

# The value of chest X-ray in the Scottish Referral Guidelines for suspected head and neck cancer in 2144 patients

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## Abstract

**Objective:** In Scotland, patients with suspected head and neck cancer are referred on the basis of the Scottish Referral Guidelines for Suspected Cancer, rather than the National Institute for Health and Care Excellence guidelines. A chest X-ray should be requested by the general practitioner at the same time as referral for persistent hoarseness. The evidence for this is level 4.

**Methods:** This audit identified adherence to this recommendation and X-ray results. All ‘urgent suspicion of cancer’ referrals to the ENT department in the National Health Service Greater Glasgow and Clyde for 2015–2016 were audited.

**Results:** Persistent hoarseness for more than 3 weeks instigated referral in 318 patients (15.7 per cent). Chest X-ray was performed in 120 patients (38 per cent), which showed: no abnormality in 116 (96.7 per cent), features of infection in 2 (1.7 per cent) and something else in 2 patients (1.7 per cent). No chest X-ray altered the management of a patient.

**Conclusion:** Performance of chest X-ray does not alter management and its removal from the Scottish Referral Guidelines for Suspected Cancer is recommended.

**Key words:** Neoplasms; Head And Neck; Practice Guideline; Mass Chest X-Ray

## Introduction

The Scottish Referral Guidelines for Suspected Cancer (2014) were published to aid cancer detection in primary care.<sup>1</sup> They aim to facilitate patients with suspected cancer being seen by an appropriate specialist within two weeks, as stipulated by the National Health Service (NHS) cancer plan.

Despite referral guidelines, cancer detection rates are poor, and published rates of head and neck cancer detected via urgent referral remain at around 11 per cent.<sup>2</sup> The majority of head and neck cancers are detected via more routine routes.<sup>2</sup>

The Scottish Referral Guidelines state that an urgent chest X-ray is required for patients with persistent hoarseness for more than three weeks. This recommendation was only added to the most recent set of guidelines, and its inclusion is based upon level 4 or grade D evidence.<sup>1</sup>

This audit aimed to assess referral adherence to the Scottish Referral Guidelines and examine the role of chest X-ray in persistent hoarseness. Chest X-ray results were audited to highlight their pertinence to on-going patient management.

## Materials and methods

### *Ethical considerations*

This is an audit of clinical practice and formal ethical approval was not required.

### *Settings, participants and design*

A total of 2144 consecutive ‘urgent suspicion of cancer’ referrals to the ENT department in the NHS Greater Glasgow and Clyde between June 2015 and May 2016 were audited. The audit included 1998 patients. A total of 146 patients were excluded because of non-attendance at out-patient appointments ( $n = 144$ ) or results not being available during data collection ( $n = 2$ ). This gave 1998 referrals for analysis.

Patient demographics, reason for referral, durations of symptom(s) and final diagnosis data were collected from: general practitioners’ referral letters regarding urgent suspicion of cancer, out-patient clinic and multi-disciplinary meeting letters, and pathology and radiology reports.

### Statistical analysis

Data are presented as means (ranges) for continuous variables and as percentages for categorical variables. SPSS version 20 (2011) statistical software (IBM, Armonk, New York, USA) was used to analyse the dataset.

## Results

### Demographics

Of the referrals, 56.6 per cent were female. The mean age of patients was 59.8 years (range, 12–99 years). Regarding patients' smoking status, 674 (33.7 per cent) had never smoked, 642 (32.1 per cent) were current smokers and 670 (33.5 per cent) were ex-smokers. Regarding patients' alcohol status, 672 (33.6 per cent) had never consumed alcohol, 1066 (53.4 per cent) were current drinkers (with 802 (40.1 per cent) drinking less than the recommended level and 264 (13.2 per cent) drinking more than the recommended level) and 73 (3.7 per cent) used to consume alcohol at more than the recommended level. Smoking and alcohol status data were missing for 12 (0.7 per cent) and 187 patients (9.3 per cent) respectively.

### Scottish Referral Guideline compliance

A total of 1100 referrals (55.1 per cent) were made in compliance with the Scottish Referral Guidelines. Of these patients, 207 (18.8 per cent) had cancer.

The most common referral reason was hoarseness, persistent or intermittent, in 644 patients (32.1 per cent), followed by a neck lump in 620 patients (31.1 per cent) (Table I). There were 313 patients (15.7 per cent) with persistent hoarseness for more than 3 weeks, compliant with Scottish Referral Guidelines.

