

Chest Radiography: General Practitioners' Compliance with Recommendations

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How to cite this paper: Some, M.J.M., Tankoano, A.I., Ouedraogo, P.A., Kindo, B., Ouedraogo, N.-A. and Harchaoui, M.A. (2024) Chest Radiography: General Practitioners' Compliance with Recommendations. *Open Journal of Medical Imaging*, 14, 56-63.

<https://doi.org/10.4236/ojmi.2024.142005>

Received: March 24, 2024

Accepted: May 7, 2024

Published: May 10, 2024

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Abstract

Introduction: Chest radiography is the most frequently prescribed imaging test in general practice in France. We aimed to assess the extent to which general practitioners follow the recommendations of the French National Authority for Health in prescribing chest radiography. **Methodology:** We conducted a retrospective analysis study, in two radiology centers belonging to the same group in Saint-Omer and Aire-sur-la-Lys, of requests for chest radiography sent by general practitioners over the winter period between December 22, 2013, and March 21, 2014, for patients aged over 18 years. **Results:** One hundred and seventy-seven requests for chest X-rays were analyzed, 71.75% of which complied with recommendations. The most frequent reason was the search for bronchopulmonary infection, accounting for 70.08% of prescriptions, followed by 11.2% for requests to rule out pulmonary neoplasia, whereas the latter reason did not comply with recommendations. Chest X-rays contributed to a positive diagnosis in 28.81% of cases. The positive diagnosis was given by 36.22% of the recommended chest X-rays, versus 10% for those not recommended. **Conclusion:** In most cases, general practitioners follow HAS recommendations for prescribing chest X-rays. Non-recommended chest X-rays do not appear to make a major contribution to diagnosis or patient management, confirming the value of following the recommendations of the French National Authority for Health.

Keywords

Chest X-Ray, Recommendations, General Practitioners, Prescription

1. Introduction

Chest radiography remains the most frequently performed imaging test, despite the increasing development and sophistication of computed tomography (CT) and magnetic resonance imaging (MRI) scans. Since it provides numerous elements contributing to the diagnosis, it remains the first-line complementary examination for thoracic exploration. In terms of availability, it is also the most accessible imaging test for clinical practitioners. In France, 74.6 million diagnostic procedures using ionizing radiation were carried out in 2007, at an average effective dose per inhabitant equal to 1.3 mSV. Among imaging procedures, 13,999,080, or 29.8%, involved chest radiography (CR) [1]. In private practice, of the 10 million procedures prescribed per year, chest X-rays alone account for more than 4.4 million procedures prescribed in the city [2]. To limit costs and avoid unnecessary irradiation, the French National Authority for Health (HAS) has issued recommendations on the indications for prescribing medical imaging [3] as well as a summary of non-indications for chest radiography [4].

To the best of our knowledge, no studies have been carried out in France to assess whether general practitioners (GPs) follow the recommendations when prescribing chest radiography in general practice. However, studies have been carried out to assess, among other things, whether recommendations are followed when prescribing CR on admission to the emergency department [5] the contribution of routine CR to patient management [6], and the relationship between the quality of the clinical examination and chest radiography [7]. The present study aims to assess how well general practitioners in Saint-Omer and Aire-Sur-La-Lys follow HAS recommendations.

2. Materials and Methods

2.1. Study Design, Period and Setting

This study was conducted in France at two radiology centers, belonging to the same group, located at 25 Boulevard Foch in Aire-Sur-la-Lys (62120) and 116 Boulevard de Strasbourg in Saint-Omer (62500), from December 22, 2013, to March 21, 2014.

2.2. The Study Population, Inclusion Criteria and Non-Inclusion Criteria

The location and size of these facilities enabled a large recruitment of patients from a varied population representative of a catchment area of over 80,000 inhabitants. This was a retrospective, quantitative study including all patients aged over 18, referred by a general practitioner for CR at the Saint-Omer and Aire-Sur-La-Lys radiography centers. Patients aged under 18, those referred by a doctor other than a GP, and costal grills were excluded from the study.

2.3. Data Collection and Analysis

Data were initially collected (with due respect for anonymity and confidentiality)

by sending a letter explaining the study and a questionnaire to GPs who had requested CR during the study period. These data were then entered into a Microsoft™ Excel software spreadsheet. For each patient, 9 items were entered:

- The sex,
- Age,
- Indication for radiography,
- X-ray recommended,
- X-ray not recommended,
- Contribution to net income,
- Non-contributory income,
- Patient reassured,
- Patient referred to a specialist.

In the third stage, results were grouped according to responses to the questionnaire by recommended radiographs (in line with HAS recommendations) and non-recommended radiographs. We performed a descriptive analysis of the variables collected in the form of proportions.

