Randomised controlled trial of general practitioner versus usual medical care in an urban accident and emergency department: process, outcome, and comparative cost

Andrew W Murphy, Gerard Bury, Patrick K Plunkett, David Gibney, Mary Smith, Edwina Mullan, Zachary Johnson

Abstract

***Objective*—To see whether care provided by general practitioners to non-emergency patients in an accident and emergency department differs significantly from care by usual accident and emergency staff in terms of process, outcome, and comparative cost.**

***Design*—A randomised controlled trial.**

***Setting*—A busy inner city hospital's accident and emergency department which employed three local general practitioners on a sessional basis.**

***Patients*—All new attenders categorised by the triage system as "semiurgent" or "delay acceptable." 66% of all attenders were eligible for inclusion.**

***Main outcome measures*—Numbers of patients undergoing investigation, referral, or prescription; types of disposal; consultation satisfaction scores; reattendance to accident and emergency department within 30 days of index visit; health status at one month; comparative cost differences.**

***Results*—4684 patients participated. For semiurgent patients, by comparison with usual accident and emergency staff, general practitioners investigated fewer patients (relative difference 20%; 95% confidence interval 16% to 25%), referred to other hospital services less often (39%; 28% to 47%), admitted fewer patients (45%; 32% to 56%), and prescribed more often (41%; 30% to 54%). A similar trend was found for patients categorised as delay acceptable and (in a separate analysis) by presenting complaint category. 393 (17%) patients who had been seen by general practitioner staff reattended the department within 30 days of the index visit; 418 patients (18%) seen by accident and emergency staff similarly reattended. 435 patients (72% of those eligible) completed the consultation satisfaction questionnaire and 258 (59% of those eligible) provided health status information one month after consultation. There were no differences between patients managed by general practitioners and those managed by usual staff regarding consultation satisfaction questionnaire scores or health status. For all patients seen by general practitioners during the study, estimated marginal and total savings were £Ir1427 and £Ir117 005 respectively.**

***Conclusion*—General practitioners working as an integral part of an accident and emergency department manage non-emergency accident and emergency attenders safely and use fewer resources than do usual accident and emergency staff.**

Department of General Practice, University College Dublin, Coombe Healthcare Centre, Dublin 8, Republic of Ireland
Andrew W Murphy, *lecturer*
Gerard Bury, *professor*
David Gibney, *research fellow and general practitioner*
Mary Smith, *research officer*
Edwina Mullan, *research assistant*

Department of Accident and Emergency Medicine, St James' Hospital, Dublin 8, Republic of Ireland
Patrick K Plunkett, *consultant*

Health Information Unit, Eastern Health Board, Dr Steevens Hospital, Dublin 8, Republic of Ireland
Zachary Johnson, *public health medicine specialist*

Correspondence to:
Dr A W Murphy, Department of General Practice, University College Dublin, Crombe Healthcare Centre, Dublin 8, Republic of Ireland.

BMJ 1996;312:1135–42

Introduction

Inappropriate use of accident and emergency departments has defied solution throughout the world, partly because the problem has been defined by doctors and not by patients.[1-2] Reported proportions of inappropriate attenders have varied from 7% to 70%.[3-7] This large variance is not surprising given that there is no accepted objective definition of appropriate use.[8-12] To address the issue it has been suggested that accident and emergency departments should be staffed on a sessional basis by general practitioners.[1 2 4 13-15]

King's College Hospital, London, is the only centre to have extensively evaluated the role of general practitioners in the accident and emergency department.[3 16] A triage system was developed to identify patients prospectively as "true accident and emergency" or "primary care" attenders[17]; 40% of all new attenders were classified as having primary care needs. By comparison with the usual accident and emergency staff, general practitioners utilised fewer hospital resources in the care of primary care attenders. Further studies on patient outcome and satisfaction were recommended.

We report a study which also assesses the impact of sessional general practitioners on the process of care in the accident and emergency department. The study differs from the King's College study, however, in two important respects. Firstly, the target population was extended to include all non-emergency patients through the use of a triage system largely based on physiological criteria (see appendix). This system conforms to the recommendations of Bindman, in that triage was performed by nurses after standardised training and all patients were seen on a single site.[11] Secondly, it was designed as a randomised controlled trial. By contrast, the King's College study allocated entire clinical sessions to either general practitioner or usual accident and emergency staff. The ethos of this project was therefore to include general practitioners as an integral part of the accident and emergency team dealing with all non-emergency patients. The study also reviewed the effect of such a service on patient outcome and satisfaction.

The research hypothesis was that the care provided to non-emergency patients by general practitioners working as an integral part of an accident and emergency department differs significantly from the care provided by the usual accident and emergency staff in terms of process (that is, a decrease in the number of investigations and admissions) but not in outcome (that is, patient satisfaction and health outcome).

Population and methods

St James' Hospital, Dublin, is a major teaching hospital with 490 acute beds serving a catchment population of 219 300. In 1992 the accident and emergency department saw 40 159 new and 7589 repeat attenders. Medical staff during the study comprised one consultant, two registrars, and 10 senior house officers. The triage system groups all attenders into four categories—namely, "life threatening" (1), "urgent" (2), "semiurgent" (3), and "delay acceptable" (4) (see appendix). The proportions of attenders in these categories are respectively 2%, 16%, 61%, and 21%.

About one fifth of all attenders are referred by their general practitioner. A triage nurse assesses patients on presentation to the department and assigns them to their appropriate triage category. Patients are then seen in order of triage priority and registration time.

In August 1993 three local general practitioners were employed in the accident and emergency department on a sessional basis. They were employed by the hospital and had no direct contact with the research team. Each worked two four hour sessions a week, managing non-emergency patients (triage categories 3 and 4) who had not been referred by their family doctor. The decision to exclude patients referred by a general practitioner was taken after consultation with general practitioners in the hospital catchment area. It was considered inappropriate for local general practitioners working in the accident and emergency department to manage referrals from colleagues in the community until the project became more established. About 66% of all attenders were eligible for the trial.

