A Report on a Workshop on the National Institute for Occupational Safety and Health B Reader Certification Program

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In September 1990, a 2-day workshop was held in Chicago to discuss the current status of the NIOSH B reader certification program and to suggest modifications and improvements. This is a summary report of the proceedings of that conference.

The National Institute for Occupational Safety and Health (NIOSH) operates a program to train and certify physicians in the use of the International Labor Office (ILO) system[1] for classifying radiographs for the presence of pneumoconioses.[2] This program went into full operation in 1978. (Some B readers were certified between 1974 and 1978 during the period when the examination was being developed and tested. Certain other readers were denoted B readers before 1974 under an older NIOSH reader classification.) Trained readers who pass a competency examination are certified as "B readers." Currently, over 600 B readers are certified.

Recently, the program has been criticized,[3-5] the main concern being that variability among readers is excessive despite the training and certification. There is also the perception some B readers systematically bias readings in legal proceedings. In an attempt to explore these and related concerns, a 2-day workshop was held to discuss the B reader program in light of the demands placed on it and to solicit suggestions for improvement. This report is a synthesis of various comments, criticisms, and suggestions made at the workshop.

B Reader Program

The stimulus for the creation of the B reader program was the finding of large interreader variability in the classification of chest roentgenograms of coal miners collected during the first few years of the Coal Workers' X-ray Surveillance Program (CWXSP), a national screening and intervention

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program operated by NIOSH from 1970 to the present.[6] The certification examination, which is administered by NIOSH, is based on classification of 125 radiographs. A recertification examination having similar format to the certification test was introduced in 1984. Morgan describes the rationale and format of the original certification examination[2]; details of and results from the current certification and recertification examinations are given in a companion report.[7]

B Reader Workshop

The B reader workshop was attended by more than 25 experts in radiology, epidemiology, surveillance, pathology, and clinical pulmonary medicine, as well as some persons connected with the legal aspects of disability compensation (the Appendix lists participants). In addition, there were interested parties in attendance from various private and governmental organizations.

After an introductory session in which the history of the program was summarized and the charge to the participants described, the group separated into three work groups. These were concerned with Training in X-ray Interpretation for the Pneumoconioses, Promoting and Certifying Competency in X-ray Interpretation for the Pneumoconioses, and Quality Assurance in X-ray Interpretation for the Pneumoconioses. Each group spent an afternoon and morning deliberating, after which all met together to hear the work-group leaders present short reports. The material synthesized from these reports shows that although there were some issues on which there was general agreement, many issues provoked a wide variety of opinions. We attempt to summarize the different perspectives.

Training in X-ray Interpretation of the Pneumoconioses

In terms of the existing training available to B reader candidates, the workshop commended the efforts of NIOSH and the American College of Radiology (ACR). The home-study material and weekend course were thought to offer an excellent foundation. Among suggestions for improvement were greater access to self-study materials; expansion of the home study course to include new films, possibly with readings by an expert panel; instructional material on film quality; and additional emphasis on pleural disease. Moreover, some believed NIOSH should stimulate training among students of certain medical specialties (radiologists, occupational medicine physicians, and pulmonologists). In addition, a "mentor" program, whereby trainees could avail themselves of the opportunity of having one or more sessions of personal guidance from an expert reader, would be advantageous.

Many workshop participants were in favor of extending training beyond mere details of the ILO classification. One option suggested was to include study of intrareader and interreader variability problems and solutions, methodologic strategies, and statistical analysis of ILO classifications. Some believed the training should go further, so the successful candidate would be able to demonstrate knowledge of the epidemiology, pathology, physiology, and risk factors for the pneumoconioses.

Some were very opposed to these proposals. They insisted the training should be concerned solely with the ILO classification and closely related matters. They believed that to include more peripheral material would lend even greater authority to the B reader and his or her radiographic determinations in the legal arena and thus engender misuse of the ILO classification in this context. In reply, advocates of more training said that B readers are now de facto experts and that additional training could only help.

Promoting and Certifying Competence in X-ray Interpretation of the Pneumoconioses

In line with the proposals to expand the training beyond details of the ILO classification, proposals were made to make certification more stringent by requiring candidates to demonstrate adequate knowledge of the pneumoconioses and related topics. This would entail a written test reflecting a fund of knowledge of pneumoconiosis, epidemiology, pathology, physiology, and associated risks. As noted above, there was wide disagreement on the desirability of widening the scope of B reader certification examination.

