SUGGESTIONS FOR REVISION OF THE ILO CRITERIA FOR ABESTOSIS BASED ON SCREENING 10,000 WORKERS

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ABSTRACT

In a screening program from 1985-87, 4,572 American shipyard and construction workers were present and were questioned about abnormalities while posteroanterior (PA) and lateral chest radiographs were interpreted for asbestosis using ILO International Classification of Radiographs of Pneumoconiosis 1980. Technically, unsatisfactory PA films were of 3 types: 1) underexposed due usually to body build or obesity, 2) overexposed due to body build or loss of lung substance due to cigarette smoking (CS) and 3) underinflated with diaphragms above the 9th intercostal space. A repeat PA film was needed in 7% of workers to have 99% films of technical quality 1. The profusion of irregular opacities in underexposed and/or underinflated films may appear to be 1/0 while ideal films on the same subject are 0/0 or 0/1. Overexposed films because of reduced lung parenchyma in smokers may be read as 0/0 when they are 1/0 or 1/1. Irregular opacities should be defined as: 1) distinct from vascular shadows and breast shadows, frequently accompanied by septal lines and present in 2 or more zones. Obliteration of one costophrenic angle with diffuse thickening is a frequent sequalae of pleural effusions from asbestosis which occur in 1–2% of subjects. Pleural fibrosis may subsequently extend into lung. Otherwise, unilateral pleural disease is often due to trauma, pleurisy, fractured ribs or infection with effusion.

INTRODUCTION

The ILO classification for chest radiographs[1] has provided a thoughtful and rational method for quantifying pneumoconiosis. Some critics are disturbed by its success which has broadened its purpose, which is to provide internationally agreed criteria for description of radiographs for epidemiological studies. Clearly it has been adopted for clinical diagnosis of asbestosis, coalworkers pneumoconiosis and silicosis in individual patients, for epidemiological studies of occupationally exposed and bystander populations,[2] hospitalized patients[3] and for compensation and litigation. Inter observer variation remains a problem. Intra observer variation has been steadily reduced. Some users have by oversight or deliberately misinterpreted the scale by leaving out the diagnostic boundry of 1/0 profusion of irregular opacities for asbestosis.[4] Others fault the classification for less than perfect correlation with pathology particularly the microscopic recognition of fibrosis.[5] On the whole, its defenders exceed its critics although no one would argue seriously that it could not be improved.

With improvements in mind 30 scientists convened in mid May in Athens to share concerns about the approaching decade birthday of the 1980 revision of a classification scheme which originated in 1916. The workshop was sponsored by the Collegium Ramazzini, an international organization, which is dedicated to the observational and descriptive principles of Bernardo Ramazzini, the father of occupational health. Irving J. Selikoff of Mount Sinai Medical School in New York, President of the Collegium, convened the meeting and described the evolution of a classification for the major dust diseases: asbestosis, coalworkers pneumoconiosis and silicosis. The initial classification, developed about 1916, was adopted by the First International Conference of Experts on Pneumoconiosis in Johannesburg under ILO auspices. It was perfected at the 3rd International Conference in Sidney in 1950. The so-called Geneva classification was adopted there in 1958 with revisions and additions made in 1968. In 1971 the UICC scheme was integrated with the ILO. The 1980 ILO revision provided a new set of 22 standard radiographs selected as mid-category profusion of small opacities to facilitate the classification of radiographs for epidemiology and disease progress.

METHODS AND RESULTS

Currently over 21.5% of workers screened for asbestosis are categorized as 1/0 or 1/1, only 5.1% are 1/2 or greater while 73.4% are negative, Table I. Because the critical border is 0/1 to 1/0 major effort was directed at obtaining ideal films, minimizing confounding by over or under exposure and competing shadows contributed by breast, pectoral girdle muscle and fat is important. Under inflation of lungs so that diaphragms are not below the 9th intercostal space can contribute

Table I

Frequency of Asbestosis (ILO Profusion Categories) in 4572 Boilermakers and Pipefitters in the United States 1986–1988

ILO :	Freq.	Percent	Cum.%	AGE	LATENCY
0/0 :	2956	64.65	64.65	50.8 ± 11.9	25.4 ± 10.9
0/1 :	399	8.73	73.38	56.6 ± 10.5	29.3 ± 11.2
1/0 :	487	10.65	84.03	59.4 ± 9.8	30.9 ± 10.2
1/1 :	498	10.89	94.93	61.8 ± 9.4	32.9 ± 9.4
1/2 :	94	2.06	96.98	63.5 ± 9.9	33.1 ± 9.9
2/1 :	53	1.16	98.14	65.9 ± 10.7	31.1 ± 12.5
2/2 :	61	1.33	99.48	66.3 ± 9.5	34.6 ± 11.0
2/3 :	14	0.31	99.78	64.7 ± 12.4	28.9 ± 12.1
3/1 :	4	0.09	99.87	59.0 ± 3.5	33.3 ± 12.1
3/2 :	3	0.07	99.93	66.7 ± 13.3	30.0 ± 7.9
3/3 :	3	0.07	100.00	67.0 ± 16.0	30.7 ± 15.0
	4572	100.00		mean 54.1 ± 12.2	mean 27.5 ± 11.1

to a spurious impression 1/0. Such hypo-inflation occurs in 12% of PA radiographs unless technicians instruct subjects to breathe out and take in their "absolutely biggest possible breath." When such instructions are insisted upon only 2.1% of radiographs have diaphragms not below the 9th intercostal space.

