

## **Unrestricted access by general practitioners to a department of diagnostic radiology**

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**A**LTHOUGH some aspects of the service are available to most general practitioners, only a minority have direct access to the complete range of diagnostic radiology. In 1968, the Welsh National School of Medicine established a General Practice Unit within the Department of Social and Occupational Medicine with the objectives of providing undergraduates with teaching of primary and continuing medical care outside the teaching hospital and of undertaking research.

The medical staff of the unit have had unrestricted use of all the services provided by the department of radiology. This report describes the use during a period of three and a half years. The implications of a general application of open access by general practitioners to departments of diagnostic radiology are discussed.

### *The General Practice Unit*

The unit is accommodated in a new Section 21 health centre approximately two miles from the department of diagnostic radiology in the teaching hospital. The staff of the unit, in contract with the Cardiff executive council, provide general medical services for the population of a new housing estate. Patients registered with the unit, and thus the population at risk, have increased rapidly during the period of study. Figure 1 shows that the distribution of the population is very different from that of the normal. There is a preponderance of very young persons, 45 per cent being under the age of 15 years.

The medical staff of the unit has been expanded as the population registered has grown. During the period of the study three senior medical staff and four trainee assistant general practitioners were working and undertook approximately equivalent amounts of clinical work.

### **Method**

All referrals from the unit are routinely noted as part of the record system (Wallace and Davis, 1970). A list of those patients who had had an x-ray examination between 1 July, 1968 and 31 December, 1971 was obtained from the computer file. The records of these patients were then examined to extract the following data:

1. Date of x-ray.
2. Type of x-ray.
3. Name of the doctor requesting the x-ray.
4. Reason for the request.
5. Clinical diagnosis.
6. Radiological opinion.

### Results

The number of radiological examinations requested and performed in the three and a half years was 467; 293 people (67.2 per cent) had a single examination; 127 (27.1 per cent) had two; and 47 (10.2 per cent) had three separate examinations.

In the first 18 months the referral rate was very much higher than in the succeeding two years, during which a reasonably steady rate was maintained (Table 1).

TABLE 1  
NUMBER OF X-RAY EXAMINATIONS PERFORMED WITH THE RATE PER ANNUM PER 1000 POPULATION AT RISK IN THE THREE-MONTHLY PERIODS STATED

<i>Period of time</i>	<i>Number of x-ray examinations performed</i>	<i>Rate per 1000 population per annum</i>
1.7.68 -30.9.68	3	120
1.10.68-31.12.68	8	104
1.1.69 -31.3.69	19	140
1.4.69 -30.6.69 ]	17	84
1.7.69 -30.9.69 }	22	84
1.10.69-31.12.69	19	56
1.1.70 -31.3.70	24	56
1.4.70 -30.6.70	34	64
1.7.70 -30.9.70	32	48
1.10.70-31.12.70	58	72
1.1.71 -31.3.71	64	68
1.4.71 -30.6.71	52	48
1.7.71 -30.9.71	52	48
1.10.71-31.12.71	63	56
	Total 467	

Seven different doctors were responsible for 459 of the radiological requests. The average yearly request rate for each of these doctors ranged from 52 to 25 per annum (Table 2). Doctors one to three were all experienced general practitioners and show a similar pattern of referral. Doctors four to seven were trainee-assistant practitioners who each spent a year in the unit. The pattern of referral of these doctors was variable although each had had approximately the same length of hospital experience since qualification.