The general practitioners worked as an integral part of the accident and emergency service and had access to the same facilities as the usual medical staff. They were dressed similarly to the usual staff and patients were unaware that they were being seen by a general practitioner. During the project two general practitioners took up posts outside Dublin and were replaced.

STUDY SAMPLE

Randomisation of patients to the general practitioner or accident and emergency staff depended on time of registration. Once patients were registered their charts were divided according to triage category on to four separate shelves and then placed in line by strict temporal order. Doctors took the first chart on the triage 3 shelf and continued doing so until the shelf was empty. They then moved to the triage 4 shelf.

Two steps were taken to ensure that this method of randomisation was adhered to. Firstly, the full time study researcher (a nursing sister) was located in the accident and emergency department and continually monitored the triage shelves. Her daily work required her to be regularly at the triage shelves in order to check patient records. Deviations from the study protocol would have been apparent to her. Secondly, the triage nursing team, who were an integral part of the study coordinating committee, frequently re-emphasised the protocol to nursing and medical staff.

All patients seen by the general practitioners in the department were studied. Controls were eligible patients seen by the usual accident and emergency staff while a general practitioner was in the department.

DATA COLLECTION

Age and number of years since full registration were recorded for the five general practitioners and 28 usual medical staff who had worked in the department between August 1993 and October 1994. Each day a computer printout of the previous day's attendance was obtained, and patients in triage categories 3 and 4 seen without a referral from their general practitioner during the hours a general practitioner was working were deemed eligible for the study. The international classification of primary care system of coding was used for presenting complaints and diagnosis.[18]

Socioeconomic status was determined by General Medical Services eligibility. Roughly one third of the population in the Republic of Ireland have access to free primary care and drugs and are described as General Medical Services eligible. The other two thirds, whose income is above a certain arbitrary level (for example, £Ir82.50 per week for a single person aged up to 66 who is living alone), are responsible for their own primary health care costs. General Medical Services eligible patients therefore represent the poorest sector of the community.

Process information included investigations (blood, *x* ray examination, or any), referral (when a second doctor was formally requested to review a patient and did so), prescription (when a script was given to the patient), and disposal. Prescribed drugs were classified as generic or proprietary according to the current Irish edition of the *Monthly Index of Medical Specialities (Mims)*. Prescribing costs were determined by using the World Health Organisation defined daily dose method, which allows conversion of prescribed substances into equivalent units of a standard defined volume.[19] All costs were based on October 1995 prices. Prescriptions that did not specify the drug (for example, "analgesia") were excluded from analysis. Also excluded were drugs for which a defined daily dose was not available (for example, topical creams). Disposal was divided into community (when follow up of a patient was recorded as either home or return to own general practitioner) or hospital. Disposal to hospital included follow up arrangements such as outpatient attendance, admission, or review in the accident and emergency department. Admission to hospital was also coded separately.

For outcomes assessment three separate measures were used. Firstly, the numbers of patients reattending the accident and emergency department within one month of the index visit throughout the study were determined by using the hospital's mainframe computer. This measure is reportedly useful in detecting significant morbidity[20-21] and has been used in previous accident and emergency intervention studies to assess patient care.[22] All cases and controls over two months were also evaluated both immediately after the consultation and one month subsequently.

Secondly, patient satisfaction was assessed immediately by a blinded interviewer using the consultation satisfaction questionnaire.[23] This rates numerically four aspects of the patient's assessment of care—namely, professional care, general satisfaction, depth of the patient-doctor relationship, and perceived length of consultation. Questions are grouped in the analysis to produce a score for each category. Scores range from zero to 100 ("most satisfied"). In general practice the questionnaire has been shown to be reliable, valid, and acceptable.[24-25] Thirdly, health status was determined one month after the initial consultation by means of a simple questionnaire (four questions) completed by telephone or letter. The method of completion was agreed with the patient after the consultation satisfaction questionnaire. If after a month there was no response to the first letter or telephone contact proved impossible a further questionnaire was sent.

COMPARATIVE COSTINGS

Costs are expressed in Irish pounds (equivalent to sterling). Marginal (materials and disposables) and total (marginal plus all staff) costs were determined in conjunction with the hospital's finance department and *x* ray and laboratory staff. Costs were calculated for the following: full blood counts; measurements of blood urea and plasma electrolyte concentrations, plasma glucose concentration, and serum amylase activity; sequential multiple analysis with computer (SMAC); and chest, limb, skull, spine, and abdominal radiographs. Such analysis is limited but as the study aimed at a comparison only it was considered to be acceptable. Based on the hospital admission profile an estimate of the average cost per admission was also obtained. This had been calculated in a study by the hospital's finance department. We did not estimate other costs.

Average differences in the use of the process variables by the general practitioners and usual medical staff were

Table 1—*Characteristics by triage category of 4684 patients seen by general practitioner or usual accident and emergency medical staff*

Triage category	No of patients	Median age (years) (interquartile range)	No (%) of men	No (%) of General Medical Services patients eligible	No (%) of patients registered with a general practitioner	Duration of complaint†		
						≤24 Hours	>24 Hours	>1 Week
3 (semi-urgent)								
General practitioner	1516	31 (22-47)*	902 (59)	560 (37)**	1420 (94)	800 (63)	261 (21)	203 (16)
Accident and emergency staff	1837	34 (12-53)	1028 (56)	772 (42)	1694 (92)	893 (60)	316 (21)	287 (19)
4 (delay acceptable)								
General practitioner	787	28 (20-40)	488 (62)	275 (35)	720 (91)	293 (43)	161 (24)	226 (33)
Accident and emergency staff	544	30 (21-42)	329 (60)	203 (37)	505 (93)	193 (43)	104 (23)	154 (34)

*Kruskal-Wallis test P< 0.01.
**Relative risk of general practitioner staff seeing non-General Medical Services eligible patients 1.09 (95% confidence interval 1.03 to 1.15).
†Data not available for 557 triage 3 patients and 200 triage 4 patients.

calculated from the study database for each presenting complaint category (for example, "musculoskeletal") within triage groups 3 and 4. These differences were then expressed in Irish pounds by using the hospital estimate of costs. However, a profile of the average make up of each triage group was required to cost the usual day to day work of the department. This profile (case mix) was calculated by using the percentage of the workload contributed by each major presenting complaint (for example, 45% of all triage category 3 patients were "musculoskeletal" cases, 10% were "skin" cases, etc). With these profiles and the cost estimates generated for each category of presenting complaint, costs could be calculated for 100 representative patients when seen by the general practitioner or usual accident and emergency staff in each triage group. Differences in costs between the general practitioner and accident and emergency staff represented savings by general practitioners within the triage category. Savings for the total number of patients seen by the general practitioners during the study were also calculated.

