Reasons for requesting radiographs in an accident department

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British Medical Journal, 1979, 1, 1595-1597

Summary and conclusions

A prospective study of 500 patients was performed to determine the reasons for requesting radiographs in an accident and emergency department. Most examinations were requested either to confirm a clinically suspected abnormality or because of difficulty in excluding a significant bone injury on clinical grounds alone. Several requests were also made to reassure the patient. Medico-legal reasons were relatively few, and those made purely because the doctor feared litigation probably accounted for only 5% of requests.

Undue emphasis on the medicolegal aspects of accident and emergency radiography in the United Kingdom is unhelpful in that it directs attention away from the real reasons for x-ray referral. Although a reduction in the number of x-ray examinations is desirable on the grounds of expense and radiation exposure it is likely to be obtained only by improving experience and acumen in the clinical assessment of injuries.

Introduction

Accident and emergency radiology accounts for 18% of the total radiographic work load in a general hospital.¹ Golberg² has claimed that much of this represents unnecessary radiography, while others^{3,4} have suggested that a major cause is the present climate of legal opinion, which makes doctors fear litigation. While concern with litigation is unavoidable, it has to be weighed against the huge cost of radiographic examinations¹ and the potential hazards of ionising radiation. Our study was carried out to establish why casualty officers request x-ray examinations, to determine whether or not the experience of the casualty officer affects the pattern of requests, and to assess the influence of medicolegal considerations.

Patients

The cards of consecutive attenders at the accident departments of a metropolitan teaching hospital (in London SW1 and SW17) who were referred for x-ray examination were stamped with a questionnaire (see figure). The casualty officers were asked to complete questions 1 and 2 of this questionnaire before the x-ray examination. Six months to a year later the answers to 500 of these were analysed in conjunction with the casualty card, outpatient or inpatient notes where applicable,

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ST. GEORGE'S HOSPITAL		Surname		Title	
ACCIDENT & EMERGENCY RECORD		First name			
G.P. Address		Address			
Location of Incident		Date of Birth		Age	
R.T.A.	At Work	Telephone No.			
P.C.	Ambulance	Previous Attendance		Folder Number	
Date & Time		<div style="border: 1px solid black; padding: 5px;"> <p align="center">DELETE THE INAPPLICABLE</p> <ol style="list-style-type: none"> 1. Diagnosis prior to x-ray: 2. Reason for x-ray examination: <ol style="list-style-type: none"> a. X-ray abnormality likely; b. Patient reassurance; c. Medico-legal. 3. Casualty officer's reading of film: <p align="center">Normal/abnormal/uncertain</p> 4. X-ray altered diagnosis: Yes/No. 5. X-ray altered treatment: Yes/No 6. X-ray findings essential for management Yes/No 7. Signature of casualty officer </div>			

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Questionnaire stamped on the casualty cards. Questions 1 and 2 were completed before the x-ray examination.

and the x-ray films. Although the questionnaire did not list "x-ray abnormality possible" as a reason for a request, this indication was spontaneously listed by the medical officers and we therefore included it in the analysis.

The casualty consultant subsequently classified all abnormal x-ray findings as being clinically significant or insignificant (without knowing who had requested the examination).

Results

Forty-one per cent of all first-time attenders to the accident department were referred for x-ray examination. The junior officers requested radiographs in 45% of their patients, whereas the consultant's referral rate was 31%. Although the consultant did not see patients at night, during the day he saw patients in the same way as all the other casualty officers, and did not limit his services to difficult problems, the seriously injured, or second opinions.

The stated reasons for requesting the x-ray examinations are shown in table I. Requests made for patient reassurance amounted to 30% of the total, whereas only 10% were for medicolegal reasons. The consultant requested proportionally half as many examinations for patient reassurance as did the junior casualty officers, but the proportion of medicolegal requests was almost identical.

Table II compares the numbers of x-ray abnormalities present in patients referred by the consultant and by the junior casualty officers. When the junior officers thought that a radiological abnormality was

TABLE I—Proportion of patients referred for radiography and stated reasons for requesting it

Reasons for requesting radiography	All casualty officers			Casualty consultant			Junior casualty officers		
	No (%) of x-ray requests	% of total patients seen		No (%) of x-ray requests	% of total patients seen		No (%) of x-ray requests	% of total patients seen	
X-ray abnormality likely	111 (22)	9		27 (23)	7		84 (22)	10	
X-ray abnormality possible	173 (35)	14		55 (47)	15		118 (31)	14	
Patient reassurance	149 (30)	12		21 (18)	6		128 (33)	15	
Medicolegal	49 (10)	4		13 (11)	3		36 (9)	4	
X-ray abnormality likely and patient reassurance	5 (1)						5 (1)		
X-ray abnormality possible and medicolegal	4 (1)	1					4 (1)	2	
Patient reassurance and medicolegal	9 (2)						9 (2)		
Total number of x-ray requests	500 (100)	41		116 (100)	31		384 (100)	45	
No of x-rays requested	727	59		258	69		469	55	
Total number of patients seen	1227	100		374	100		853	100	