TABLE 2  
THE YEARLY REQUEST RATE FOR RADIOLOGICAL EXAMINATIONS OF SEVEN DOCTORS

<i>Doctor</i>	<i>Number of examinations requested per year</i>
One	52
Two	41
Three	49
Four	55
Five	25
Six	29
Seven	38

About half of all the examinations that were performed were of the chest (Table 3). Examinations involving contrast media accounted for 18.5 per cent of the total. The majority of the requests for examination of bones were to exclude fractures. The examinations included under 'other' were mammography (four), sinuses (nine), soft tissue

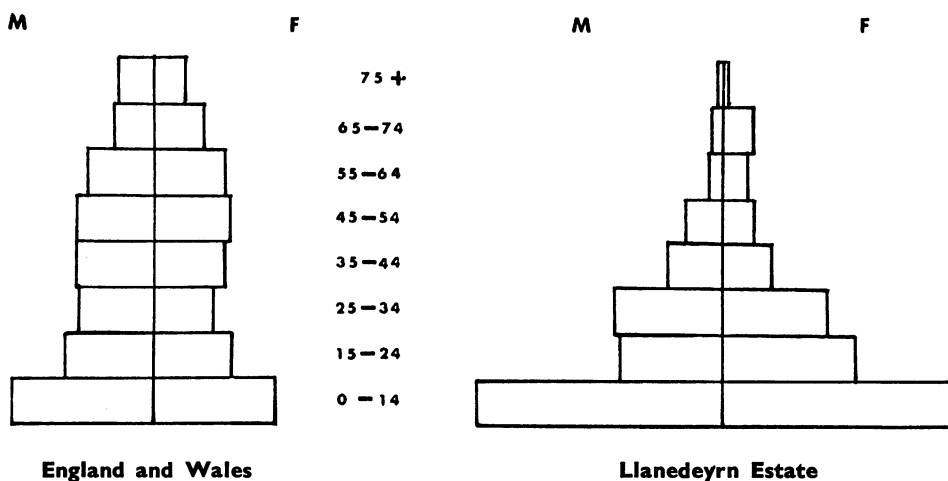


Figure 1.

The age-sex distribution of the population of the Llanedeyrn estate compared with that for England and Wales.

x-ray of buttock (one), barium swallow (one). The incidence of requests for barium-meal examinations was 3.5 per 1,000 population during the final 12 months of the period under review.

TABLE 3

NUMBER OF RADIOLOGICAL EXAMINATIONS OF THE TYPE SPECIFIED WHICH WERE PERFORMED OVER A PERIOD OF THREE AND A HALF YEARS EXPRESSED AS A PERCENTAGE OF THE TOTAL

<i>Type of x-ray</i>	<i>Examinations performed</i>	<i>Percentage of total</i>
Chest	237	50.5
Bones	55	12.7
Back	53	11.3
IVP	38	8.1
Barium meal	28	5.9
Cholecystogram	15	3.1
Barium enema	7	1.4
Skull	3	0.5
Other	31	6.5
TOTAL:	467	100.0

Approximately one third of all the examinations performed showed abnormal radiological appearances (Table 4). The proportion ranged from 64.3 per cent in the case of barium-meal examinations to nil in the case of examinations of the skull.

The request forms were analysed to determine why the examination had been requested (Table 5). With the exception of 'other', those types of examination which revealed a high incidence of abnormal findings (cholecystogram, barium meal and back,

TABLE 4  
TYPES OF RADIOLOGICAL EXAMINATIONS SHOWING THE NUMBER REVEALING ABNORMAL FINDINGS

	<i>Type of x-ray</i>									
	<i>Chest</i>	<i>Bones</i>	<i>Back</i>	<i>IVP</i>	<i>Barium meal</i>	<i>Cholecystogram</i>	<i>Barium enema</i>	<i>Skull</i>	<i>Other</i>	<i>Total</i>
Examinations performed	237	55	53	38	28	15	7	3	31	467
Abnormal x-ray findings	71	13	27	14	18	9	2	—	18	171
Percentage	30.0	23.8	50.9	36.8	64.3	60.0	28.6	0.0	59.5	36.8