PILOT STUDY AND STATISTICAL ANALYSIS

A pilot study in August and September 1993 showed the feasibility of the project, specifically the allocation of cases and controls and the data collection instrument. Preliminary analysis of data collected during the pilot study suggested that, of the study variables, the largest sample size required would be that to assess the significance of different admission rates. These rates were 5% and 10% among triage category 3 patients for the general practitioners and usual staff respectively. This suggested that detecting a difference between these rates at a two sided 1% level of significance with a power of 95% required a minimum of 979 patients in each triage 3 group.[26]

Table 2—*Process by triage category of 4684 patients seen by general practitioner or usual accident and emergency staff*

Process measure	No (%) managed by accident and emergency staff	No (%) managed by general practitioner	% Relative difference (95% confidence interval)
Triage category 3	**(n = 1837)**	**(n = 1516)**	
Any investigation	1184 (64)	777 (51)	20 (16 to 25)
Any blood investigation	369 (20)	127 (8)	58 (50 to 66)
Any *x* ray examination	922 (50)	599 (40)	21 (15 to 27)
Referral	399 (22)	202 (13)	39 (28 to 47)
Any prescription	583 (32)	681 (45)	-41 (-30 to 54)
Disposal to hospital	647 (35)	374 (25)	31 (23 to 38)
Admission	229 (12)	103 (7)	45 (32 to 56)
Triage category 4	**(n = 544)**	**(n = 787)**	
Any investigation	261 (48)	287 (36)	24 (14 to 33)
Any blood investigation	12 (2)	1 (<1)	94 (56 to 99)
Any *x* ray examination	250 (46)	278 (35)	23 (12 to 33)
Referral	60 (11)	31 (4)	64 (46 to 77)
Any prescription	181 (33)	390 (50)	-49 (-30 to 71)
Disposal to hospital	120 (22)	119 (15)	31 (14 to 45)
Admission	8 (1)	0	NS

Ages and lengths of experience of the general practitioners and usual accident and emergency department staff were analysed by Student's *t* test. The study groups were compared for demographic, process, and outcome characteristics by χ^2 and Kruskal-Wallis tests.

ETHICAL APPROVAL

The study was approved by the research ethics committees of the Irish College of General Practitioners and Federated Dublin Voluntary Hospitals.

Results

The median age of the five general practitioners employed during the project was 32 years. This was significantly higher than that (26 years) of the usual medical staff of the accident and emergency department (P<0.005). The median time since full registration was seven years for the general practitioners and six months for the usual staff (P<0.005).

During August 1993 to October 1994, 4684 patients were enrolled in the study. Both the full time researcher and the triage nursing team were satisfied that the study randomisation protocol was followed. Table 1 shows the characteristics of the patients. It was expected that general practitioner staff would see comparatively fewer triage 3 patients but comparatively more triage 4 patients. This was because (*a*) at any time only one general practitioner was on site as compared with at least three accident and emergency medical staff and (*b*) triage 3 patients always take precedence over triage 4 patients. Triage 3 patients seen by general practitioner staff were slightly more likely to be non-General Medical Services eligible (relative risk 1.09; 95% confidence interval 1.03 to 1.15) and younger (median age 31 years *v* median age 34 years) than those seen by the usual accident and emergency staff. There were no differences in characteristics between triage 4 patients seen by general practitioners and those seen by the usual accident and emergency staff.

Triage 3 patients were also analysed by presenting complaint category. Six principal categories accounted for over 90% of attenders—namely, musculoskeletal, skin, neurological, digestive, general, and respiratory. The remaining patients were included in the category labelled "other"—namely, blood, circulatory, ear, endocrine, eye, gynaecological, male, obstetric, psychological, social, and urological. There were significant differences in these seven categories between patients seen by the general practitioners and those seen by the usual accident and emergency staff. The median age of patients with neurological complaints seen by general practitioner staff was 29 years as compared with 38 years for those seen by the usual staff (Kruskal-Wallis test, P<0.05). The median age of patients with complaints categorised as "other" and seen by general practitioner staff was 32 years as compared with 42 years for those seen by the usual staff (Kruskal-Wallis test, P<0.05). The relative risk of general practitioner

staff seeing non-General Medical Services eligible patients with digestive complaints was 1.09 (95% confidence interval 1.06 to 1.42). The relative risk of general practitioner staff seeing female patients with "other" complaints was 0.56 (0.38 to 0.82).

Over 90% of all triage 4 patients were included in the musculoskeletal and skin categories; the remaining 10% were grouped under "other (triage 4)." There were no differences between triage 4 patients seen by general practitioners and those seen by the usual accident and emergency staff.

PROCESS

Tables 2, 3, and 4 give the details of process for all patients, triage 3 patients, and triage 4 patients respectively. Process differences are expressed as the percentage relative difference. The percentage relative difference for each process measure was calculated by subtracting the percentage usage figure of the general practitioner staff from the percentage usage figure of the usual accident and emergency staff. The result was divided by the percentage usage figure of the usual accident and emergency staff. Positive differences reflect increased process usage by the usual accident and emergency staff in comparison with general practitioner staff. Negative differences reflect the reverse.