Of the patients, 90.2 per cent presented with only one symptom. The remaining 9.8 per cent presented with multiple symptoms (between two and five). The

numbers of cancer diagnoses for each symptom compliant with the Scottish Referral Guidelines are shown in Table II.

### Cancer detection rate

The overall cancer detection rate from all referrals was 11.60 per cent ( $n = 232$ ), while the detection rate of primary head and neck cancer was 8.6 per cent ( $n = 171$ ). The rate of cancer diagnosis from compliant Scottish Referral Guidelines referrals was 18.8 per cent.

### Cancer diagnoses

The most frequent type of head and neck cancer diagnosed was laryngeal cancer ( $n = 50$ , 22 per cent), followed by oropharyngeal cancer ( $n = 46$ , 20 per cent). Following these, lymphoma was the most common cancer diagnosis ( $n = 36$ , 16 per cent) (Table III).

### Chest X-rays

A total of 120 (38.3 per cent) out of 313 patients with persistent hoarseness for more than 3 weeks had chest X-rays requested. Of these, 116 (96.7 per cent) were normal, 2 (1.7 per cent) had evidence of infection and 1 (0.8 per cent) showed another finding (cervical rib). One chest X-ray (0.8 per cent) identified a lesion consistent with malignancy in a patient with vocal fold palsy. This patient also underwent computed tomography (CT) of the neck and thorax.

## Discussion

### Key findings

A total of 1100 referrals (55.1 per cent) were adherent to the Scottish Referral Guidelines. Of these patients, 151 (13.7 per cent) were diagnosed with primary head and neck cancer, and the overall cancer diagnosis rate was 18.8 per cent ( $n = 207$ ). Including the non-compliant referrals, the total cancer detection rate was 11.6 per cent, and the primary head and neck cancer diagnosis rate was 8.6 per cent.

The most common reasons for referral were hoarseness ( $n = 644$ , 32.1 per cent) and neck lump ( $n = 620$ , 31.1 per cent). Of the patients, 313 (15.7 per cent) were referred with persistent hoarseness lasting more than 3 weeks, and 120 (38.3 per cent) of these had a chest X-ray requested. One (0.8 per cent) of these chest X-rays suggested malignancy, but this did not affect patient management.

### Guideline adherence

The guideline adherence rate in this large series was 55.1 per cent, which is lower than other published series by Tikka *et al.*<sup>2</sup> (66.3 per cent adherence) and McKie *et al.*<sup>3</sup> (71.5 per cent adherence). This is the largest Scottish audit of head and neck cancer referral.

The decision to refer within the two-week wait period is multifaceted, and is influenced by pressure from patients, increasing waiting times for non-urgent appointments and the late diagnosis of cancers being

TABLE I  
REFERRALS AND CANCER DIAGNOSES FOR EACH PRESENTING SYMPTOM\*

Symptom	Patients ( <i>n</i> (%))	Cancer diagnoses ( <i>n</i> (%))
Neck lump	620 (31.1)	143 (61.6)
Persistent hoarseness	318 (15.9)	74 (31.9)
Persistent dysphagia	158 (7.9)	33 (14.2)
Globus	264 (13.2)	12 (5.2)
Persistent sore throat	96 (4.8)	22 (9.5)
Intermittent hoarseness	326 (16.3)	5 (2.2)
Weight loss	247 (12.4)	61 (26.7)
Cough	123 (6.2)	5 (2.2)
Intermittent dysphagia	102 (5.1)	4 (1.7)
Oral swelling or ulcer	114 (5.7)	49 (21.1)
Odynophagia	59 (3)	22 (9.5)
Unilateral sore throat	33 (1.6)	7 (3.0)
Intermittent sore throat	71 (3.5)	2 (0.9)
Mucosa patches	15 (0.8)	3 (1.3)
Haemoptysis	48 (2.4)	3 (1.3)

\*A total of 1998 referrals and 232 cancers; some patients presented with more than 1 symptom.