TABLE 5  
NUMBER OF RADIOLOGICAL EXAMINATIONS OF EACH TYPE ACCORDING TO REASON FOR THE REQUEST

<i>Reason for x-ray</i>	<i>Type of x-ray</i>									
	<i>Chest</i>	<i>Bones</i>	<i>Back</i>	<i>IVP</i>	<i>Barium meal</i>	<i>Cholecystogram</i>	<i>Barium enema</i>	<i>Skull</i>	<i>Other</i>	<i>Total</i>
Screening	6	—	—	—	—	—	—	—	—	6
Disease suspected	71	23	47	28	28	15	6	1	20	239
To confirm clearing of disease	39	1	—	1	—	—	—	—	—	41
To exclude disease	121	31	6	9	—	—	1	2	11	181
TOTAL:	237	55	53	38	28	15	7	3	31	467

TABLE 6  
NUMBER OF X-RAYS OF EACH TYPE IN WHICH DISEASE WAS SUSPECTED, BY RADIOLOGICAL DIAGNOSIS

<i>X-ray diagnosis</i>	<i>Type of x-ray (disease suspected only)</i>									
	<i>Chest</i>	<i>Bones</i>	<i>Back</i>	<i>IVP</i>	<i>Barium meal</i>	<i>Cholecystogram</i>	<i>Barium enema</i>	<i>Skull</i>	<i>Other</i>	<i>Total</i>
1. Same as clinical diagnosis	50	11	25	8	15	9	—	—	15	133
2. Other diagnosis	4	2	2	6	3	—	2	—	1	20
3. No abnormality	17	10	20	14	10	6	4	1	4	86
TOTAL	71	23	47	28	28	15	6	1	20	239
4. Line 1 as percentage of total	70.4	46.7	53.6	28.2	53.6	60	—	—	80	55.6

Table 4), were requested because some specific disease was suspected. In contrast, with the exception of barium-enema examinations, those types of examination which revealed a lower incidence of abnormal findings (chest, IVP, skull and bones, Table 4), were requested most often in order to confirm clearing of disease or to exclude disease.

In 239 (55.6 per cent) of all the requests for examination, a precise clinical diagnosis had been made on the request form. In rather more than half the cases the radiological diagnosis was the same as the clinical diagnosis (Table 6). The clinical diagnosis agreed with the radiological diagnosis in approximately two thirds of all chest and 'other' examinations; in approximately half of the barium meal and cholecystogram, back and bone examinations and in approximately one third of all IVPs. There was a notable lack of agreement between the clinical and radiological diagnosis in barium enema and skull examinations.

### Discussion

It has been generally accepted that general practitioners should have direct access to departments of diagnostic radiology. The implementation of this policy has, however, been fraught with difficulties. Most departments of diagnostic radiology find it difficult to satisfy the ever increasing demands of the hospital service, not only because of the cost of equipment but because of a shortage of radiologists and radiographers.

It is consequently important for future planning to know what the probable demand would be if open access were to be made available to all general practitioners.

Before extrapolating from the data presented here, it is important to determine how representative the data are of general practice as a whole.

#### *Population*

The population at risk in this study was atypical. It included a preponderance of children who are not likely to need radiological examination as often as adults. To this extent, therefore, the data presented here would underestimate the demand for radiological examination.

#### *Differences in referral rate amongst doctors*

Differences in referral rate exist between doctors both to outpatients, diagnostic radiology and pathology. For example, higher than expected referral rates have been noted for doctors in a group practice who have a special interest in a particular subject (Evans and McBride, 1968).

The rate of referral for radiological examination was higher among the more experienced doctors in this study compared with that of three of the four trainee assistant general practitioners. This difference is surprising because no corresponding difference existed between the referral rates to hospital outpatient departments of the two groups of doctors. Backett *et al.* (1966) noted that a high use of laboratory and diagnostic-radiological services was associated with a high referral rate to hospital outpatient departments amongst doctors in the North-east of Scotland, and Morrell *et al.* (1971) confirmed this finding among the doctors in a group practice in London.

The differences in the rate of referral between the more experienced and the less experienced doctors that we have found contrast also with the inverse relationship between the length of time since a doctor had qualified and his referral rates both for diagnostic radiology (Davis and Williams, 1968) and for laboratory investigations (Hitchens and Lowe, 1966). The difference in the referral rates for diagnostic radiology between experienced general practitioners and trainee assistants merits further study. It is, however, doubtful whether the inter-doctor differences in referral found here will seriously under or over-estimate the overall referral rate since other studies have shown a similar range of use (Davis and Williams, 1968; Anderson, 1968).