DISCUSSION

The instructions for readers should be improved to reduce ambiguity and more emphasis should be given to production of new standard chest radiographs which are of film quality 1, ideal for ILO interpretation rather than marginal films. There are serious questions as to whether films below quality 1 should or even can be interpreted? It may be best to make the decision as to pneumoconiosis the summary, not as it is now, the readers initial decision. Can a single radiograph be considered adequate for detecting and quantifying pleural as well as parenchymal asbestosis. Adding a lateral chest radiograph would contribute dorsal and ventral pleural mapping, survey the area behind the heart and assist in classifying emphysema (see below) by showing the anteroposterior slope of the diaphragms, at a small increase in cost. Optional density of chest structures especially the lung fields and full inflation of the lungs as judged by diaphram descent to at least below the right 9th intercostal space are essential.

How can the precision of the basic decision between a positive and negative radiograph, especially for asbestosis, the 0/1 1/0 decision be improved. The concrete addition to this decision making would be employment of "boundry films," films which define the division between steps of classification. It would be a testable strategy. A detailed protocol for developing a set of single or paired radiographs on both sides of boundry (0, 1, 2 and 3) has been described for the classification by Michael Jacobson of Edinburgh's Institute of Occupational Medicine. This would add 3 or 6 films to the standard 18 which define the mid categories. "The hypothesis is that it would be easier to classify films within categories that are defined by lower and upper limits of profusion of small opacities, than it is to match appearances defined as typical of a particular category." Ideal boundry films would represent an even 50:50 split of interpretation on both sides by a large number of experienced readers. The practicality of this strategy could be tested by determining if it reduced inter-reader variability, intra-reader variability and correlated with dust exposure.

Dr. G.K. Sluis-Cramer (South Africa) has questioned whether the size of opacities in asbestosis s/s vs s/t or t/t predict population differences for non radiograph measures particularly for pulmonary function. If not, is it important to record size? There is a further question as to whether large irregular opacities, u/u, are ever seen in asbestosis.

Considerable discussion concerned the asbestos pleural dilemma. Would more detailed and comprehensive description be useful in the ILO reading or is the 3 fold separation into diffuse pleural, plaques and calcification sufficient. Clearly analysis using the present scale vs an experimental extended

scale of one or two large populations correlating pulmonary functional impairment, clinical findings and these pleural changes would answer this question. At least two large cohorts of asbestos exposed workers have been studied in the United States by Selikoff (New York) and by Kilburn (Los Angeles) which could be analyzed to answer such questions. Perhaps of greatest importance is whether to include obliteration of both costophrenic angles plus diffuse thickening as a most advanced pleural category. Should diffuse pleural thickening be divided into upper, mid and lower zones plus costophrenic angles? Further research on large collected cohorts of asbestos exposed workers as proposed would answer this question as well as establishing the predictive value of pleural asbestos disease. The ILO classification has already been employed to describe the radiologic progression of asbestosis.[6] Similarly it should be quite simple to settle the film quality issue: as to which quality produces unacceptable variability in interpretation and thus determine whether films below quality 1 can be interpretated without unreasonable variability.

The listing of nonpneumoconiotic observations, the "other disease" category, is useful but needs updating to incorporate current findings. Perhaps an intuitive or logical organization would help rather than the present alphabetical array. In addition to bullae and definite emphysema, step wise incremental emphysema criteria to include low flat diaphragms on PA film, low flat diaphragms on the lateral film, wide (beyond 2.5 cm) retrosternal clear zone, and radiolucency or hypovascular zones[7] which has already been field tested in cotton textile workers with byssinosis are suggested.[8] Other useful additions would include 1) dilated aorta, 2) surgical clips, 3) staples and sutures, and 4) bronchiectasis. Calcified primary complex could be added to tuberculosis.

Technical advances such as computerized tomography greatly increase the cost of radiographic diagnosis with a modest yield epidemiologically. Nevertheless high resolution (extended scale) CT scans may be well justified in individual cases, for example, in differentiating pseudotumors or linear pleuroparenchymal infiltrations. Even computerized interpretation should be explored because it has the potential to eliminate intra-reader and inter-reader variability.

Research should be directed to expand the range and or test the predictive capacity of the ILO classification for chest X-rays. Time will help sort out these needs. We need to consider ways to extend the usefulness of this venerable classification scheme. It is time to examine the issues which need to be faced before 1991, the proposed revision date.

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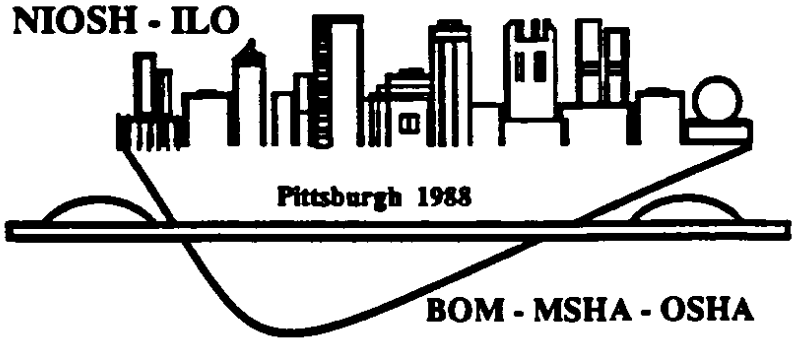

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