Tables 2 and 3 and to a less extent table 4 show that general practitioners performed fewer investigations, referred less often, prescribed more frequently, and disposed of more patients to the community.

Forty seven per cent of items prescribed to triage 3 patients by the general practitioners and 15% of items prescribed by the usual accident and emergency staff were written in generic form (odds ratio of prescribing generic products to triage 3 patients for general practitioner versus usual accident and emergency staff 4.80; 95% confidence interval 3.70 to 6.21). Forty four per cent of items prescribed to triage 4 patients by the general practitioners and 22% of items prescribed by the usual accident and emergency staff were written in generic form (odds ratio of prescribing generic products to triage 4 patients for general practitioner versus usual accident and emergency staff 2.76; 1.85 to 4.15). For triage 3 patients 190 (13%) of 1467 items prescribed were not included in the defined daily dose analysis as a defined daily dose was unavailable. A further 148 items (10%) were also excluded as no drug was specified. The defined daily dose cost per triage 3 patient seen by the general practitioners was £Ir0.18; for the usual accident and emergency staff the equivalent figure was £Ir0.16. For triage 4 patients 70 (11%) of 619 items prescribed were not included in the defined daily dose analysis as a defined daily dose was unavailable. A further 72 items (12%) were also excluded as no drug was specified. The defined daily dose cost per triage 4 patient seen by the general practitioners was £Ir0.18; for the usual accident and emergency staff the equivalent figure was £Ir0.16.

Table 3—*Process by presenting complaint of 3353 triage 3 patients seen by general practitioner or usual accident and emergency staff*

Process measure	No (%) managed by accident and emergency staff	No (%) managed by general practitioner	% Relative difference (95% confidence interval)
Presenting complaint musculoskeletal	**(n = 795)**	**(n = 719)**	
Any investigation	601 (76)	460 (64)	15 (9 to 21)
Any blood investigation	48 (6)	11 (2)	75 (52 to 87)
Any *x* ray examination	576 (72)	437 (61)	16 (10 to 22)
Referral	156 (20)	71 (10)	50 (35 to 61)
Any prescription	322 (41)	452 (63)	-55 (-40 to -72)
Disposal to hospital	369 (32)	166 (23)	29 (16 to 40)
Admission	59 (7)	19 (3)	64 (41 to 79)
Presenting complaint skin	**(n = 273)**	**(n = 279)**	
Any investigation	50 (18)	33 (12)	35 (3 to 57)
Any blood investigation	11 (4)	4 (1)	NS
Any *x* ray examination	36 (13)	26 (9)	NS
Referral	23 (8)	17 (6)	NS
Any prescription	62 (23)	55 (20)	NS
Disposal to hospital	108 (40)	72 (26)	35 (16 to 49)
Admission	18 (7)	15 (5)	NS
Presenting complaint neurological	**(n = 246)**	**(n = 167)**	
Any investigation	171 (70)	91 (54)	22 (8 to 33)
Any blood investigation	86 (35)	29 (17)	50 (28 to 66)
Any *x* ray examination	116 (47)	61 (37)	23 (2 to 39)
Referral	54 (22)	23 (14)	37 (2 to 60)
Any prescription	32 (13)	35 (21)	-61 (-4 to -150)
Disposal to hospital	76 (31)	34 (20)	30 (9 to 55)
Admission	38 (15)	17 (10)	NS
Presenting complaint digestive	**(n = 165)**	**(n = 124)**	
Any investigation	129 (78)	74 (60)	24 (10 to 35)
Any blood investigation	80 (48)	28 (23)	53 (33 to 68)
Any *x* ray examination	48 (29)	16 (13)	56 (26 to 74)
Referral	46 (28)	31 (25)	NS
Any prescription	61 (37)	42 (34)	NS
Disposal to hospital	61 (37)	38 (31)	NS
Admission	31 (19)	21 (17)	NS
Presenting complaint general	**(n = 133)**	**(n = 80)**	
Any investigation	107 (80)	52 (65)	19 (3 to 33)
Any blood investigation	61 (46)	24 (30)	35 (4 to 55)
Any *x* ray examination	64 (48)	26 (33)	32 (3 to 53)
Referral	42 (32)	24 (30)	NS
Any prescription	39 (29)	23 (29)	NS
Disposal to hospital	52 (39)	20 (25)	NS
Admission	33 (25)	10 (13)	50 (3 to 74)
Presenting complaint respiratory	**(n = 93)**	**(n = 68)**	
Any investigation	75 (81)	40 (59)	27 (9 to 42)
Any blood investigation	55 (59)	23 (34)	43 (17 to 41)
Any *x* ray examination	59 (63)	27 (40)	37 (13 to 55)
Referral	26 (28)	18 (26)	NS
Any prescription	35 (38)	34 (50)	NS
Disposal to hospital	30 (32)	22 (32)	NS
Admission	21 (23)	12 (18)	NS
Presenting complaint other†	**(n = 132)**	**(n = 79)**	
Any investigation	81 (61)	52 (66)	NS
Any blood investigation	28 (21)	8 (10)	NS
Any *x* ray examination	23 (17)	6 (8)	NS
Referral	52 (39)	18 (23)	42 (9 to 63)
Any prescription	32 (24)	40 (51)	-109 (-44 to -203)
Disposal to hospital	62 (47)	22 (28)	43 (15 to 61)
Admission	29 (22)	9 (11)	NS

† "Other" includes circulatory, ear, endocrine, eye, gynaecological, male, obstetric, psychological, social, and urological complaints.

OUTCOME

The hospital's computer could not locate 83 (2%) of the 4684 patients enrolled in the study. Thirty three had been seen by the general practitioners and 50 by the usual accident and emergency staff. They could not be located because their registration numbers had been changed for administrative reasons after their visit. Of the remaining 4601 patients, 393 (17%) who had been seen by general practitioner staff reattended the department within 30 days of the index visit; 418 patients (18%) seen by accident and emergency staff similarly reattended. Among those who reattended, the mean number of visits within 30 days for the 393 who had been seen by general practitioner staff was 1.6; for the 418 patients who had been seen by the usual accident and emergency staff the equivalent figure was 1.8 ($P<0.05$).