3. Results

The study involved 560 chest X-rays taken during the study period, 77.14% of which were requested by GPs. It involved the participation of 98 GPs, to whom a letter with questionnaires was sent. A response was received from 182 patients (42.12%). Due to incomplete data, five (5) questionnaires were excluded.

The 177 patients included in the study comprised 92 men (51.98%) and 85 women (48.02%). The mean age of patients was 54.35 years. For men, it was 52.88 and 55.94 for women.

CR requests have been classified according to the reasons for appeal in **Table 1**.

Of the CR requests, 71.75% complied with the recommendations, while 28.25%

Table 1. Chest radiography demand according to reasons for Chest radiography use.

	Frequency	Percentage (%)
Bronchopulmonary infections	114	64.41
Search for neoplasia	20	11.2
Trauma	9	5.08
Pneumothorax	8	4.52
Cardiovascular pathology	3	1.69
Tuberculosis container	8	4.52
Hemoptysis	4	2.26
Occupational illness	6	3.39
Other non-specific requests/complaints	5	2.82
Total	177	100

Table 2. Breakdown of chest radiography recommendations according to HAS.

	Recommended (R)	Not recommended (NR)
Bronchopulmonary infections	89	25
Search for neoplasia	0	20
Trauma	9	0
Pneumothorax	8	0
Cardiovascular pathology	3	0
Tuberculosis container	8	0
Hemoptysis	4	0
Occupational illness	6	0
Other non-specific requests/complaints	0	5
Total	127	50

did not. According to HAS guidelines, CR were classified in **Table 2** as recommended and non-recommended.

Among recommended CRs, 70.08% were for bronchopulmonary infection, 7.09% for chest trauma, 6.30% for suspected pneumothorax and tuberculosis, 4.72% for occupational disease, 3.15% for hemoptysis and 2.36% for cardiovascular pathology. For non-compliant CRs, the breakdown showed that 50% concerned broncho-respiratory infections, 40% neoplasia research and 10% miscellaneous requests.

Of the 114 CRs performed to check for bronchopulmonary infections, 89 complied with HAS recommendations. All radiographs to rule out neoplasia or for non-specific complaints were non-recommended. **Figure 1** shows the distribution of recommended and non-recommended CR according to symptoms.

The results of recommended and non-recommended CR have been grouped according to the positive contribution of the CR in **Table 3**. CRs that confirmed the diagnosis or revealed a new diagnosis were considered positive. The positive findings were 28.81%, *i.e.* 36.22% for recommended CRs and 10% for non-recommended CRs.

The **Table 4** shows the estimated impact of CR for recommended and non-recommended CR on patient management.

4. Discussion

As in all studies carried out in outpatient practices, the main reason for ordering a chest X-ray was to find a lung infection. In our study, the search for bronchopulmonary infection (64.41% of requests) was more important than in other studies, which could be explained by the fact that our study was carried out during the winter period, which is conducive to the development of respiratory infections [8] [9]. The search for bronchopulmonary infections remains an important reason for referral to CR in general practice, whereas, in an emergency

