The Low Back X-Ray as a Pre-Employment Screening Tool in the Forest Products Industry

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In 1964 the IMA Ad Hoc Committee on Low Back X-Rays published suggested criteria for the use of lumbosacral films in placement examinations in industry.[1] In their report, the authors acknowledged that the published literature does not permit conclusions as to just what abnormalities of the lower spine are contraindications for placement in various jobs. Accordingly, they chose the less desirable but only alternative at the time — the considered opinions of physicians experienced in the use of low back x-rays as a placement technique.

The committee stated more than once that it was not a part of its work to attempt an evaluation of the worth of such x-rays, and that their value had not been agreed upon, "probably due to the difficulty of obtaining a suitable sample of persons to study." These statements suggested the need for continued investigation into industrial programs where low back x-rays were being used as part of placement screening.

The present report describes the results of such a program during a study period of four years, using criteria similar to those suggested by the Ad Hoc Committee. While not necessarily claiming to be a conclusive sampling, the report does give a picture of the usefulness of the pre-employment back x-ray in one industry over a four-year span.

Identifying Risk

At the outset, it was assumed that this technique, using the Weyerhaeuser Company criteria (Fig. 1), would identify those job applicants who were at increased risk of low back injury while performing sustained heavy work. This risk was to be avoided either by medical rejection of the applicant thus identified, or by placement in a lighter work situation if feasible.

In Fig. 2 is reproduced a section of the report of the Ad Hoc Committee on Low Back X-Rays which deals with the classification of industrial jobs by amount of stress on the low back. In the forest products industry, virtually every job in which a new employee might be placed falls into Class III or Class IV. In fact, most of them are Class IV jobs. Lighter jobs, such as those involving operation of equipment from a push-button console, do exist, but they are obtained through long experience and job seniority in a unionized company. In referring to the forest products industry, we include logging, lumber manufacture, fabrication of plywood and other panels, as well as pulp and papermaking.

If the assumption that the suggested x-ray criteria will identify high-risk individuals is accepted, then it may be hypothesized that subjects falling into the high-risk category will show a significantly greater incidence of low back injury than those in the low-risk category, other factors being equal.

Ideal Study

An ideal method of study would be to x-ray the low back of all applicants, file the films without looking at them, and place the applicants in jobs according to

WEYERHAEUSER COMPANY
BACK X-RAY REPORT

Location _____ Date _____

Name _____ Age _____ Sex _____ No. _____

Height _____ Weight _____ Job Assignment _____

Previous History _____

_____

_____

A. ABNORMALITIES OF MINOR IMPORTANCE
(Combination of several may be important)

1. ☐ Mild tropism lumbar joints
2. ☐ Minor spina bifida occulta (X-Ray findings only)
3. ☐ Schmorl's nodes L 1-2-3
4. ☐ Minor cong. defects — no symptoms
5. ☐ Minor lordosis
6. ☐ Osteoarthritis — X-Ray only
7. ☐ Minimal Scoliosis
8. ☐ 6 Lumbar Vertebrae

B. ABNORMALITIES OF INCREASED IMPORTANCE
Questionable Acceptance for Sustained Heavy Work
(Combination of several is significant)

1. ☐ Marked tropism lumbar joints or facets
2. ☐ Extensive spina bifida occulta
3. ☐ Schmorl's nodes L 3-4-5 — & loss lumbar curve
4. ☐ Moderate degenerative changes upper lumbar or lesser in lumbar spine
5. ☐ Mild to moderate scoliosis
6. ☐ Decrease in lumbar segments (5 to 4)
7. ☐ Transitional lumbosacral vertebra & no pseudoarthrosis
8. ☐ Minimal Narrowing L-5, S-1 interspace