During the two months of the outcome study 604 patients were eligible for inclusion. Of these, 435 (72%) completed the consultation satisfaction questionnaire. Table 5 shows the scores for the two groups. The groups were similar in triage category, age, sex distribution, and General Medical Services eligibility. There were no differences in scores between the groups.

Fifty eight patients who completed the consultation satisfaction questionnaire did not wish to be contacted in one month about their health status. Thirty two had been seen by the general practitioners and 26 by the usual accident and emergency staff. Of the remaining 377 patients, health status information was obtained for 258 (68%). The response rate of all eligible patients was therefore 59%. There was no difference in triage

Table 4—*Process by presenting complaint of 1331 triage 4 patients seen by general practitioner or usual accident and emergency staff*

Process measure	No (%) managed by accident and emergency staff	No (%) managed by general practitioner	% Relative difference (95% confidence interval)
Presenting complaint musculoskeletal	**(n = 353)**	**(n = 515)**	
Any investigation	215 (61)	260 (51)	17 (7 to 261)
Any blood investigation	4 (1)	0	NS
Any *x* ray examination	214 (61)	257 (50)	18 (7 to 27)
Referral	50 (14)	28 (5)	62 (40 to 75)
Any prescription	132 (37)	306 (59)	−59 (−36 to −85)
Disposal to hospital	75 (21)	72 (14)	NS
Admission	3 (<1)	0	NS
Presenting complaint skin	**(n = 133)**	**(n = 206)**	
Any investigation	23 (17)	11 (5)	69 (39 to 84)
Any blood investigation	2 (2)	0	NS
Any *x* ray examination	20 (15)	10 (5)	68 (33 to 84)
Referral	2 (2)	1 (<1)	NS
Any prescription	35 (26)	53 (26)	NS
Disposal to hospital	27 (20)	43 (21)	NS
Admission	0	0	NS
Presenting complaint other triage 4†	**(n = 57)**	**(n = 66)**	
Any investigation	23 (40)	16 (24)	NS
Any blood investigation	6 (11)	1 (2)	NS
Any *x* ray examination	16 (28)	11 (17)	NS
Referral	8 (14)	2 (3)	NS
Any prescription	14 (25)	31 (47)	−95 (−15 to −228)
Disposal to hospital	18 (32)	4 (6)	NS
Admission	8 (14)	0	NS

†"Other triage 4" includes all categories except musculoskeletal and skin.

Table 5—*Consultation satisfaction questionnaire scores (n=276 in general practitioner group; n=159 in accident and emergency group)*

	Mean	Median	SD
General satisfaction			
General practitioner	67.8	71.0	19.5
Accident and emergency	67.0	67.0	20.8
Depth of relationship			
General practitioner	48.0	50.0	17.6
Accident and emergency	47.0	50.0	17.9
Perceived time			
General practitioner	55.8	58.0	22.7
Accident and emergency	56.0	58.0	22.4
Professional care			
General practitioner	71.3	71.0	17.0
Accident and emergency	70.0	71.0	17.8

category, age, sex distribution, or General Medical Services eligibility between patients seen by the general practitioners and those seen by the usual accident and emergency staff. Table 6 shows the results of the health status questionnaire. There was no significant difference in outcome between patients seen by the general practitioners and those seen by the usual accident and emergency staff.

COMPARATIVE COSTINGS

After adjustment for the accident and emergency case mix the marginal cost savings for every 100 representative triage 3 and triage 4 patients seen by a general practitioner were £Ir64 and £Ir58 respectively. The equivalent total cost figures were £Ir6999 and £Ir1385. This indicates that for all 2303 patients seen by the general practitioners during the study the marginal and total savings were £Ir1427 and £Ir117 005 respectively. The salary costs of the general practitioners during the period were £Ir21 880, suggesting an overall possible total saving of £Ir95 125.

Discussion

METHODOLOGICAL CONSIDERATIONS

A key area of concern when designing the research methodology for this study was to select an appropriate randomisation method for allocating patients to the general practitioner or the usual accident and emergency staff. By using allocation to triage groups and time of registration as the basis of randomisation several possible difficulties were addressed. These included the problems inherent in randomisation based on lists of "suitable problems" to be dealt with by general practitioners, the unpredictable needs of patients in triage categories 1 and 2, and delays caused by rigid streaming of patients into groups which could be managed by only one type of doctor. The commitment and enthusiasm of the research and triage nursing teams ensured that the study randomisation protocol was followed. Indeed, by comparing the two methods under conditions in which they would be applied in practice the study design can be considered "pragmatic" rather than "explanatory."[27]

A concern when interpreting the study results were the differences in some characteristics between triage 3 patients seen by the general practitioners and those seen by the usual accident and emergency staff. However, we do not believe these differences were important in the differing performance of the two groups of staff. In any large sample chance differences may occur between study groups.[28] Differences in process were maintained in the univariate analysis of both similarly matched presenting complaint groups (tables 3 and 4) and specific presenting complaints (data available on request).

The Irish health system is a mixture of public and private health schemes. Roughly 85% of health financing is provided through central taxation.[29] As stated above, on the basis of a means test one third of the population of the Republic of Ireland are entitled to free health services. The remaining two thirds pay for all primary health care costs, including accident and emergency attendances. Extrapolation of the results of this study to different health care systems must be performed with caution.