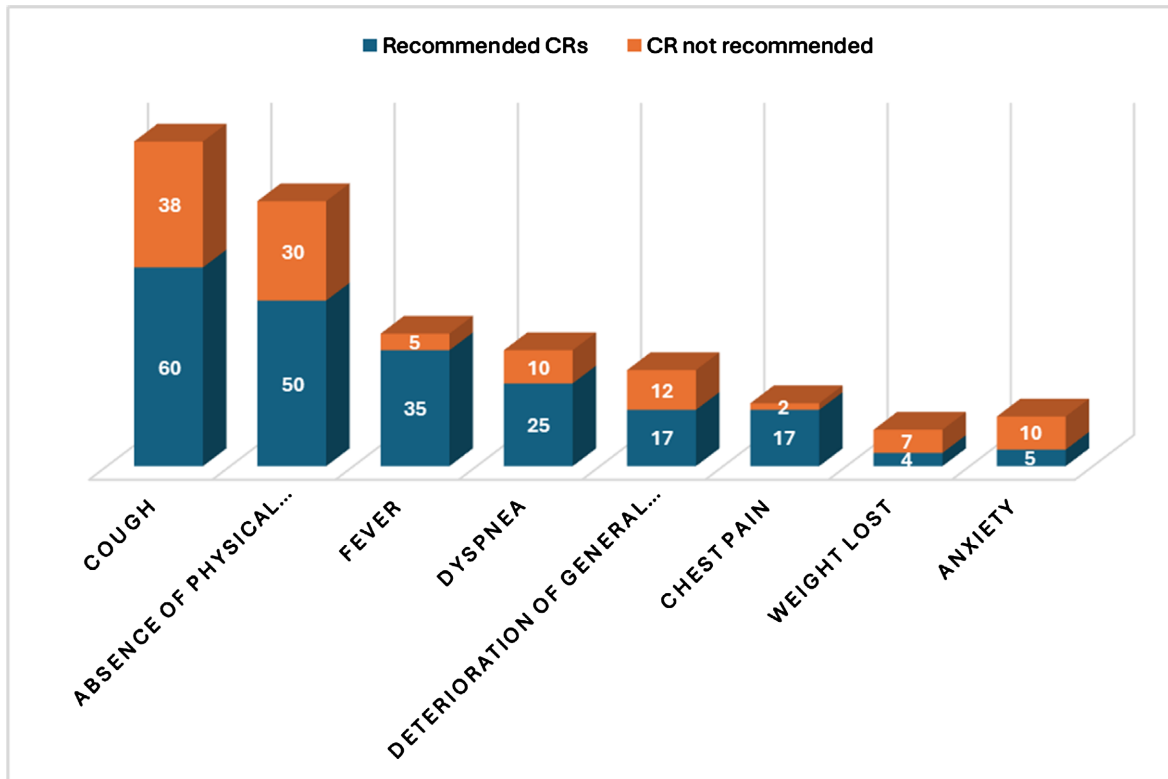


Figure 1. Distribution of recommended and non-recommended chest radiography according to symptoms.

Table 3. Contribution of chest radiography based on recommendations.

	Positive diagnosis	Positive diagnosis
	Recommended CRs	CR not recommended
	n	n
Bronchopulmonary infections	37	4
Search for neoplasia	0	0
Trauma	4	0
Pneumothorax	1	0
Cardiovascular pathology	1	0
Tuberculosis container	0	0
Hemoptysis	1	0
Occupational illness	2	0
Other non-specific requests/complaints	0	1
Total	46 (36.22%)	5 (10%)

department, it only comes in 2nd place behind emergency in multi-pathological patients over 75 and acute cardiopulmonary disorders [5] [10]. Similarly, for hospitalized patients having undergone routine CR, there is less demand for bronchopulmonary infections [6].

Prescriptions for tuberculosis represent 4.52% of requests, down from the

Table 4. Impact of chest radiography on management.

	Recommended CRs n (%)	CR not recommended n (%)
Result confirmation	39 (30.70)	3 (6.0)
New diagnosis found	7 (5.50)	2 (4.0)
Initiating or modifying treatment	20 (15.75)	3 (6.0)
Send to a specialist	14 (11.20)	3 (6.0)
Patient reassured	42 (33.07)	25 (50.0)

study carried out over 30 years ago by P. B. Guyer and A. G. Chalmers [8] probably related to the decline in tuberculosis cases [11].

Chest radiography in the setting of hemoptysis account for 2.26% of cases, a result lower than that of other studies [8]. This discrepancy may be because some patients are referred to the hospital for a full workup. Our study does not include the number of patients referred directly to an emergency admission department for CR at the same time as the rest of the workup.

In our study, compliance with recommendations was 71.75%. This result is comparable to that of studies carried out in hospitals [5] [10]. Some non-recommended prescriptions are still quite common, notably for the search for neoplasia (11.2%). Although this is the 2nd most important reason for resorting to CR, it remains lower than the 18% for suspicion of neoplasia in the study by AM Speets *et al.* [9]. It is difficult to assess the contribution and impact of CR in our study. However, we obtained 28.81% positive findings, as in W. J. MAIR's study, with 29.8% of abnormalities detected [12] and 30% for the study by B. B. Wallace [13]. Overall, we had 36.22% positive diagnoses for recommended CRs and 10% for non-recommended CRs.

In the case of non-recommended CR, few radiographs demonstrated useful results or improved management. This confirms the value of following the recommendations and is in line with S. Malnick's study, which shows that routine chest radiography has no major contribution to make [6]. The use of CT to reassure the patient could explain the failure to comply with the recommendations, especially as the notion of reassuring the patient appears more frequently for non-recommended CR (50%) than for recommended CR (33.22%).

5. Conclusion

What makes our study special is that it is the first of its kind to assess GPs' compliance with recommendations for prescribing CR in France. The majority of GPs follow HAS recommendations for prescribing CR. Most CR prescriptions concern the search for bronchopulmonary infections. It is in this group that the HAS recommendations are followed the most - 70.08% of recommended requests. Although not in line with HAS recommendations, the search for pulmonary neoplasia is the second most common reason for requests, accounting for

half of the non-recommended requests. Non-recommended CR does not appear to make a major contribution to diagnosis or to changing patient management, which confirms the value of following HAS recommendations. On the other hand, CR seems to play a role in reassuring the patient, which would explain the use of CR even outside HAS recommendations.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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