C. ABNORMALITIES INDICATING SUBSTANDARD RISK FOR SUSTAINED HEAVY WORK

1. ☐ Spondylolysis or spondylolisthesis
2. ☐ Transitional lumbosacral vertebra with pseudoarthrosis
3. ☐ Narrowing intervertebral space L 3-4-5, especially associated with marginal spurring, sclerosis, etc. Upper lumbar narrowing possibly less significant
4. ☐ Marked hypertrophic degeneration - upper lumbar,
   Moderate " " L 4-5 and
   Milder " " if under 30 years
5. ☐ Collapsed or wedged vertebra; evidence old fractures of vertebral body or neural arch, or multiple defect spines or transverse process
6. ☐ Neoplasm or destruction of bone
7. ☐ Extensive spine bifida of 2 or more vertebrae
8. ☐ Prior back surgery; radio-opaque materials evidence previous infections; Marie-Strumpell spondylitis; major congenital anomaly, disease of lumbosacral or sacroiliac joints
9. ☐ Active osteomyelitis or substantiated history of osteomyelitis, or reactive change of sacroiliac in younger persons
10. ☐ Symptomatic osteoarthritis or rheumatoid
11. ☐ Herniated nucleus pulposus, or history of surgery re.
12. ☐ Disease of sacroiliac or lumbosacral joints, chronic with radiated pain; postural deformities and/or limitation of motion, lumbar
13. ☐ Rotary scoliosis
14. ☐ Degenerative diseases (i.e. osteoporosis)
15. ☐ Definite epiphysitis deformity
16. ☐ Multiple Schmorl's nodes

DESCRIPTION AND DIAGNOSIS _____

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FORM 1019 2/65

Signed _____ M.D.

Fig. 1.

IMA AD HOC COMMITTEE ON LOW BACK X-RAYS
(Excerpt: JOM 6:373, September, 1964)

All types of work have been arbitrarily grouped into four classes on the basis of the amount of stress apt to be placed on the low back.

Class I: Administrative work in which employee sits at desk. Possible hazards related to company travel, from lifting and carrying luggage, from slips and falls when in unfamiliar areas. White collar worker.

Class II: Clerical and/or light physical work such as stockroom clerks, light bench assembly, first line supervisors, salesmen (retail, wholesale, traveling, etc.) Work is fairly active but with at least part of time at a desk or bench. Involves occasional light lifting, considerable walking, some bending, stooping, squatting.

Class III: Moderate physical activity, such as inside craftsman, many factory jobs, etc. On feet most of time; involves bending, stooping, squatting, twisting, reaching, working on irregular surfaces, occasional lifting of objects weighing over 50 pounds, frequent lifting of 10-25 pounds.

Class IV: Heavy physical stress on back. Includes outside craftsmen, construction laborers, foundrymen, etc. Involves frequent heavy lifting (over 50 pounds)—often combined with bending, twisting, working above ground or on irregular surfaces.

Fig. 2.

conventional criteria. Later on, x-rays could be evaluated and back injury experience compared between normal and abnormal groups. Such a study would have been difficult to justify to management, and indeed, the decision had already been made to reject or limit those candidates in what was assumed to be a high risk category. However, a review of a four-year span in our program revealed what appeared to be an acceptable alternative for casting light on the association between x-ray defects of the low back and back injury frequency.

Method

A total of 2,378 lumbosacral spine series, each with four views (AP, lateral, right and left oblique), were exposed during the period Jan. 1, 1967 to Jan. 1, 1971. Table I illustrates the breakdown of x-ray findings in these subjects by A, B and C grouping, according to the Weyerhaeuser Company criteria in Fig. 1. When compared with a previous summary done within the company,[2] it is seen that the group figures are rather similar. However, when specific details of category "C" diagnoses are given, there is a great difference in the C-1 subclass between the current series and the one it is compared with. This will be commented upon later.

Looking at the figures for category "C" backs, one might assume that 386 out of 2,378 applicants for employment were summarily rejected because of high risk backs. Actually, this was not the case. Considering the rapid turnover in our industry (pulp and paper excepted) and the short labor supply available at certain times, a rejection rate of the magnitude of 16.2 per cent simply is not feasible, so compromise was necessary.

All spondylolyses without spondylolisthesis were accepted, as were some borderline spondylolistheses. Since plywood is our lightest production work, some transitional vertebrae with pseudoarthrosis were placed there, in the hope they would conform to our usual experience that plywood workers do not often transfer to heavier work. Toward the end of the study, a number of applicants with defects were placed experimentally in other departments as well. In addition, there were, as always, some applicants whose job skills or other attractive features overruled any medical opinion about theoretical back injuries.