Nevertheless, it is noteworthy that overall process use was broadly similar among King's College "primary care" and St James' Hospital triage 4 patients (table 7). To facilitate comparison all figures in table 7 refer to consultations with the usual accident and emergency staff only. Primary care and triage 4 may represent broadly synonymous categories. Process use was also similar for King's College "true accident and emergency" and St James' Hospital triage 3 patients (table 7). Notably, 13% of triage 3 patients were admitted. By contrast with triage 3 patients, the King's College true accident and emergency category plainly included patients with life threatening and urgent conditions. Triage 3 may represent a category of patients intermediate between primary care and "life threatening/urgent." This suggests that our study

Table 6—*Health status one month after consultation among patients seen by general practitioner or usual accident and emergency staff*

	No (%) seen by general practitioner (n = 163)	No (%) seen by accident and emergency staff (n = 95)
Cured	88 (54)	47 (49)
Improved	48 (29)	36 (38)
Same	22 (13)	10 (11)
Worse	5 (3)	2 (2)
Had reattended accident and emergency department for treatment of same complaint	19 (12)	9 (9)
Had reattended own general practitioner for treatment of same complaint	40 (25)	21 (22)
Had original diagnosis subsequently changed	4 (2)	2 (2)

Table 7—*Overall process use for King's College and St James' Hospital patients. Results refer to consultations performed by usual accident and emergency staff only. Figures are percentages except where stated otherwise*

	King's College "primary care" (n = 2065)†	St James' triage 4 (n = 544)	King's College "true accident and emergency" (n = 291)†	St James' triage 3 (n = 1837)
Process measure				
Any *x* ray examination	25.5	46.0	46.7	50.2
Any blood test	6.1	2.0	27.2	20.1
Prescription	44.5	33.0	38.4	32.0
Referral	9.7	11.0	33.3	22.0
Disposal				
Community	76.9	77.0	49.8	62.2
Outpatient department	4.6	4.4	2.8	7.2
Accident and emergency department review	5.8	7.1	7.7	7.5
Fracture clinic	3.1	3.9	6.3	4.5
Admission	Negligible	2.0	Not provided	13.0

†Figures for King's College Hospital taken from Dale *et al.*[17]

extended the King's College model to include patients who have more serious but still non-emergency conditions. This hypothesis might be tested by replicating the King's College triage method in St James' Hospital or vice versa. If the vast majority of triage 4 patients were classified as "primary care" and appreciable numbers of triage 3 patients were classified as "true accident and emergency" the above hypothesis would be proved.

PATIENT SATISFACTION AND HEALTH STATUS

In assessing patient outcome it was reassuring to find that similar proportions of patients seen by the general practitioners and usual accident and emergency staff reattended the department within 30 days of the index visit. We believed patient satisfaction with the consultation to be especially important when process variables showed such pronounced differences. The consultation satisfaction questionnaire has been validated for use in general practice[24-25] but to our knowledge has not been used in an accident and emergency setting. We considered it to be appropriate in this study, as by definition the patients were similar to those regularly seen in general practice. Dale *et al* reported that accident and emergency consultations with general practitioner staff lasted significantly longer than those with the usual accident and emergency staff.[3] In their study over a quarter of general practitioner consultations lasted over 10 minutes as compared with less than a tenth of consultations with the usual staff. This might be expected to produce greater satisfaction among patients seen by general practitioner staff. We did not collect data on consultation length. Satisfaction scores, however, were similar between patients seen by general practitioners and those seen by the usual accident and emergency staff.

The results of the health status questionnaire must be interpreted with caution owing to the low overall response rate (59%). As the questionnaire was unique to this study, comparison with other work is difficult. Future studies may consider using common outcome measures such as the short form 36.[30]

REASONS FOR DIFFERENT PERFORMANCE

This study has shown that by comparison with the usual accident and emergency staff general practitioners investigate fewer patients, refer to other hospital services less often, more frequently refer patients back to their own general practitioner for follow up, admit fewer patients, and prescribe more often. They do so with no apparent effect on patient outcome or on their subsequent use of hospital services. The study provides no explanations for these differences, which will be the subject of further research. Reasons for the more efficient performance of general practitioner staff might include their additional years of experience, their training in general practice, or their greater familiarity with community services. Indeed, the higher prescribing rates by the general practitioners may represent a different approach to the management of non-emergency patients, which itself warrants further exploration.

Owing to small numbers of hospital staff at registrar grade or higher we could not effectively compare the work of general practitioners and hospital doctors with similar years of experience. Though years of clinical experience may represent a key determinant of efficient care, it may also be that factors specific to general practice such as familiarity with unsupported decision making, coping with high levels of uncertainty, and the need to manage diverse clinical and psychosocial problems give general practitioners an advantage over their hospital trained colleagues. In the King's College study it is interesting to note that for patients seen by general practitioners and accident and emergency registrars with similar periods since qualification differences in process were still maintained.[16]

It is important to emphasise that the financial calculations are comparative costings of process variables only. We did not attempt to estimate other costs, such as those incurred by patients. The putative financial savings generated by the general practitioner staff must be interpreted cautiously. This is because marginal savings were minimal and total savings can be achieved only through a reduction in staff numbers, which would have important implications for other services. Possibly the true relevance of these savings lies in their redeployment for other uses. For instance, the general practitioners in this study generated around 100 fewer admissions of patients in triage category 3 than their accident and emergency colleagues; this may facilitate the elective use of beds to reduce waiting lists. The value of these opportunities is best seen against the background of increasing acute medical admissions,[31] which rose between 7% and 13% during 1993-4.[32] These increases are causing problems for both patients[33] and health care professionals.[34] Despite significant differences in admission rates of patients in triage category 3 between general practitioners and the usual accident and emergency staff the overall contribution to admissions from the accident and emergency department by patients in this category was small. By comparison, in St James' Hospital triage category 2 patients contribute at least half of all admissions. The next phase of the research will explore whether differences between general practitioners and the usual accident and emergency staff in the management of non-emergency cases are maintained in the management of patients with more severe problems. It is unlikely that differences of the magnitude already reported will be sustained but it is possible that some

Key messages

- General practitioners in an accident and emergency department utilise fewer hospital resources than do the usual staff when treating primary care attenders
- A study extending this innovation shows that the care provided to non-emergency patients by general practitioners working as an integral part of an accident and emergency department also differs substantially from the care provided by the usual staff in terms of process
- Compared with the usual accident and emergency department staff, general practitioners investigate fewer patients, refer to other hospital services less often, more often refer patients back to their own general practitioners for follow up, admit fewer patients, and prescribe more often
- General practitioners within an accident and emergency department have no apparent effect on reattendance rates to the department within 30 days, patient satisfaction, or health status one month after the initial attendance
- As yet there are no explanations for these differences, which warrant further research

types of problems within triage category 2 lend themselves specifically to management by general practitioners. Additional training in emergency care will be provided for the general practitioners before this phase is begun. Of equal interest will be whether general practitioners caring for more serious problems can maintain their distinct approach to non-emergency patients.