TABLE II  
REFERRALS AND CANCER DIAGNOSES COMPLIANT WITH SCOTTISH REFERRAL GUIDELINES\*

Scottish Referral Guidelines Symptom	Patients (n)	Cancer diagnoses (n)
Persistent unexplained head & neck lump for $\geq 3$ weeks	567	128
Ulceration or unexplained swelling of oral mucosa persisting for $\geq 3$ weeks	113	43
All red or mixed red & white patches of oral mucosa persisting for $\geq 3$ weeks	15	3
Persistent hoarseness lasting $\geq 3$ weeks (+ chest X-ray)	313 (120)	72 (10)
Persistent pain in throat lasting for $\geq 3$ weeks	92	21
Dysphagia or odynophagia lasting for $\geq 3$ weeks	212	53

\*There were 1100 unique referrals; 212 patients presented with more than 1 symptom.

a major contributor of poor survival in the UK.<sup>4</sup> Referrals for urgent suspicion of cancer are expected to comply with guidelines; however, evidence for guideline effectiveness is limited. Baughan *et al.* demonstrated that a significant number of patients non-compliant with 'urgent suspected cancer' referral guidelines were subsequently found to have cancer.<sup>5</sup>

Further research into the positive predictive value of key signs and symptoms to produce evidence-based guidelines may help to streamline truly urgent patients.<sup>2,5</sup> Presently, the exclusion of certain head and neck cancers is difficult unless examination using fibre-optic laryngoscopy is performed, which is unavailable in primary care. Resultantly, an increased number of non-cancer diagnostic referrals compared to other types of cancers is feasible.

#### Cancer detection

The primary head and neck cancer detection rate of 8.6 per cent is low, considering the reasonably high rate of compliance with the guidelines. This again is comparable to other published series, which demonstrated cancer rates of 8.4 per cent<sup>2</sup> and 10.9 per cent<sup>3</sup> (Table IV<sup>2,3,6-9</sup>).

Comparison with other types of cancer from referrals for urgent suspicion of cancer reveals unfavourable performance; breast cancer detection from urgent

referrals is 22 per cent, and the urology urgent referral cancer detection rate is 23 per cent.<sup>4</sup> A prospective audit within general practice in Scotland investigated over 18 000 suspected cancer referrals, and found that cancer detection rates for colorectal cancer were 13.1 per cent, compared to 7.8 per cent for laryngeal cancer.<sup>5</sup> Laryngeal cancer had the lowest detection rate out of all the referrals for the 16 tumour types included. This may reflect the subtler nature of head and neck cancer symptoms compared to other cancers, and how head and neck symptoms can mimic those of benign head and neck disease.

#### Chest X-ray value

In the 313 patients who had persistent hoarseness for more than 3 weeks, only 38.3 per cent had a chest X-ray performed. In general practice, chest X-ray is one of the most widely used diagnostic tests. The mean number of chest X-rays carried out annually is 236 per 1000 patients. This accounts for 25 per cent of the annual total number of diagnostic imaging scans conducted by radiology.<sup>10</sup>

In a prospective cohort study of chest X-ray use in primary care, Speets *et al.* highlighted that management changed in 60 per cent of cases as a result of the chest X-ray findings, demonstrating value in the primary care setting.<sup>10</sup> However, the value of a guideline stating the requirement of chest X-ray in the context of persistent hoarseness cases referred to secondary care is currently undemonstrated.

The reasons for non-compliance with chest X-ray requests in this series may be due to a lack of knowledge of the referral process or there may be widespread awareness that these patients will receive axial imaging if required. We identified one patient with features of malignancy identified on chest X-ray, but this patient had a vocal fold palsy and went on to have a CT scan. Patients will undergo CT, magnetic resonance imaging or positron emission tomography imaging if there is serious clinical suspicion of malignancy, rendering the chest X-ray unnecessary.

The cost of an out-patient chest X-ray is £62.76. If this guideline was revised and the requirement of a chest X-ray was removed, then in this series £7531.20 (120 patients  $\times$  £62.76) would have been saved.

TABLE III  
CLASSIFICATION OF CANCERS

Cancer type or site	Cancer diagnoses (n (%))
Laryngeal cancer	50 (22)
Oropharyngeal cancer	46 (20)
Lymphoma	36 (16)
Thyroid cancer	22 (9)
Hypopharyngeal cancer	19 (8)
Lung cancer	15 (6)
Metastatic neck – unknown primary	12 (5)
Salivary gland malignancy	10 (4)
Skin cancer	6 (3)
Oral cancer	4 (2)
Haematological malignancy	3 (1)
Oesophageal cancer	3 (1)
Metastatic neck – prostate primary	2 (1)
Nasal cavity malignancy	2 (1)
Metastatic neck – pancreatic primary	1 (0.5)
Metastatic neck – colon primary	1 (0.5)

