ORIGINAL

Is there Over Utilization of Chest Radiography at the Primary Health Care Level in Bahrain?

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ABSTRACT

It had been our impression that there was over utilization of x-ray, particularly chest radiography, at the primary health care level in Bahrain. Accordingly, we studied the chest radiographs of a health centre's patient population (Shaikh Sabah Health Centre) over a period of 6 months (Jan-June, 1986). Out of the 291 chest radiographs studied only 45 (15.46%) were positive. Therefore, strict criteria for chest radiography should be established locally to minimize the cost of patient care and to reduce radiation dose to the general population.

Radiation exposure from medical sources is growing rapidly[1,5,6]. Chest radiography constitutes a significant proportion of this dose[10]. The bone marrow, breasts and thyroid gland are in the primary radiation field and thus absorb a significant portion of this dose. There has been a widespread concern that many x-rays taken are clinically unnecessary[3,5,6,7] and not necessarily cost-effective.

TABLE 1

Frequency of chest x-rays in the Health Centres*

Year	Total x-rays	Chest x-ray	%
1981	98794	32701	33
1982	100702	40970	40.68
1983	125544	43842	34.92
1984	128105	45496	35.5
1985	126478	42507	33.6
1986	123686	38529	31.15

* Source: Annual Reports of Radiology Department at Health Centres and Salmaniya Medical Centre / Ministry of Health, Bahrain.

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Physicians have a direct responsibility to prevent over-utilization and consequently reduce radiation and its harmful effects to the general population. Other concerns expressed relate to rising costs and limited resources[5]U2,[6] especially in economically under privileged societies. We have had the impression that overutilization of chest x-rays in Bahrain is not different from that in other parts of the world[4,6].

The purpose of this study is to verify this statement by evaluating chest radiographs taken in a Government Health Centre over a period of time. We selected chest radiography because it is the most frequently performed radiological procedure world wide[5,11] and also in Bahrain (Table 1).

METHODS

The clinical information of patients referred to Sh. Sabah Health Centre for chest radiography over a period of six months (Jan '86 – Jun '86) was obtained from the x-ray request card and supplemented by referring to patients' medical records. The clinical information obtained was grouped to

TABLE 2

Frequency of the radiographic findings in relation to the clinical indications

No	Clinical Indication	Chest Radiograph			%
		Normal	Abnormal	Total	Positive
1	Cough	85	15	100	15.0
2	Fever & no chest findings	6	0	6	0
3	Dyspnoea	17	1	18	5.6
4	Combination of items 1,2 & 3	29	10	39	25.6
5	Non-traumatic chest pain	9	1	10	10.0
6	COPD++ or long standing asthma	25	3	28	10.7
7	Routine for 1. Hypertension or 2. Diabetes	26	5	31	16.1
8	Routine, combination of non-specific* signs or symptoms	49	10	59	16.9
	TOTAL	**246**	**45**	**291**	**15.46**

* TB contact
H/O TB
PPD + Old age Smoker
Loss of weight
H/O heart failure
Chest trauma
Ca – lung

++ COPD = Chronic Obstructive Pulmonary Disease

establish the reasons for the x-ray requisition. The grouping was based on the chief complaint, a previously known chest disease, a social habit (eg. smoking) known to cause or associated with respiratory disorder, or a systemic illness (eg. hypertension) with possible complications seen on the chest radiograph (Table 2). The radiograph was determined to be either negative or positive based on the abnormalities recorded in the formal radiological report.

If the abnormality on the radiograph was incidental and considered in-significant (eg. parahilar scarring), the radiograph was considered negative. Chest radiographs showing signs of current chest infection, chronic airway infection, cardiovascular compromise or significant incidental finding (eg. hilar mass) were considered positive. From a total of 350 patients, 59 were excluded from the study because of incomplete clinical data and/or inconclusive radiological reports leaving 291 patients ranging in age from 2 months to 75 years, with an average age of 30 years. There were 149 males and 142 females. 223 were Bahrainis and the rest were of other nationalities, mainly from the Indian subcontinent.

RESULTS

Only 45 (15.46%) radiographs were considered positive. The remaining 246 (85.54%) were considered negative. The positive yield was highest (25.9%) if there were several clinical symptoms of respiratory illness. This is higher than for patients with a clinical diagnosis of chronic lung disease. It is also higher than the yield for patients referred for routine chest radiography but without clinical signs of current chest illness. In fact, a clinical diagnosis of chronic lung condition without acute symptoms was associated with a low pick-up rate: one in ten. A single reason for referral for chest radiography was associated with a low yield: dyspnoea scored just over 5% positive yield. No patient with fever and absent clinical signs of lower respiratory illness showed positive radiographic findings.

DISCUSSION

Our results support our contention that there is over utilization of chest radiography at primary care level assuming that Sh. Sabah Health Centre represents primary health care delivery in Bahrain. It is of course unrealistic to assume that some of the negative results (84.54%) did not contribute to patient management. Although our cases are a mixture of patients with chronic chest conditions, acute chest conditions and systemic illnesses, data of the subgroups do show a certain trend: that is radiographic positive yields which contribute to patient management are mainly associated with a combination of acute chest complaints.

Recommendations for chest radiography have been forwarded for a variety of risk groups. Low yield has been shown for screening of non-selective low risk groups[2,7,3,11], routine admission chest x-rays[2,5], chest radiographs in patients under 40 with acute chest complaints but no haemoptysis or abnormal physical findings[3], prolonged follow-up chest x-rays of adequately treated tuberculous patients with inactive disease[2,11], chest radiography in the work-up of hypertension[8,2] or functional psychiatric illness in the absence of clinical evidence of chest disease or alcoholism[9], a previously diagnosed but stable chronic lung condition[5], preoperative chest x-rays and several other conditions[2]. A consequence of this low yield is unnecessary radiation and unjustified costs. This procedure also accounts for up to 50% of the medical radiological examinations[1,2,10].

The contribution of chest radiography in ambulatory patients with acute chest complaints needs to be re-emphasized. Benaceraf et al,[2] have shown that in patients with acute chest complaints, a radiographic abnormality was demonstrated when the physical examination of the chest was abnormal, and vice versa. Therefore, the decision to order a chest radiograph should only be made after obtaining a thorough relevant clinical history and physical examination. The recommendations forwarded by World Health Organization[10] in reference to chest radiography constitute an excellent guideline. It must be the concern of all physicians to curtail the overuse of x-rays. There is a need to modify the practice of ordering chest radiographs at the primary health care level, if not at all levels in Bahrain. Establishing strict clinical criteria is only one aspect, as any attempt to limit such a practice is a complex process[5] that must consider patients' beliefs and expectations. The low yield from chest radiography at the primary health care level should be the concern of the local medical body. A critical appraisal of the practice of ordering radiodiagnostic investigations at all health care levels in Bahrain is timely; we need to minimize the damaging effects of radiation for present and future generations and

appropriately utilize the limited monetary resources available to us. In this connection, we would like to draw attention to the question raised by Leonidas[6] in his attempt to put logic in x-raying children: will the x-ray change the management of the patient cost-effectively? If the answer is 'no', then obviously there is no need for the x-ray requisition.

CONCLUSION

There is over-reliance on chest radiography at the primary care level in Bahrain. Further wide community studies are necessary in order to establish guidelines for chest radiography in Bahrain.

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