It is also planned to evaluate the service in another large acute hospital but one in which the catchment area includes both urban and rural communities. Expansion of the service to sites dissimilar to ours will be carefully monitored to see if process and outcome differences are maintained in different circumstances.

BREAKING THE CYCLE

Many initiatives have attempted to safely reduce inappropriate attendances at accident and emergency departments. Strategies have included advisory letters to frequent attenders,[35] allocation of general practitioners to attenders with no regular source of primary care,[36] direct referral to general practitioners,[37] and even changing the name "casualty service" to "accident and emergency."[38] All have failed. The relevance of inappropriate attendance extends beyond mere considerations of workload. Bliss described these attendances as "high in cost and low in quality."[39] He suggested that doctors in accident and emergency departments seem mostly to manage such problems by offering investigations, outpatient referral, or admission. Such behaviour may simply reinforce patient perceptions of the need for hospital based care. General practitioners working on a sessional basis in a local accident and emergency department may have the potential to break the cycle of inappropriate attendance, use of hospital resources, and perceived confirmation of need for an accident and emergency visit. This study represents an attempt to improve the appropriateness of care provided in accident and emergency departments.[40]

As in this study, most patients in triage categories 3 and 4 who attend accident and emergency departments in the United Kingdom and Ireland are managed by non-consultant medical staff in training for other disciplines. This study shows that general practitioners working as an integral part of an accident and emergency department manage non-emergency accident and emergency attenders safely and use fewer resources than do the usual accident and emergency staff. The reasons for the difference—whether experience, training, or other—will be explored in further research.

Appendix

St James' Hospital triage categories

(1) Life threatening
Airway problems
Systolic blood pressure <90 mm Hg
Respiratory rate <10 or >30/min
Glasgow coma scale <13
Multiple trauma
Burns <10% (simple erythema not included)

(2) Urgent
Collapse with altered physiology but not in triage category 1
Cerebrovascular accident
Asthma/severe shortness of breath (difficulty speaking)
Chest pain (severe/cardiac type)
Abdominal pain (plus fever/rigors/haematuria/tachycardia)
Palpitations
Severe headache (plus photophobia/altered consciousness)
Obvious fracture
Full thickness/partial thickness burns >5%
Moderate external bleeding
Haematemesis/melaena
Hypothermia

(3) Semiurgent
"Collapse" with normal physiology
Chest/abdominal pain (mild or >48 hours)
Mild shortness of breath
Limb injury with disability
Minor bleeding
Headache without photophobia or altered consciousness

(4) Delay acceptable
Minor soft tissue injury
Injury >24 hours old, without disability
Abdominal/chest pain >7 days

We acknowledge the invaluable work of the general practitioners—namely, Drs Tony Delap, Mick Doyle, Seamus Kilby, Anthony O'Sullivan, and Kevin O'Flynn. We also thank Gavin Maguire, of the St James' Hospital finance department, and Finian Lynam, of the hospital's information management services. Statistical advice was provided by Leslie Daly. We are grateful to the departmental nursing and reception staff, without whose patience and support this study would not have been possible.

Funding: Department of Health through the General Practice Unit of the Eastern Health Board.

Conflict of interest: None.

1 Calling all gatekeepers: this is an emergency. *Lancet* 1994;343:305-6.
2 Dale J. Primary care: the old bugbear of accident and emergency services. *Br J Gen Pract* 1992;42:90-1.
3 King's College Hospital Accident and Emergency Primary Care Project. *Providing for primary care: progress in A&E.* London: King's College School of Medicine and Dentistry, 1991.
4 Driscoll PA, Vincent CA, Wilkinson M. The use of the accident and emergency department. *Arch Emerg Med* 1987;4:77-82.
5 Foroughi D, Chadwick L. Accident and emergency abusers. *Practitioner* 1989;233:657-8.
6 Bader J-M. Revamp of emergency units. *Lancet* 1993;342:857.
7 Hynes M, O'Connor S. *Accident and emergency report.* Dublin: Eastern Health Board, 1990.