TABLE II—Results of x-ray examinations requested by casualty consultant and junior casualty officers

Reason for x-ray examination	Casualty consultant				Junior casualty officers			
	No of requests	No (%) normal	No (%) abnormal		No of requests	No (%) normal	No (%) abnormal	
			Clinically significant	Clinically insignificant			Clinically significant	Clinically insignificant
X-ray abnormality likely	27	6 (22)	19 (70)	2 (7)	84	38 (45)	32 (38)	14 (17)
X-ray abnormality possible	55	44 (80)	10 (18)	1 (2)	118	91 (77)	15 (13)	12 (10)
Patient reassurance	21	21			128	116 (91)	7 (6)	5 (4)
Medicolegal	13	13			36	29 (81)	3 (8)	4 (11)
X-ray abnormality possible and patient reassurance					5	4 (80)	1 (20)	
X-ray abnormality possible and medicolegal					4	3 (75)		1 (25)
Patient reassurance and medicolegal					9	8 (89)		1 (11)
Total	116	84 (72)	29 (25)	3 (3)	384	289 (75)	58 (15)	37 (10)

likely one was present in 55% of cases; when they thought one was possible it was present in 23%. Nine per cent of the radiographs requested by the juniors to reassure the patient were abnormal, as were 19% of those they requested for medicolegal reasons. No radiographic abnormalities were present in those cases referred by the consultant for reassurance or medicolegal reasons.

As expected, clinically important x-ray abnormalities were most common in cases where the casualty officer thought an x-ray abnormality was likely. When the consultant stated that an x-ray abnormality was likely 70% of the patients had a clinically significant abnormality, whereas the corresponding figure for the junior officers was 38%. In 48% of cases where a radiograph was requested for medicolegal reasons the injury had been sustained in an assault (11 cases), a road-traffic accident (11), or accident at work (8).

Discussion

The number of x-ray examinations in accident and emergency departments is increasing by about 6% annually without a corresponding increase in the population.¹ Some workers have claimed that appreciable reductions in radiography would be obtained if casualty officers were not compelled by medicolegal considerations to request unnecessary radiographs.^{2,3} Our study was carried out to determine the reasons for x-ray requests after trauma. Any questionnaire designed for completion in the accident department is open to criticism, as it is difficult to design a proforma which will reflect precisely why a doctor, often of limited experience and in busy and difficult conditions, refers a patient for radiography. We do not claim that our questionnaire supplied a precise analysis of the reasons for x-ray requests, but it did allow a broad assessment of the indications for the examinations.

The x-ray examinations made solely for medicolegal reasons represented only 10% of all requests (95% confidence limits 7.2-12.4%). The expression "medicolegal reason" is often regarded as merely connoting fear, concern, or an awareness of litigation which might follow management of the injury. This was not necessarily the casualty officers' interpretation, however. Some x-ray examinations were performed primarily, if not solely, to document the presence or absence of a fracture or foreign body in a patient who may subsequently become involved

in a dispute about the circumstances in which the injury occurred and not in relation to its subsequent management. Road-traffic accidents, assaults, and accidents at work will account for most of the cases which lead to this form of documentation. Some of these x-ray examinations may be regarded by the casualty officer as clinically inessential but nevertheless potentially helpful to the patient. There is a second group in which the injury has not resulted from any of these incidents but the stated reason for x-ray examination is also medicolegal. These requests probably do reflect an awareness that litigation might possibly affect the casualty officer in regard to the management of the injury. Our results suggest that such considerations probably account for little more than 5% of all requests for x-ray examinations.

This relatively low percentage contrasts with those cited in previous reports,⁴ in which requests made for medicolegal reasons are claimed to be as high as 44% of the total. This is an important finding because undue emphasis that radiographic examinations are made mainly because of fear of litigation can lead to the suggestion that only a change in the prevailing legal attitude would allow a reduction in referrals for radiographs.

