
Health Services Research

Task reassignment is an aspect of health services research. It seemed evident to Fred Gilbert that the tasks done by health care team members were often inappropriate. Physicians carry out simple, repetitive tasks that might be done as well or better by others who are well trained and supervised, leaving physicians to perform tasks more in keeping with their unique abilities. In 1969 he wrote: "The physician in the near future must function as a technician and accept this role, or he must function as a true professional creating new health workers where needed and organizing about him the new people and technologies to improve the health of his or her patients. If there is thoughtful consideration of the patient as well as the disease, patients will accept these new interfaces and all participants, including the physician, will be the better for it."

The following papers sample these ideas.

Screening of Chest Roentgenograms by a Radiological Assistant*

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Medical-legal roadblocks would first have to be lowered. But the extended use of paramedical personnel in the field of radiology could reduce the cost of medical care without compromising quality.

The demands being made on diagnostic radiology are increasing. Soon there will not be enough radiologists to meet the needs. This was the essence of the National Advisory Committee on Radiation's report to the Surgeon General in 1966.

With this in mind, the Straub Medical Research Institute decided to undertake a pilot program to train lay persons to screen survey chest roentgenograms in the Health Appraisal Center. If the program was a success, we might be able to ease the burden of our radiologists.

The Cost Factor

There were also obvious implications regarding the cost of medical care. Physicians in our health appraisal center use the results of a series of diagnostic tests to determine the overall status of an individual's health. In our radiological program, we use 100 mm photofluorograms of the chest, and cost is an important consideration.

The lower cost of the minifilms and their lower storage and development costs outweigh the cost of the additional radiation that must be administered. We have found that the 100 mm films are as efficient as 14 by 17 films for survey and teaching purposes. However, we could achieve the greatest economy if we could utilize a lay reader instead of a physician to interpret the films.

Training

The individual who participated in this investigation had worked for three years as a secretary to a group of orthopedic surgeons and her mother was a registered nurse. She had no prior experience in medicine or radiology other than this peripheral exposure. At Straub Clinic, she first underwent a three-month probationary training period as a diagnostic technician. Her work involved performing tests such as height, weight, pulmonary function, vision, hearing, blood pressure, photomotograms, EKG, and taking chest photofluorograms.

It was not until this three-month period was completed that her interest in interpreting chest films was aroused, and she was chiefly motivated to undertake the pilot program through her own interest. However, her knowledge of radiographic technique was limited to taking photofluorograms.

Each day, for the next three months, she watched our radiologists and learned the basic concepts of chest film interpretation. She did not attempt to read the films herself. She simply listened and looked while the radiologist explained any abnormalities that he discovered in the course of daily interpretations.

At the same time, she spent many hours at home studying the details of normal and pathological anatomy of the chest from textbooks. She learned to distinguish some of the normal and abnormal physiological changes of chests studied in relation ship to roentgenograms, the changes due to chronic and acute disease, and to recognize abnormality and decide whether or not it was significant.

Study Methodology

At the end of the six-month period, we began a double-blind study to measure her newly found knowledge. Our assistant privately reviewed each film, recorded her interpretation and then sorted the films into negative and positive groups. Borderline findings were included in the positive group.

Then a radiologist conducted independent examinations and recorded his interpretations. The results were compared and discrepancies reviewed. The films could fall into five categories, which we used. This classification, incidentally, readily lends itself to computer analysis.

Results

With time and experience, the significant discrepancies made by the screening assistant began to diminish. The radiologist and screening assistant read 2,432 films over an intermittent period of 115 days. In that time, there were 57 significant discrepancies in their interpretations, a rate of 2.6%. There were 18 significant discrepancies, or 3.6%, for the first 500 x-rays that the assistant screened and 12 significant discrepancies, 2.4%, for the final 500.

The results of the study were heartening. They indicate that a well-motivated, bright person can be trained to recognize abnormalities in chest roentgenograms and to grade the significance of the findings.

From reading Garland's article on "The Reliability of Roent

gen Survey Procedures,"¹ it can be seen that the consistency and performance of the trainee compared favorably with that of seasoned radiologists. The best of radiologists will have a significant rate of self-inconsistency with his or her own readings and rereadings of an identical large series of films.

There is also an attitude factor to be taken into account. The mood of the reader will have an effect on the number of positives and negatives that are called. For example, an individual in an optimistic frame of mind will tend to call fewer positives, and vice versa. Fatigue, distraction, boredom, and the wandering mind become factors also inherent in any mass screening situation.

When the double-blind portion of the study was completed, the assistant began to give the radiologist two distinct stacks of films. We found that she saved him one-half to two-thirds of the time that it had taken him to interpret and record the findings of the films before the program was instituted. For example, if it had taken him 30 minutes to view some 50 films, it now took him less than 15 minutes to complete this same number.

The attraction of this system is apparent. It eliminates the radiologist's tedious chores of recording and classifying and allows him to concentrate on those films which he knows show abnormalities and are, therefore, of particular interest.

Overview

The entire study and training program took 18 months and far exceeded that which would be normally expected under an intensive training program. One reason for this was that the investigation was essentially being conducted only for interest's sake during the initial stages.

Then, she was instructed by three radiologists during the 18 months. This is not fully desirable because each doctor has a different approach to interpretation. Consequently, the time taken to absorb the different methods was longer than if just one radiologist had been the instructor throughout.

In addition, she felt that she should receive training in anatomy and pathology. Although she might be able to observe an abnormality in the film, she would be unable to give an accurate anatomical description. She had never formally studied these areas.

Classification			
	Grade	Interpretation	Radiographic Follow-up Recommendations
Negative	1	No abnormality	None
	2	Abnormality of doubtful significance	None
	3	Significant abnormality (but no additional information likely to be gained by more films)	None
Positive	4	Possible significant abnormality in need of confirmation	PA 14 x 17
	5	Definite significant abnormality, more films needed	PA and lateral 14 x 17



Gretchen Ludwig, radiological assistant, learns to interpret the minifilms with Dr Rigler's help.

An intensive training program should take approximately three months, depending on the previous knowledge of the applicants. For example, the training period for a candidate who received some medical training in the armed services would be shorter than that for a high school graduate. Utilizing radiologic technologists for film interpretation has recognized merit.²

However, the demands placed on a radiologist's time for teaching must also be weighed. When the pluses and minuses of such a program are tallied, this factor must be subtracted from future benefits. Several assistants should be taught simultaneously. Training on a one-to-one basis may not be worthwhile.

Legal Responsibility

Until problems of legal responsibility can be clarified, physicians will be hesitant to allow any lay person, however competent, to render final diagnostic judgment in a separation of negative from positive chest roentgenograms. The American Society of Clinical Pathologists has made great forward strides in lessening the skilled manpower shortage by instituting the Certified Laboratory Assistants (CLA) and Cytotechnologists (CT) (ASCP) Programs years ago.

Perhaps it is time for organized radiology to follow suit and develop standardized courses, requirements and a proficiency examination for a Certified Radiological Assistant Program. The economic implications are obvious. The extended use of paramedical personnel in the field of radiology could reduce the cost of medical care without compromising quality.

References

1. Garland LH. On the reliability of roentgen survey procedures. *Am J Roentgenology Radium Therapy*. 1950;64:32-41.
2. Sheft DJ, Jones MD, Brown RF, Ross SE. Screening of chest roentgenograms by advanced roentgen technologists. *Radiology*. 1970;94:427-429.

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