Thus, in the 48-month period studied, there were 213 subjects hired with so-called "C" backs. Only four could be assigned to Class II jobs, while 209 were placed in Class III and IV jobs. Although they were generally selected as lesser injury risks than some of the applicants whose x-rays indicated more obvious defects, they nonetheless fell into the Ad Hoc Committee's (and our) rejectable category for the type of work they were being assigned to do.

These 209 subjects thus became the abnormal or "high risk" group, to be compared with a "low risk" group of 1,992 employees hired during the same 48-month period. This latter group, although much larger, was comparable except for low back x-ray findings, which designated that they were "normal," "A," or "B."

A detailed analysis of 395 consecutive low back injuries occurring between Jan. 1, 1967 and Jan. 1, 1971 included many which occurred to employees hired prior to 1967. However, it also included those injuries which befell the 209 high risk subjects and 1,992 low risk subjects in this study.

Results

Of the 209 employees in the high risk group, 199 were males and 10 were females. Table II reveals that by the end of the 48-month study period 132 employees, or almost two-thirds, had already terminated, and 77 were still active. The average duration of employment for the 132 terminated subjects was 5.1 months, and their average age at hire was 26.9 years. Among the 77 employees who were still working, the average duration of employment as of Jan. 1, 1971 was 20.0 months, and their average age at hire was 27.7 years.

These statistics were compared with those of the low risk group by selecting every third employee of the 1,992 hired with normal back x-rays. The sampling totaled 664 and included 20 females and 644 males. Table II shows that in this group, also, two-thirds of the employees had left employment by Jan. 1, 1971. The

TABLE I

SUMMARY OF X-RAY INTERPRETATIONS DURING THE PERIOD 1/1/67 to 1/1/71

	1/1/67 to 1/1/71		Comparison Study 1964–66[2]	
	No.	%	No.	%
Total Films Interpreted	2,387	100.0	9,593	100.0
Normal Backs (no defect)	1,038	43.6	3,743	39.1
"A" Backs	640	26.9	3,311	34.5
"B" Backs	314	13.2	1,321	13.7
"C" Backs	386	16.2	1,218	12.7

BREAKDOWN OF CLASS "C" X-RAY FINDINGS 1/1/67 to 1/1/71

	1/1/67 to 1/1/71			Comparison Study 1964–66[2]		
	No.	% of "C" Backs	% of Total Films	No.	% of "C" Backs	% of Total Films
Total "C" Backs	386	100.0	16.2	1,218	100.0	12.7
C1, Spondylolisthesis	155	40.1	6.5			
C1, Spondylolysis without Spondylolisthesis	106	27.4	4.5			
C1, Combined	261	67.5	11.0	397	31.5	4.1
C2. Transitional Vertebra with Pseudoarthrosis	91	23.6	3.8	371	29.4	3.9
C3, Narrow Intervertebral Space	9	2.3	0.4	209	16.6	2.2
Other	25	6.5	1.1	281	22.5	2.4

TABLE II

AGE AND DURATION OF EMPLOYMENT OF 209 EMPLOYEES HIRED WITH "C" BACKS, COMPARED WITH A ONE-THIRD SAMPLING OF 1,992 SUBJECTS WITH NORMAL BACK X-RAYS

	209 High Risk Subjects		664 Normal Subjects	
	Terminated	Still Active	Terminated	Still Active
Number	132 (63.2%)	77 (36.8%)	454 (68.4%)	210 (31.6%)
Average Duration of Employment	5.1 months	20.0 months	6.6 months	24.3 months
Average age at Employment	26.9 years	27.7 years	26.5 years	28.9 years

TABLE III

PLACEMENT AND DURATION OF EMPLOYMENT OF 209 EMPLOYEES HIRED WITH "C" BACKS, COMPARED WITH A ONE-THIRD SAMPLING OF 1,992 SUBJECTS WITH NORMAL BACK X-RAYS

	209 High Risk Subjects		664 Normal Subjects	
	No. Placed	Average Duration	No. Placed	Average Duration
Woods	46 (22%)	9.2 months	148 (22%)	9.5 months
Lumber	89 (42%)	10.2 months	343 (52%)	13.8 months
Plywood/Panels	55 (26%)	15.3 months	118 (18%)	12.3 months
Paperboard	7 (4%)	18.0 months	21 (3%)	14.5 months
Other	12 (6%)	3.4 months	34 (5%)	5.7 months

average duration of hire was 6.6 months for those who left and 24.3 months for the 210 subjects still remaining at the end of the 48-month period. It can also be seen that the average ages of the members of the two comparison groups are quite similar (about 27 years).