Some discussion was given to improving the general level of reader competence by raising the score needed to pass the certification examination. One concomitant advantage of this is it would result in fewer B readers being certified, thus simplifying the process of monitoring and maintaining performance after certification. However, limitation of B readers ran counter to a NIOSH objective of increasing the number of physicians knowledgeable about occupational diseases.

Some suggestions were made concerning modifying the format of the present B reader test to take account of the changing pattern of pneumoconiosis among workers. For example, it was believed the large opacity classification should now be downplayed because progressive massive fibrosis (PMF) is becoming a rare disorder. In addition, it was noted that the test focuses on small opacities, with less emphasis on accurate recognition of pleural abnormalities. Some participants suggested that film quality, which is well known to influence the classification of radiographs, should be brought back into the grading scheme.

Some workshop participants were concerned that many readers read few films using the ILO classification after certification. These readers, it was thought, were more likely to provide anomalous results because of their inexperience. Hence, it was proposed that a minimum number of films be read per year as a condition of maintaining B reader status.

Quality Assurance of B Readers

The workshop participants agreed that one of the main problems inherent in the B reader program was maintaining quality of readings after certification. Although it was agreed that

recertification was a useful procedure, recertification did not go far enough to ensure satisfactory uniformity among B readers.

Three different approaches to maintaining quality were suggested: (1) instituting a mandatory program of checks on readers, (2) initiating a core group of expert readers, and (3) making provision for readers to voluntarily calibrate themselves with expert readers.

In the first case, some workshop participants considered that only a centrally organized program of mandatory quality assurance could hope to control variability among all B readers. Such a system would involve the routine circulation of batches of films to all readers. Because of the large number of B readers, the difficulties and costs involved in operating such a system are obvious. One proposed solution was to restrict the check to random audits of B readers, whereby readers would be required to submit a batch of recently read radiographs and their readings when asked. The problem with both approaches is that the readings supplied during the check or audit may not necessarily reflect the actual practices of the reader. Moreover, after having passed the check, the reader may drift over time in his or her pattern of interpretation.

For these reasons, some workshop participants rejected the idea of a program of quality assurance for all readers, believing that any system was almost impossible to implement and would be of doubtful success. They believed that although NIOSH is well placed to test competence in roentgenograph interpretation, it cannot enforce or police the practice of certified readers.

Because of this belief that an overall program of quality control encompassing all B readers might not be feasible or sufficiently successful, another approach was suggested. This involved the establishment of a core group of expert readers. Criteria for selection to this pool would be past experience in reading films for the pneumoconioses, plus consistency with their peers. To ensure continuing consistency, the group would be subject to periodic intrareader and interreader reproducibility monitoring, thereby, it was hoped, maintaining consistent reading patterns over time. Readers giving clearly anomalous readings would be replaced.

Some participants hoped panel members would serve as a resource for expert readings, particularly in respect of films associated with litigation. They might also be available for participation in roentgenogram reading trials of films from epidemiological and surveillance studies. Consideration also should be given to their being available for consultation on the design of film-reading studies and on film-reading questions in general. There was widespread agreement on the potential advantages of such a panel, although some workshop participants expressed concern about the professional impact of this de facto two-tiered certification system.

The third suggestion on maintaining quality after certification concerned the institution of a mechanism by which B readers could voluntarily calibrate themselves by comparison of their readings with those of experts. In this, batches of selected films together with the expert readings could be prepared and made available to interested parties. Alternatively, batches of readings could be submitted for reading by the expert readers. This proposal would fit well with the proposal for the establishment of an expert panel of quality assured readers.

It was noted that quality assurance should be undertaken outside the B reader program when appropriate. For example, in the case of large epidemiologic and surveillance studies, a system of continuing quality assurance should be set up, using multiple readers and including periodic assessment of both interreader and intrareader variation, with feedback to the readers.

Other Factors Contributing to Reader Variability

Certain factors contributing to reader variability did not fit easily into the three headings given above:

Workshop participants considered that certain aspects of the existing ILO classification scheme may be responsible for part of the problems in inconsistency among readers. In particular, major deficiencies in the classification scheme for pleural abnormalities were noted. These related mainly to diffuse pleural disease and calcification. Ambiguities concerning the use of certain "other symbols" also should be addressed. Certain standard films were thought to be inadequate, and the quality of reproduction of some of the standard sets is problematic.