#### *The overall referral rate*

The overall referral rate during the last year of the present study was 55 per 1,000

population per annum. Wright (1968) found that 77 general practitioners in the South-west of England referred 88 per 1,000 patients for diagnostic radiology. Eimerl (1962) estimated that approximately 50 patients per 1,000 would be referred. The difference between the referral rate found in this study and that found by Wright might be accounted for by the peculiar age structure of the practice population of the General Practice Unit to which we have already referred.

#### *Different types of x-ray*

The frequency with which the various types of radiological examination were requested in this study broadly follows the same pattern as that found by other workers (Darbi-shire House Health Centre, 1962; Medical Care Research Unit, 1962; Fry *et al.*, 1964; Cook, 1966; Anderson, 1968).

#### *Barium-meal requests*

The analysis of the requests for this type of examination provides data which can be compared with those obtained from a study of the x-ray unit which has provided facilities for barium meal and cholecystogram examinations for general practitioners in Cardiff since 1964 (Davis and Williams, 1968).

The overall request rate by general practitioners who used the service in Cardiff was 3.8 per 1,000 practice population (range 1.3 to 6.2) compared with 3.5 per 1,000 in the last year of the present study. The difference in the age structure of the population in this study would lead one to expect a lower request rate than that found for all Cardiff practitioners. The figures for all Cardiff practitioners did not, however, include about 23 per cent who made no use of the facilities provided, whereas all the doctors in the present study used these services.

#### *Planning future diagnostic radiology facilities*

We have compared the data derived from this study with those of other observers. Judged by a variety of criteria, the referral rate for diagnostic radiology within the unit would not appear to differ greatly from that of general practitioners as a whole. It thus seems justifiable to extrapolate from the data available to determine what would be the likely load for a department of radiology providing open-access facilities for general practitioners. Using the data in column 2 of Table 3 and applying these figures to the mean population of the General Practice Unit for the final year of the study, the number of examinations performed by a department of diagnostic radiology for general practitioners per thousand population per annum would be:

Chest	126
Bones	29
Back	28
IVP	20
Barium meal	15
Cholecystogram	8
Barium enema	4
Skull	2
Other	17
	<hr/>
Total	249
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The 249 examinations would involve 199 people of whom 157 would have a single examination, 39 people would have two, and eight people would have three examinations.

If one looks at these figures in relation to an average general practice of 2,500 persons, it means that about eight per cent of the persons would be x-rayed annually.

Assuming a consultation rate of five per patient per annum, this means that approximately 16 patients will be referred for radiological investigation out of every 1,000 consultations.

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Single room .. .. .	£3 per night
Double room .. .. .	£5 per night
Flatlet (Bed-sitting room for two, bathroom and dressing room) .. .. .	£7 per night, or £40 per week
Self-contained flat (Double bedroom, sitting room, kitchen and bathroom) .. .. .	£8 per night, or £45 per week

Members are reminded that children under the age of 12 years cannot be admitted, and dogs are not allowed.

Members and associates may, subject to approval, hire the reception rooms for meetings and social functions. The charges for these are:

Long room (will seat 100) .. .. .	£30 for each occasion
Damask room (will seat 50) .. .. .	£20 for each occasion
Common room and terrace .. .. .	£20 for each occasion
Dining room and kitchen .. .. .	£10 for each occasion

A service charge of ten per cent is added to all accounts to cover gratuities to domestic staff.

For the convenience of members, four car-ports, outside 14 Princes Gate, have been rented by the College and may be hired at 50p per 24 hours.

Enquiries should be addressed to **The Royal College of General Practitioners, 14 Princes Gate, Hyde Park, London, SW7 IPU.** (Tel: 01-584-6262). Whenever possible bookings should be made well in advance.