In Table III the analysis shows where the subjects were placed and how long they worked there. More applicants went to lumber jobs than any other, and the fewest went to paperboard, reflecting the low turnover there. However, the shortest mean duration of work experience occurred in the woods, and the longest in paperboard. Woods, lumber and paperboard jobs can generally be considered Class IV and plywood jobs Class III, according to the description given by the Ad Hoc Committee.

X-Ray Diagnoses

Table IV lists the various back x-ray diagnoses of the entire 213 cases of "C" back. Almost all of the diagnoses came under spondylolysis, with and without

TABLE IV

X-RAY DIAGNOSIS IN 213 EMPLOYEES HIRED WITH "C" BACK

Without spondylolisthesis	99
First degree spondylolisthesis	56
Second degree spondylolisthesis	1
Transitional vertebra with pseudoarthrosis	36
Previous surgery	7
Evidence of old fracture or wedged vertebra	6
Narrowed lumbosacral interspace	4
Epiphysitis deformity	1
Rotary scoliosis	1
Moderate arthritic changes, lower spine	2

TABLE V

REASON FOR HIRING 213 EMPLOYEES WITH "C" BACK

Spondylolysis without spondylolisthesis; not grounds for rejection	101
Defect borderline; applicant accepted	35
Job skill or other attractive feature overrides defect	18
Experimental placement in panels department	13
Experimental placement in other departments	17
Hired temporarily without x-rays; defect discovered during subsequent exam for permanent hire	10
Hired for temporary period only or for part-time work	12
Placed in Class II-type job	4
Other	3

spondylolisthesis, and transitional vertebrae with pseudoarthrosis. All the reasons for hiring the 213 employees are detailed in Table V. The majority were hired because the defect spondylolysis without spondylolisthesis was not taken as grounds for rejection. Also, a substantial number of applicants with borderline defects were hired, primarily because of management pressure to hire and because of rapid turnover. Four candidates were placed in Class II type jobs.

Thus, excluding the four subjects who were placed in Class II type jobs, there were 209 high risk employees hired into Class III and IV jobs, mostly Class IV, over a 48-month period. All of them had defects which, according to the placement criteria of the Ad Hoc Committee on Low Back X-Rays, should have disqualified them for the type of back stress required on these jobs.

Fig. 3 reveals the injury experience of the group. Six of the 209 had low back injuries during the observation period; all were minor and none caused any lost time. Based on person-years of experience, this was an injury rate of 32.5 per thousand.

Low Risk Group

The 1,992 employees in the low risk group had a total of 126 low back injuries during the period Jan. 1, 1967 to Jan. 1, 1971. The person-years at risk were determined only for the one-third sampling. Extrapolating for the entire 1,992 subjects, these 126 injuries represented an injury rate of 62.3 per thousand. Fifty-nine of the 126 injuries occurred to lumber department employees, 42 to woods employees, 17 to those in the panels department, 7 in paperboard, and one in the "Other" category.

The 126 injuries which occurred to the employees in the low risk study group and the six occurring to those in the high risk group were only a portion of the total injuries recorded for all employees during the four years under consideration. Actually, there were 395 low back injuries in all, most of them happening to employees whose employment dates fell prior to 1967, which would exclude them from the comparison groups.

Discussion

Kelly[3] has pointed out that there are areas of wide disagreement, even opposing viewpoints, on the pertinence of low back x-rays in pre-employment screening. But he saw this as a reflection of the differing requirements, experience, and needs among various industries. In his series of 1,087 examinations, 9.8 per cent of applicants were found to have disqualifying or limiting conditions, based on lumbosacral x-rays. The incidence of spondylolisthesis in this group was 3.4 per cent.