The organization of many recording sheets was believed to contribute to reader variation. The form should be organized for accuracy and simplicity of coding and data entry. It also should be arranged to be easy to check for completeness. Suggestions were made to revise the form to achieve these objectives.

Some of the participants suggested that many of the problems observed with the B reader program arose from its incorrect application. In this respect, they thought neither the B reader scheme nor the ILO classification were developed specifically for legal or clinical purposes. It was suggested that for litigation, chest radiographs should be only part of the medical evidence and should be interpreted and combined with other medical data instead of being regarded as unambiguous indicators of the presence or absence of disease and disability.

The use of B readers and the ILO classification for medical screening or surveillance and for clinical purposes provoked conflicting opinions. One central question was whether the reader should classify the radiological features strictly according to the ILO guidelines or whether the disease process should be interpreted, with the reader attempting to distinguish between occupational and nonoccupational etiology. For instance, should an apparent abnormality of the pleura meeting the definition of a pleural thickening be classified as such if the reader believes it truly is due to obesity? Should a large opacity *always* be classified as PMF although the reader thinks it really is a carcinoma? Some participants were of the strong opin-

ion that for worker screening it was desirable to have additional entries on the roentgenogram reading form on which the reader could state a belief that the abnormalities were due to pneumoconiosis, another disease, or natural causes.

There was much controversy with this proposal. Opponents took the stance that to permit interpretation would be to increase interreader variation. Instead, they said, the ILO scheme should be used solely to classify appearances without interpretation, and readers should be blind to any other information about the subject. Then, if a clinical opinion was needed, a separate interpretation should be done, where all pertinent information was available. Furthermore, it was noted, the provision for interpretation currently exists, for readers have the opportunity to supply additional information about a case in the comments section of the ILO reporting form.

Some workshop participants thought that many nonphysicians could benefit from greater knowledge of the ILO classification system and B reader program and their associated merits and weaknesses. The recommendation was made that training materials appropriate to judges, lawyers, radiology technicians, nurses, medical students, labor representatives, and company management be prepared.

Further Research

Some suggestions for research were made. One of these concerned the possible effects of possession of ancillary information when classifying roentgenograms. In other words, to what extent does knowledge of demographic factors, smoking, and occupational exposure influence the classification of radiographs using the ILO scheme? A related topic concerned investigation into how training affects variability in readings. Another suggested study involved the correlation of radiographic with pathologic data to validate the ILO classification. Better information on the prevalence of abnormalities among nonexposed groups, particularly among older people, was considered desirable.

Summary

The workshop generated numerous suggestions for improvement in the way the B reader program could aid in improving consistency and accuracy in interpretation of chest roentgenograms for pneumoconiosis. Most suggestions were vigorously debated; some approaches were incompatible. Nevertheless, a pattern emerged.

First, continuation of a program with the goal of the current B reader program was endorsed. The need for trained and competent readers able to participate in public health surveillance of dust-exposed workers, in itself, was seen to justify continuation of the effort.

Second, ongoing quality assurance of readers, beyond that offered by quadrennial recertification, was widely supported. Diverse methods were suggested to accomplish this. None were without critics or potential significant limitations.

Third, within the context of the B reader program or through other means, the need to expand the training of medical practitioners to improve competence in the recognition and prevention of occupational lung diseases was strongly supported.

This workshop represents a significant landmark in an ongoing effort by NIOSH to understand more about the ways in which the B reader program can support good health practice and fulfill regulatory requirements. The diversity of views and absence of consensus preclude the possibility of incorporating all recommendations into a modified program. Nevertheless, plans to improve the program are under way based on the comments voiced in the workshop and criticisms from the literature.

In the meantime, it is hoped that this document leads to an improved understanding of the limitations of the current program and of the variety of opinions on how it could be modified. Pending improvements to the program, NIOSH encourages those who use radiographic readings to become fully aware of the problems inherent in the methodology. In particular, sponsors of surveillance programs and epidemiologic investigations using B readers are encouraged to explore and adopt their own quality assurance activities.

APPENDIX

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