PRACTICE OBSERVED

Practice Research

Laboratory and radiological investigations in general practice

IV—Results of radiological investigations

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Introduction

In the previous three papers of this study (8 October, p 1033; 15 October, p 1111; 22 October, p 1188) we considered laboratory tests and x-ray examinations together under the one heading "investigations." We thought, however, that it was worth while including a section concerned only with the use of radiological investigations to determine how this relatively newly acquired open access facility was being used by our sample of general practitioners in Belfast.

Access to chest x-ray examinations has been available for over a decade, contrast media studies since the mid 1970s, but skeletal x-ray facilities for only the past two years. At that rate, then, are investigations being requested, and does this vary for the different types of x-ray examinations? How does the rate of usage vary among general practitioners and among practices, and to what extent do radiological investigations fulfil the general practitioners' expectations of them?

Method

The method of data collection was described (8 October, p 1033). Slight modifications were necessary to measure the general practitioners' expectations and the results of radiological investigations. All x-ray films (except chest x-ray films taken at the local clinic), are ordered

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on a standard hospital request form. The general practitioner may give details of history, signs and symptoms, and the reason for requesting the particular examination. The form is taken to the x-ray department by the patient, who is either examined immediately or given an appointment. Requests for chest x-ray examinations to be done at the local clinic are made on forms issued by the clinic and posted direct to the clinic by the general practitioner.

The results of hospital x-ray examinations—the film, original request form, and consultant's typed appraisal—are returned to the general practitioner. For chest x-ray examinations the original form with results and comments added is returned. In both cases we were able to add our "results" rubber stamp to the request forms before use and the general practitioners agreed to fill it in when the forms were returned with results. This still left the problem of obtaining a measure of the general practitioners' expectation for the x-ray request—that is, normal/exclude disease or abnormal/to confirm a diagnosis. The results of the pilot study showed that the general practitioners were reticent about stating their expectations on the hospital or clinic request forms. It seemed unlikely that asking general practitioners to fill in a separate request form for us at the same time as filling in one for the hospital would help compliance. The only alternative was to ask the general practitioners to indicate when ringing the results stamp whether the result was the one they had been expecting or not and whether, if they had hoped to exclude disease, it had been specific or non-specific disease. Though such retrospective rating of expectation may be a less accurate measure of the general practitioners' expectation at the time of requesting an x-ray examination than the prospective method used for the laboratory tests, it was the only feasible way to achieve a measure of expectation.

Results

TYPES OF RADIOLOGICAL INVESTIGATION REQUESTED

We classified all x-ray examinations requested as skeletal (including the skull), contrast media (including intravenous pyelograms, chest excluding routine and pre-employment x-ray films), or others (this

each practice the percentage of radiological requests that gave the result the general practitioner most expected (that is, included cases where a suspected abnormality was confirmed and cases where the general practitioner was expecting a normal result to exclude disease). There was no statistically significant difference among the practices. To see in detail to what extent x-ray examinations requested fulfilled the general practitioners' expectations we compared expectation with outcome for every x-ray examination requested by each practice. There were six possible combinations of expectation—to exclude specific disease, to exclude non-specific disease, or to confirm diagnosis—and outcome—normal or abnormal. For each combination the number of x-ray examinations that fell into each of these combinations is shown in table V. For all four practices most x-ray examinations

TABLE V—Expectation and outcome (figures in parentheses are percentages)

Results	A	B	C	D	Total
Excluded specific disease*	99 (60)	25 (19)	144 (31)	151 (41)	399 (35)
Excluded non-specific disease*	55 (32)	55 (42)	143 (31)	81 (22)	334 (30)
Confirmed diagnosis*	25 (14)	27 (21)	96 (23)	75 (20)	223 (20)
Failed to exclude specific disease†	7 (4)	3 (2)	12 (3)	16 (4)	38 (3)
Failed to exclude non-specific disease†	8 (5)	7 (5)	16 (4)	11 (3)	42 (4)
Failed to confirm diagnosis†	10 (6)	15 (11)	22 (5)	31 (8)	80 (7)
Total	174	132	435	369	1110

* $p < 0.001$, $p < 0.001$.† $p < 0.001$, $p < 0.001$.‡ $p < 0.001$, $p < 0.001$.§ $p < 0.001$, $p < 0.001$.|| $p < 0.001$, $p < 0.001$.¶ $p < 0.001$, $p < 0.001$.||| $p < 0.001$, $p < 0.001$.|||| $p < 0.001$, $p < 0.001$.||||| $p < 0.001$, $p < 0.001$.|||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.

included a few straight abdominal and sinus x-ray examinations). Table I gives the numbers in each category requested by each practice and what percentage they represented of all the x-ray examinations requested by that practice. If the total for all the practices is considered, skeletal x-ray films were the most frequently requested, followed by chest and contrast media examinations. The same sequence held true for all the practices except B, which showed a noticeably higher use of chest x-ray examinations than the other three practices, with a percentage usage over three times that for its skeletal x-ray examinations. There was also a pronounced statistically significant difference among the practices in terms of the percentage usage of each type of x-ray examination.

TABLE I—Type of x-ray examination requested

	A	B	C	D	Total
No. of requests	174	132	435	369	1110
Skeletal*	107 (61)	29 (22)	149 (34)	151 (41)	537 (48)
Contrast†	18 (10)	15 (11)	82 (19)	87 (24)	202 (18)
Chest‡	54 (31)	86 (65)	151 (35)	108 (29)	400 (36)
Others§	7 (4)	2 (2)	6 (1)	9 (2)	24 (2)

* $p < 0.001$, $p < 0.001$.† $p < 0.001$, $p < 0.001$.‡ $p < 0.001$, $p < 0.001$.§ $p < 0.001$, $p < 0.001$.

RATE OF REQUESTS

Table II shows the total number of x-ray examinations requested of all types by individual general practitioners and practices. To allow fair comparison among general practitioners or practices we expressed the number of x-ray examinations requested as per 1000 surgery encounters. To compare with other studies we have also expressed them as per 1000 registered patients.

TABLE II—Rate at which radiological investigations were requested by practice and by general practitioner

Practice	No. of surgery encounters	No. of x-ray examinations requested in study year	No. per 1000 registered patients	No. per 1000 encounters
A	9,822	174	18	18
B	12,166	132	11	11
C	28,712	435	15	15
D	24,344	369	15	15
Total	62,938	1110	18	18

* $p < 0.001$, $p < 0.001$.† $p < 0.001$, $p < 0.001$.‡ $p < 0.001$, $p < 0.001$.§ $p < 0.001$, $p < 0.001$.|| $p < 0.001$, $p < 0.001$.||| $p < 0.001$, $p < 0.001$.|||| $p < 0.001$, $p < 0.001$.||||| $p < 0.001$, $p < 0.001$.|||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.||||||| $p < 0.001$, $p < 0.001$.