Kosiak et al.,[4] on the other hand, reported a five-year rejection rate of 28 per cent in a series of 4,103 x-ray exams at 3M Company. Altogether, 289, or 7.0 per cent, were rejected because of spondylolisthesis. They acknowledged their rejection rate of 28 per cent was somewhat higher than that reported by other authors. In an earlier paper,[5] these same authors stated that absolute rejection for heavy work was recommended only in the presence of previous back surgery, spondylolysis, spondylolisthesis, destructive bone and joint lesions, and marked narrowing of the intervertebral disc space at the lumbosacral junction.

Others[6–8] have recorded rates of rejection based on back x-rays from 16.1 to 29 per cent, and each investigator has applied criteria which he felt best fit the experience and needs of his industry.

McGill Report

In an earlier account of the Weyerhaeuser Company's back program, McGill[2] reported an overall rate of rejectable backs ("C" backs) of 12.7 per cent, out of 9,593 applicants examined. Spondylolysis and spondylolisthesis together accounted for only 4.1 per cent, and transitional vertebrae with pseudoarthrosis made up 3.9 per cent of the total. In the present study, 16.2 per cent of the applicants had "C" backs, and this group included an unusually high percentage of spondylolisthesis (6.5 per cent). An additional 4.5 per cent had spondylolysis without spondylolisthesis.

Due consideration has been given the possibility of over-interpretation of the films for spondylolisthesis. All were read by the author, eliminating interobserver variation. Spondylolisthesis was always confirmed by

JOB INJURY EXPERIENCE AMONG 209 EMPLOYEES HIRED WITH "C" BACK OVER A 48-MONTH PERIOD:

1. F.M., age 22, worked in woods eight months. Diagnosis spondylolysis without spondylolisthesis; jumped off log and "pulled" back. Treated by chiropractor; did not lose time.
2. R.B., age 36, still employed in lumber department. Diagnosis transitional vertebra with pseudoarthrosis; twisted low back. Treated conservatively, recovered in three days; did not lose time.
3. R.A., age 52, still employed in panels department. Diagnosis moderate hypertrophic changes L4-5; strained low back. Treated conservatively, did not lose time.
4. D.O., age 19, still employed in lumber department. Diagnosis spondylolysis without spondylolisthesis: developed sore back from pulling lumber; did not lose time.
5. G.M., age 23, worked in lumber department four months. Diagnosis borderline spondylolisthesis; strained upper and lower back lifting heavy boards. Treated conservatively; did not lose time.
6. R.A., age 54, still employed in panels department. Diagnosis moderate hypertrophic changes L4-5; strained low back while pushing panels. Treated by chiropractor, did not lose time. (Same patient as in 3 above.)

Fig. 3

the presence of spondylolysis on oblique projections, which were routine. A number of cases were borderline, but the majority appeared as clear-cut forward vertebral displacements, almost all at L4-5 and almost all of first degree.

It is felt that the population studied included a higher than usual number of subjects with this defect. It compares in incidence with the 7.0 per cent reported by Kosiak et al.[4] Of the 155 applicants with spondylolisthesis, 57 were included in the high risk group (Table IV) for one reason or another, most frequently because the defect was considered borderline (Table V). The rest were rejected for employment.

The many descriptive reports of pre-employment back x-ray programs are similar, in that generally criteria are used which resemble those adopted by the Ad Hoc Committee on Low Back X-Rays. Each industry has its own slight modifications, and each has its individual rejection rate, but this is to be expected considering the dissimilarity among industries. What is more striking, however, are the diverse ways in which the authors evaluate the worth of their pre-employment x-ray programs.

Frequency of Abnormalities

One method of studying the association between x-rays and low back injury has been to record the abnormal x-ray findings most commonly diagnosed in the injured back. However, Splithoff[9] and Runge,[10] among others, have commented on the large number of abnormalities which may be observed with equal frequency in both normal persons and those with back pain. A variation of this approach is to divide the injured subjects into two groups: an abnormal group with x-ray defects based on the Ad Hoc Committee's criteria, and a "normal" group with normal or insignificant x-ray findings. Diagnosis, frequency, and severity of injury are then compared between the two groups.