The reasons for most x-ray requests may be categorised as follows. Firstly, in many patients the casualty officers have difficulty in determining on clinical examination alone whether an abnormality is present. The frequency of x-ray abnormalities was highest in those patients referred because a radiological abnormality was considered likely on clinical grounds. A high correlation between clinical findings and an x-ray abnormality might be expected in this group. When the junior casualty officers considered an x-ray abnormality to be likely they were correct in 55% of cases, and in 38% the abnormality was clinically significant. (Not all x-ray abnormalities are clinically important—for example, the demonstration on a radiograph of a fracture of the nasal bone will not affect management.) This represents a relatively high false-positive prediction rate of an x-ray abnormality, usually a fracture. When the consultant considered an x-ray abnormality to be likely he was correct in 78% of cases, and in 70% the abnormality was clinically significant.

Secondly, a third of all requests were made because an x-ray abnormality was thought possible. This large percentage of

requests again suggests that casualty officers had difficulty in determining on clinical grounds alone whether there was a fracture or other abnormality.

Thirdly, a further third of all requests were made to reassure the patient. If the casualty officers were thus using radiographs as an addition to verbal reassurance this would appear to be a disturbing practice which, on the face of it, should be discouraged. But there are cases when radiographs play a valid part in reassurance. For example, a manual worker who has injured the tuft of his terminal phalanx will be reassured that a fracture has not been shown on the x-ray film, even though its demonstration would not have affected clinical management. The casualty consultant, however, made only half as many requests for patient reassurance as did the juniors. This is to be expected in that an experienced general surgeon will be more confident in both his clinical expertise and in his ability to reassure patients without the aid of radiographs. Some requests made for patient reassurance by the juniors may in fact have been an expression of clinical doubt about whether an injury was or was not present. Nevertheless, even if the number of x-ray examinations requested by the consultant for patient reassurance is taken as being the more accurate, this remains surprisingly high at 18% of all requests.

The yield of positive radiographic findings was low among patients whose radiographs had been requested to reassure them or for medicolegal reasons. Nevertheless, it is disturbing that 6% of cases referred for reassurance and 8% referred solely for medicolegal reasons by the junior casualty officers had clinically significant x-ray abnormalities.

Our results suggest that junior casualty officers in particular

have difficulty in determining by clinical examination alone whether a significant abnormality, usually a fracture, is or is not present. The current level of x-ray referral, often regarded as being excessive,^{2,4} may well be appropriate and commensurate with the level of clinical knowledge, confidence, and experience of the casualty officers. Nevertheless, there are areas in which the number of films per examination can be reduced⁵ (see accompanying paper below) and others where clinical guidelines on the likelihood of a significant radiographic finding have been suggested.⁶⁻⁸ Until such measures are accepted and put into practice and until clinical experience and acumen are improved, an appreciable reduction in the number of x-ray referrals in accident and emergency departments is unlikely.

We thank Dr John Williams and the clerical staff in the x-ray department at St George's Hospital, SW1; Dr Frank Vajda for his help with the manuscript; and Christine Chamberlain for typing.

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(Accepted 4 April 1979)

Rationalising requests for x-ray examination of acute ankle injuries

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British Medical Journal, 1979, **1**, 1597-1598

Summary and conclusions

Radiographs of injured ankles represent about 1 in 50 of all radiological examinations. The notes and radiographs of 100 patients with ankle injuries were reviewed, and the films of a further 93 patients who had ankle fractures treated by immobilisation were also scrutinised to assess the presence or absence of soft tissue swelling over the malleoli. Any accompanying radiographs of the foot requested at the same time were also studied. In 65 of the 100 cases of ankle injury there was no soft tissue swelling, and none of the patients had a major fracture, while 92 of the 93 patients with a major fracture had soft tissue swelling at the level of the malleoli. In 32 of the 100 cases of ankle injury foot radiographs had also been requested, but only three foot injuries were found.

If the simple maxim of "No swelling adjacent to a malleolus, no radiographs" were applied radiography of twisted ankles could be reduced by as much as two-thirds. Moreover, if this maxim included the rider "and no routine foot films" the total casualty radiographic work load could be reduced by 8%.

Introduction

Ankle radiographs represented 10% of examinations requested from the casualty department at St George's Hospital, London SW1 in 1975. In 1960 Garfield¹ suggested that if there is no soft tissue swelling after an ankle injury then a radiograph is not clinically useful. We wanted to determine the number of patients attending the casualty department who underwent ankle radiography without having soft tissue swelling adjacent to either malleolus. We also assessed the number of patients with ankle injuries who also had foot films requested.

Patients and methods

The x-ray films, casualty cards, and, when applicable, the notes of 100 consecutive patients who attended the accident department at St George's Hospital during 1975 and were referred for radiography of the ankle were reviewed retrospectively. All injuries were sustained while falling downstairs, walking, or running. No distinction was made

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