TABLE IV  
COMPARISON WITH PREVIOUS STUDIES

Audit (year)	Study size (number of referrals)	Study period (months)	Compliant referrals (n (%))	Head & neck cancer (%)
Current audit (2018)	1998	12	1100 (55.1)	8.6
Tikka <i>et al.</i> <sup>2</sup> (2016)	4715	48	3125 (66.3)	8.4
Pracy <i>et al.</i> <sup>6</sup> (2013)	622	12	510 (82)	5.6
McKie <i>et al.</i> <sup>3</sup> (2008)	1079	36	771 (71.5)	10.9
Hobson <i>et al.</i> <sup>7</sup> (2008)	177	12	107 (60)	12.4
Duvvi <i>et al.</i> <sup>8</sup> (2006)	187	12	67 (35.8)	9.7
Lyons <i>et al.</i> <sup>9</sup> (2004)	171	12	No data	14.6

Finally, there is the issue of ‘ownership’ of results. Usually the chest X-ray is requested at the time of referral. Some patients attend their referral without having had the chest X-ray, but then receive it after their ENT appointment. This means that the ENT surgeon does not see the result at clinic, and the general practitioner may not realise this. This may mean that results are missed.

We suggest that chest X-ray be removed from the Scottish Referral Guidelines with respect to head and neck cancer, as it is an unnecessary diagnostic intervention and resource expenditure.

#### Clinical implications

The volume of referrals alone has a major clinical implication, as they represent a major demand on resources. The majority (91.4 per cent) of patients referred did not have a primary head and neck cancer diagnosis. This indicates that an average of 11 patients must be seen in an urgent appointment for 1 case of head and neck cancer to be diagnosed. There are now many published series highlighting the poor detection rate for two-week referrals in head and neck cancer (Table IV),<sup>2,11</sup> suggesting that our guidelines need refinement.

In comparison to head and neck cancer, colorectal cancer has a much stronger evidence base with regard to both general practitioners and patients. The predictive value of individual symptoms rises between presentation in the community and presentation in primary care, and is highest in patients referred for the investigation of possible colorectal cancer. The higher predictive value of symptoms in the population referred for investigation when compared to the predictive value on first presentation to primary care demonstrates that the general practitioner is able to identify, in part, those patients who are likely to have colorectal cancer. It also demonstrates that if there is a higher relative rise from the predictive value in the general population to those presenting to the general practitioner, patients are capable of identifying which symptoms matter for colorectal cancer.<sup>12</sup>

This is not the case for head and neck cancer, with many published reports indicating that patients are unaware of the risk factors and symptoms.<sup>13</sup> Increased general practitioner education has been suggested as part of the solution to combat non-compliant and ultimately non-cancer diagnostic referrals; however, we

would suggest that patient education is also vital. The relevance of safety-netting is therefore highlighted here as a measure to increase patient awareness of significant symptoms, but also to limit the number of non-urgent referrals. There is also a need for further research transitioning across patients, primary care and secondary care, to establish the predictive value of the symptoms currently dictating urgent referrals.<sup>14</sup>

#### Strengths

This audit included over 2000 referrals over a 12-month period. It is the largest audit in this timeframe in Scotland, and is the second largest audit of its type in head and neck cancer referral to our knowledge. It provides a higher level of evidence for the exclusion (rather than inclusion) of chest X-ray from the Scottish Referral Guidelines.

#### Study limitations

The number of patients referred with hoarseness lasting more than three weeks who also had a chest X-ray request was low. The majority of chest X-ray findings were normal and none changed the patients’ pathway.

- **Of referrals included in the audit, 55.1 per cent were compliant with Scottish Cancer Referral Guidelines**
- **The inclusion of chest X-ray in referral guidelines for suspected head and neck cancer is based on level 4 evidence**
- **Only a limited number of chest X-rays are performed in patients referred for persistent hoarseness**
- **No chest X-rays performed altered patient management**
- **It is possible to remove chest X-ray from referral guidelines for patients with suspected head and neck cancer**

#### Conclusion

This audit has shown a 55.1 per cent compliance rate with the Scottish Referral Guidelines of general practitioner referrals for urgent suspicion of cancer. The rate

of head and neck cancer diagnosis was 8.6 per cent. Of patients referred with persistent hoarseness for more than three weeks, 38.3 per cent had a chest X-ray requested, and none of these scans altered management. Chest X-ray in laryngeal cancer is poorly evidenced and poorly adhered to by referring clinicians. Chest X-ray therefore appears to be of limited value in the assessment of patients with head and neck cancer. There is a need for further research into the symptoms of head and neck cancer in the community, and in primary and secondary care.

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