Thus, Connell[11] compared "contributing factors" in an injured group with the same factors in a group of pre-employment applicants and found a ratio of three to one in the former over the latter. Moreover, among the back injury patients, those with lesions ("contributing factors") had a much greater severity rate and treatment time than those who did not have spinal anomalies.

This particular retrospective analysis, done after the fact of injury, in no way represents a controlled experiment in which multiple other variables such as age, duration of exposure, and heaviness of assigned work are eliminated as possible contributors to the results.

Along similar lines, Kosiak et al.[4] concluded that rejection or selective placement was justified during pre-employment evaluation, based on their follow-up studies of back injuries over a three-year period. However, some of the injured patients included in the analysis did not have a pre-employment x-ray at the time of hire but a diagnostic one at the time of injury, while others had been x-rayed prior to employment. Also, a screening program was in effect at the time, which means that the worst risks were constantly being eliminated.

This, also, could not be construed as a valid comparison of the relative risks for injury between subjects with undesirable x-ray defects of the low back and those with normal backs. These authors found that the most common radiographic change in the high risk group with lost time claims (average age 48 years) was narrowed intervertebral disc space at the L5-S1 level. They acknowledged, however, that the potential arthritic cannot usually be detected by x-ray examination of the young adult.

Crookshank and Warshaw

The method of Crookshank and Warshaw[7] was to compare a group of 1,503 applicants placed in jobs suited to their x-ray status with 3,395 workmen in similar jobs who were not x-rayed prior to placement. Only seven in the former group sustained non-traumatic back disability in a five-year period, while 254 cases occurred in the latter group. No doubt this justified the placement program, but, again, it does not evaluate the risk posed by a predetermined set of abnormal x-ray criteria. By selectively placing the applicant suspected of being a high risk in a protected work status, there was no opportunity to observe what experience that person would have had compared to a "normal" employee doing similarly heavy work.

In the impressive seven-year study by Rowe[12] the normals used for comparison with a group of patients were matched employees who had never experienced low back disability. The results seemed to discount the value of pre-employment back x-rays by demonstrating there was no difference in the incidence of fixed findings between the patients with back pain and the normals. These fixed findings included increased lumbosacral angle, spondylolisthesis and transitional lumbosacral vertebra.

The only x-ray finding which differed between the normal group and the patient group was degenerative disc change, which showed an incidence of 22 per cent in the normals, 54 per cent in a patient group which had *not* lost time, and 62 per cent in the patient group that had lost time. However, this was only in men in their 30's and 40's, giving this finding a limited usefulness as a predictive tool in a young applicant population.

Justification of X-Ray Examination

Other authors[2, 13] have justified the pre-employment x-ray examination on the basis of reduction in compensation costs following the adoption of a "back program." Normally there are other components to the program, which cloud the role played by the x-ray alone as a technique for screening out high risk backs.

The general intent in these studies has been to show either the strong association between certain abnormal x-ray findings and varying degrees of low back disability, or to demonstrate a favorable trend in reduction of injury frequency and severity and/or compensation costs following the adoption of a program in which pre-employment back x-rays was one of the elements. However, it does not seem that the actual worth of the x-ray as a screening technique can be properly evaluated by studying injured patients or by following programs in which the x-ray is anything but a controlled variable.

In contrast, the present report on Weyerhaeuser employees simply compares the injury experience of two groups of employees doing heavy work — one with back x-ray findings indicating high risk in this kind of stress and the other with normal back x-rays. Hopefully, the subjects in the two groups are closely matched except for the one variable.

Limitations in Study

There are some limitations to this study which should be pointed out. The most obvious is that while 386 applicants were identified as substandard risks for heavy work in the four-year period of investigation, there were only 209 members in the high risk group. If the 177 "C" backs that were rejected for employment represented a greater risk than those selected, then the study is biased. There is no question that the 209 applicants with "C" backs accepted for employment were selected in a biased manner, i.e., with hope that *their* defects were less perilous than those of the rejects.

The best that can be said in favor of the design is that the employees in the high risk group nonetheless fit squarely into the definition of rejectable candidates for Class III and IV jobs, according to the Ad Hoc Committee, and should be acceptable for comparison with normal candidates by this yardstick.