8 Green J, Dale J. Health education and the inappropriate use of accident and emergency departments: the views of accident and emergency nurses. *Health Education Journal* 1990;**49**:157-61.
9 Foldes SS, Fischer LR, Kaminsky K. What is an emergency? The judgements of two physicians. *Ann Emerg Med* 1994;**23**:833-40.
10 McCabe JB. What is an emergency, and who wants to know? *Ann Emerg Med* 1994;**23**:872-3.
11 Bindman AB. Triage in accident and emergency departments. *BMJ* 1995;**311**:404.
12 George S, Read S, Westlake L, Fraser-Moodie A, Pritty P, Williams B. Differences in priorities assigned to patients by triage nurses and by consultant physicians in accident and emergency departments. *J Epidemiol Community Health* 1993;**47**:312-5.
13 Kaliszer M, McCormick J. New casualty attenders at a Dublin hospital. *Journal of the Irish Medical Association* 1975;**68**:159-64.
14 Casualty Departments in Dublin. *Journal of the Irish Medical Association* 1975;**68**:181.
15 Wilkinson A, Kazantzis G, Williams DJ, Dewar AD, Bristow KM, Miller DL. Attendance at a London casualty department. *J R Coll Gen Pract* 1977;**27**:727-33.
16 Dale J, Green J, Reid F, Glucksman E, Higgs R. Primary care in the accident and emergency department: II. Comparison of general practitioners and hospital doctors. *BMJ* 1995;**311**:427-30.
17 Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. *BMJ* 1995;**311**:423-6.
18 Lamberts H, Wood M, Hofmans-Okkes I, eds. *The international classification of primary care in the European Community with a multilanguage layer.* Oxford: Oxford University Press, 1993.
19 World Health Organisation Collaborating Centre for Drug Statistics Methodology. *Guidelines for defined daily doses.* Oslo: WHO, 1991.
20 Armstrong AM, Pennycock AG, Swann IJ. Unplanned reattendance in the accident and emergency department. *Scott Med J* 1991;**36**:111-4.
21 Lerman B, Kobernick MS. Return visits to the emergency department. *J Emerg Med* 1987;**5**:359-62. Hansagi H, Carlsson B, Olsson M, Edhag O. Trial of a method of reducing inappropriate demands on a hospital emergency department. *Public Health* 1987;**101**:99-105.
22 Baker R. Development of a questionnaire to assess patients' satisfaction with consultations in general practice. *Br J Gen Pract* 1990;**10**:487-90.
23 Baker R. The reliability and criterion validity of patients' satisfaction with their general practice. *Fam Pract* 1991;**8**:171-7.
24 Baker R, Whitfield M. Measuring patient satisfaction: a test of construct validity. *Quality in Health Care* 1992;**1**:104-9.
25 Daly LE, Bourke GJ, McGilvray J. *Interpretation and uses of medical statistics.* Oxford: Blackwell Scientific, 1991:426-7.
26 Schwartz D, Lelluoch J. Explanatory and pragmatic attitudes in therapeutic trials. *Journal of Chronic Diseases* 1967;**20**:637-48.
27 Pocock SJ. *Clinical trials: a practical approach.* New York: Wiley, 1983.
28 Boerma WGA, de Jong FAJM, Mulder PH. *Health care and general practice across Europe.* Utrecht: NIVEL, 1993.
29 Ware JE. Measuring patients' views: the optimum outcome measure. *BMJ* 1993;**306**:1429-30.
30 Hobbs R. Rising emergency admissions. *BMJ* 1995;**310**:207-8.
31 Court C. Rising emergency admissions disrupt NHS. *BMJ* 1994;**309**:132.
32 Duillner J. Emergency delays need urgent attention. BMJ 1995;**310**:283. Jenkins C, Bartholomew J, Gelder F, Morrell D. Arranging hospital admission for acutely ill patients: problems encountered by general practitioners. *Br J Gen Pract* 1994;**44**:251-4.
33 O'Shea JS, Collins EW, Pezzullo JC. An attempt to influence health care visits of frequent hospital emergency facility users. *Clin Pediatr (Phila)* 1984;**23**:559-62.
34 Straus JH, Tangerose OS, Charney E. Referrals from an emergency room to primary care practices at an urban hospital. *Am J Public Health* 1983;**73**:57-61.
35 Hansagi H, Carlsson B, Olsson M, Edhag O. Trial of a method of reducing inappropriate demands on a hospital emergency department. *Public Health* 1987;**101**:99-105.
36 Subcommittee, Central Health Services Council, Standing Medical Advisory Committee. *Accident and emergency services.* London: HMSO, 1962. (Platt report.)
37 Bliss HA. Primary care in the emergency room: high in cost and low in quality. *N Engl J Med* 1982;**306**:998.
38 Brook RH. Appropriateness: the next frontier. *BMJ* 1994;**308**:218-9.

(Accepted 14 March 1996)

A MEMORABLE PATIENT

Don't blame the messenger

Some 40 years have elapsed since the death of my landlord at university but the event is still clearly etched in my memory. I was a late acceptance for the Cambridge medical course that year and my college had difficulty in finding accommodation. Finally it succeeded in persuading one of its former landladies to reverse her decision that she would no longer take students. Accordingly, I was billeted with an elderly couple of whom the husband was by now increasingly handicapped from injuries that he suffered in the first world war. His wife considered herself to be burdened enough looking after him, but she was a good landlady. Everything changed dramatically on 1 March 1956 when my landlord suffered a heart attack in the middle of the afternoon. My medical studies, by then towards the end of their second term, had been insufficient to prepare me for this situation. The general practitioner pronounced the case as serious, administered a morphine injection for the pain, and then departed. The landlady and I found ourselves mutually bewildered and we sat with her dying husband over the next few hours. At least his pain had been controlled and his physical distress subsided into semiconsciousness which increasingly progressed until he died at about 2 o'clock the following morning.

The widow implored me to do something but I was unsure of the correct proceedings. I decided I should communicate with the general practitioner and I wandered into the streets to find a public telephone box. Eventually I succeeded in speaking to an irate and sleepy doctor who berated me for disturbing him in the night since he had already predicted the outcome. He made little or no allowance for the inexperience of an 18 year old who considered himself faced with an unusual situation and much earlier in his medical career than the course had recommended.

When I returned to my lodgings I decided not to report the doctor's reaction but merely said that he would attend in the morning to deal with the formalities. Neither of us now felt much like sleeping and so the rest of the night was spent with my landlady reminiscing about her time in Cambridge.

The funeral was at the crematorium a few days later and I declined the family's offer to join them in the cortege. Instead I cycled, developed a puncture, and arrived late, breathless and flustered. Nevertheless, the bonding experience of the shared situation kept us in contact for the rest of her life. She retired to an elderly people's home and died at the age of 93. I used to visit her regularly and always sent her something for Christmas. She, in her turn, wrote regularly and always inquired about my expanding family which she met from time to time if we were passing through her area. These healthy and high spirited youngsters cheered her up when she was elderly and frail.

With her death ended an unusual relationship forged between two people of different age groups, background, and temperaments. Nevertheless, we were linked by one of the most basic of human events: contending with the inevitability of death. Even at that formative student stage I also learnt an important lesson that has lasted through my career. If a death is reported to you, even if it is expected, it is an inappropriate response to lambast the informant.—A P JOSEPH *is a general practitioner in the West Midlands*

We welcome filler articles of up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake,* or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk.