
Very satisfied	254 (76)	217 (78)	0.779
Satisfied	41 (17)	45 (16)	
Acceptable/dissatisfied	25 (7)	17 (6)	

Table 5 Callers' satisfaction with the 999 ambulance service in general and the ambulance crew. Results are numbers (%)

	Before	After	p value
Service in general			0.044
Very satisfied	238 (71)	220 (79)	
Satisfied	81 (24)	45 (16)	
Acceptable/dissatisfied	17 (5)	12 (4)	
The ambulance crew			0.070
Very satisfied	276 (82)	243 (87)	
Satisfied	45 (13)	21 (8)	
Acceptable/dissatisfied	17 (5)	14 (5)	

the two time periods, adjusted to take account of the difference in relationship of caller to patient in the two time periods.

DISCUSSION

Caller satisfaction levels for the 999 ambulance service were higher with EMD than before this new service. Satisfaction levels were higher for specific aspects of the ambulance service such as the 999 call itself, and the amount of first aid and general advice given, while remaining unchanged for response times. In this context of increasing satisfaction with the service, three small problems with EMD emerged. Firstly, there was an increase in callers feeling that they were asked irrelevant questions. This may be a disbenefit perceived by some callers so that other callers can benefit from the longer interaction between the call taker and the caller. The questions may have been relevant but only *seemed* irrelevant to callers. However, irrelevant questions have been identified elsewhere as a source of delay when giving first aid instructions by telephone.² Secondly, a small number of written comments after the introduction of this EMD showed that some callers were asked to make a note of the doctor's details when this was not needed by the ambulance crew or the hospital. Finally, there were a small number of written comments about the seriousness with which the crew took the situation after the introduction of this EMD—some respondents were unhappy that the crew did not want to take the patient to hospital, or did not make an effort to get to hospital quickly. The discordance between patients' and health professionals' perceptions of the urgency of need for emergency care is well known^{3,4} and may be heightened by a system that identifies a group of patients as non-urgent.

Limitations

The response rate to the second survey was lower than to the first survey. This may account for the increase in satisfaction levels over time if dissatisfied callers are less likely to respond to questionnaires than satisfied callers. However, the response difference was mainly attributable to a lack of wardens of residential and nursing homes responding and adjustments for differences in who made the call did not change the results. Changes in the service, other than the introduction of EMD, may have contributed to changes in satisfaction over time, although we are aware of no significant operational changes occurring in Greater Manchester Ambulance Service in this time period.

Generalisability

The survey was undertaken on one EMD system used by an ambulance service in a metropolitan setting. As stated above, this EMD system is used by the majority of ambulance services in England and therefore results of this study are

generalisable to elsewhere. Although Greater Manchester Ambulance Service covers a metropolitan population, it has typical response times and answers calls in the same way as other ambulance services; thus the results are likely to be generalisable to other types of populations.

Implications for services

There is no evidence that ambulance services should be concerned that introducing EMD will be detrimental to caller satisfaction. EMD is acceptable to callers to the 999 ambulance service and there is evidence that it increases satisfaction with the service. The call taker takes a larger role in the process than in the past, which is appreciated by callers, although some callers feel that they are asked irrelevant questions. EMD meets an unmet need for first aid and general advice to callers, although ambulance services may wish to ensure that the advice they give, such as asking callers to write down the details of the patient's doctor, is needed. In a small proportion of calls, EMD may create caller dissatisfaction if callers feel that the ambulance crew treat the situation less seriously than they would like.

Contributors

Alicia O'Cathain designed the questionnaire, analysed the data and wrote the paper. Janette Turner contributed to the design of the study, the design of the questionnaire, interpretation of the findings and writing of the paper. Jon Nicholl designed the study, and contributed to the design of the questionnaire, interpretation of the findings and writing of the paper. Brigitte Colwell undertook the administration of the surveys. Dave Ward and Allan Withers of Greater Manchester Ambulance Service helped to identify the survey samples. Alicia O'Cathain is the guarantor for this paper. This work was undertaken by the Medical Care Research Unit, which is supported by the Department of Health. The views expressed here are those of the authors and not necessarily those of the Department.

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