A second shortcoming is the fact that four years is not a very long time to record the back injury experience of these two groups and draw conclusions from the observations. This apparent defect is countered by the revelation that two-thirds of the subjects stayed on the job an average of only five or six months and then quit. In these cases, five or six months was all the follow-up time permitted to us.

Further insight into the association between time on the job and injury is presented by Kosiak et al.[4] who reported an inverse relationship, with approximately 50 per cent of the claims and lost time being reported by employees with less than one year on a specific job. This held true through the fifth decade, with the greatest incidence in the younger employees, demonstrating a high rate of injuries in employees with relatively brief work experience, especially in the younger age bracket, and suggesting that a long period of observation may not be essential to a study such as the present one.

Ages in Study

The average age of our 126 injured employees in the low risk group was 28.6 years; however, this was definitely tied to the young age of the employees at hire (an average of about 27 years). No subject could be more than four years older at the end of the observation period. One would have to accept the limitation, if it is one, that this study does not present an opportunity of following employees with "C" backs, in controlled job situations, for a prolonged period of time. This is partly because it covers only a four-year period, but mainly because the rate of labor turnover is so high that, for the majority of subjects, only a few months elapsed from employment to termination. Certainly the latter statistic might have a strong bearing on whether or not a pre-employment back x-ray program is justified in a labor market of this kind.

Finally, the industrial back injury by itself may be a rather superficial measuring stick of the total disability risk presented by a selected group of x-ray findings. This study does not correlate defects revealed by x-ray with back injuries or back pain which may have occurred to subjects off the job or before they were hired. A more comprehensive survey would give a greater understanding of the total back disability picture as it is affected by the one variable of abnormal x-rays. Since the industrial back injury and its tremendous costs assumes such overriding importance in industry, these other related quantities are often neglected. The paper by Rowe[12] is an exception to this.

Summary

1. Using criteria similar to those adopted by the Ad Hoc Committee on Low Back X-Rays, 209 employees

designated as substandard risk for sustained heavy work and 1,992 employees with normal x-rays were placed on similarly heavy jobs, and their back injury frequency rates were compared over a four-year period of observation.

2. Six members of the high risk group sustained low back injuries, giving an injury rate of 32.5 per thousand. In the low risk group there were 126 such injuries, for an injury rate of 62.3 per thousand.

3. For the majority of subjects, the risk experience was only a few short months, and the possible vitiating effects of this factor were discussed. Also, the method of selection of the high risk subjects and the manner in which this might attenuate the study results were examined.

Conclusions

This investigation did not support the hypothesis that subjects classified as high risk according to low back x-ray should show a significantly greater incidence of low back injury than those designated low risk. Employees placed in the high risk group actually had a lower incidence of injury than the low risk employees.

Thus, using the criteria presented here, the lumbosacral x-ray taken at the time of employment did not predict or screen out injury-prone applicants.

In the occupational setting described, two-thirds of the employees remained on the job only five or six months. This study could not evaluate the worth of an x-ray screening program applied to the other one-third who may stay with the company for many years. As long-term predictors, the x-ray criteria might very well find more usefulness in this group as their age and duration of exposure increase. The answer must lie in continuing investigation into the experience of the long-service employee.

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Competence Is a Perishable Commodity

With all the problems that recertification entails, why does the board pursue it? We certify internists, and subspecialists in internal medicine, as being competent in their field. But competence is a perishable commodity these days. New knowledge of value in maintaining health and managing disease is being created more and more rapidly. If the physician does not learn the new knowledge that counts, he may unwittingly do his patients a disservice because they consult him instead of another physician who might know better what to do. As the years go by and science advances, the lessons of medical school and formal graduate training are less and less useful. Even if the stream of new knowledge were to stop flowing, we should all have to keep paddling to stay in the same place. Everything fades with time. The board has seen all too often how scores on the written examination can progressively fall over a period of years as unsuccessful candidates repeat their efforts to pass. It has also seen great improvement in the score of an occasional repeater whose failure has stimulated serious preparation for another trial. The demands of new knowledge, the reality of human forgetfulness, the demonstrated benefits of review, and the board's wish that its certificates should really mean what they say have all prompted our move towards recertification.

— From "Periodic Recertification," by John B. Hickman, M.D., JAMA, Sept. 7, 1970, p. 1658.