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nerve are produced by irritation at the pelvic level of the sciatic nerve. The nerve compression may, if prolonged, result in marked muscular atrophy or impairment of nerve conduction with loss of reflexes. These signs clear up following release of the fascial contracture.

The length of time necessary to bring about relief of symptoms by the routine stretchings varies according to the severity and locale of the contracture, and the cooperation of the patient. For example, the symptoms of dysmenorrhea[2] will usually be relieved by the end of the second to third month. Symptoms of "spastic hammer toes," "Morton's toe," metatarsalgia and painful tender heels[4] will usually be relieved within three to four weeks.

After relief has been obtained, it is best to advise all patients to continue sufficient stretchings to prevent recontracture.

It must be emphasized that the basic requirements for any plan of physical rehabilitation are a trained, well organized working team supplied with an adequate physical plant in which to carry out the necessary procedures. Each individual to be rehabilitated must be coordinatedly and carefully guided and encouraged both physically and psychologically.

A mental attitude of fear, distrust, discouragement, resentment, antagonism or rebelliousness, if allowed to persist, will controvert any attempted aid.

Summary

THE role played by fascial ligamentous bands in mechanical functioning of the body is outlined.

2. The syndrome of fascial ligamentous contractures producing back pain and peripheral nerve distribution symptoms and signs by means of compression irritation of the nerve pathways is described.

3. Factors instigating fascial contracture are listed.

4. Methods of diagnosing fascial contracture are given.

5. Stretching methods for release of fascial contractures are outlined.

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The Industrial Physician

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TO ENUMERATE the professional and the personal qualifications of the physician in industry is a task which cannot be accomplished with any degree of finality. Any definition of what constitutes the desirable physician in industry must remain tentative. Progress in medicine as a whole and advances in medicine as applied to industry will, inevitably, make such a definition subject to change.

It is indeed conceivable that our current thinking will be as obsolete 50 years hence as are many of the observations of that seventeenth century physician, Ramazzini, who may be justly called the father of industrial medicine.

In discussing not only the personal qualifications but the scientific ability of the present-day physician in industry, it is proper that we should consider the attainments and the personal attributes of this early pioneer in the field of industrial medicine. A glance at his early career showed that he wavered between the study of law and medicine. His greatest attribute was his humanitarianism. He displayed an attitude of sympathy for and an understanding of the worker in a period when manual occupations were looked upon with scorn. He disregarded social status at a time when the strata of society were divided by impossible barriers from one another. Yet, he was able to win and retain the confidence and favor of the leaders of this period. He won favor with noble patrons with whom he had long profitable association.

At a time when many physicians were primarily concerned with anatomical study he urged the study of epidemiology, and sought data for medical meteorology. He was not an academic recluse isolated from the many problems of his day. He was, in many respects, a most worthy example whom we may well consider when we attempt to define the qualifications of the physician in industry.

THIS discussion must begin with the prospective medical student since, in a real sense, the doctor is already partly formed before his matriculation into a school of medicine. This man or woman should possess some of the qualities of the pioneer; a sense of high adventure, a willingness—in fact, an eagerness—to be a part in the building of new paths to medical progress. These are the qualifications to be sought, for the reason that, within the next decade or two, the evolution which we shall witness in this field will surpass the expectations of our most sanguine hopes. And, those students who, in their school careers, go beyond the passive assimilation of factual information are the ones best fitted to share in the active, creative years ahead. If one were to ask what curricular demands should be insisted upon in training these students one might name, as of fundamental importance, biology, physics and chemistry. These subjects will particularly affect our daily lives, for in no other fields may we expect such far reaching developments as will occur within these. Emphasis should also be placed upon history, economics and sociology. Stress should fall upon the subjects which orient the student in respect to his human relationships. The elements of human psychology—both normal and abnormal—should be considered an essential part of the premedical curriculum. Still another demand might be made—one removed from the conventional sphere of the premedical program as we know it today. One might ask for a course in salesmanship and accounting in the collegiate years. This is a point of view which this writer has rarely expressed. It is not proposed to develop the ability to "sell" in the commercial sense. However, in the industrial and commercial setting in

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which the physician we have in mind will function, such training may help bridge the gap between this environment and the laboratory or lecture hall. Then, too, we are forced to admit that the appeal to managerial support for the medical department in industry demands some degree of salesmanship, at least it demands the capacity to translate indisputable human needs as well as legal requirements into such a form as may command the attention of the occasional executive mind whose thinking is largely in material terms. In addition, it has been my observation that the well-trained salesman frequently possesses a delicacy of human understanding and a capacity for personal adjustment in human relationships not always apparent in the professions. Let it be understood that it is these qualities which are sought when we mention training in salesmanship and that, whatever may be the means for the development of such qualities, they should be utilized, inasmuch as common observation would seem to indicate their desirability in industry. The industrial physician must, on occasion, be more than a physician and for such occasions he should be adequately prepared. In addition, accounting training provides information valuable in the control of budgets. This is a vital matter for the medical department in industry.

We come now to a consideration of the undergraduate medical training for the practice of industrial medicine. This question cannot be dismissed in its entirety by the mere acceptance of the present conventional course of study as suitable for the purpose. It will probably be generally admitted that the highly developed curriculum of our medical schools places them in the vanguard of medical teaching. It is the very fact of this phenomenal growth which enables us to seek, in the curriculum of the medical school, certain specific elements for emphasis which should aid in accomplishing two objectives: first, the preparation of the physician in private practice to recognize and deal with disease which originates in industrial exposures; and, second, the establishment of a strong foundation upon which the future industrial physician may erect the superstructure of specialized study. These objectives may call for a revision of our present curricula; they demand the placing of emphasis upon certain courses already offered in our schools and, possibly, the inclusion of certain specific topics within these courses. While we do not wish to imply that any of the currently required studies should be relegated to positions of secondary importance, we should like to point out the necessity of attaching great significance to biochemistry, histology—particularly in its hematological aspects, physiology, pathology, bacteriology, pharmacology and toxicology. With such emphasis it should then be possible in the senior year to establish a course in industrial medicine, thereby correlating work done in other departments in the application of medical science to our industrial units of society. This should not be an elective course since at least 90% of our graduates have in the first few years of practice some industrial contacts, directly or indirectly. In this manner the student will become aware of the opportunity and the importance of the field.

In the clinical years of medical training the primary effort should be directed towards the development of the powers of independent observation. The didactic work in medicine and surgery should be supplemented by extensive opportunity for first-hand individual study of cases and the synthesis of clinical observations into diagnostic and therapeutic conclusions which the student reaches by his own efforts and which are later revised and supplemented through the indispensable check made by the teaching staff. The reason for emphasis on these matters lies in the basic necessity of developing, in our industrial physicians, the capacity for independent effort and self-reliant attitudes. This does not suggest that in the performance of his practical duties the industrial physician should always consider his judgment final. It does mean, however, that he must be taught to accept responsibility in the usual case rather than delegate it as a matter of routine. Only in this manner is it possible to develop effective physicians for this field —physicians to whom their work will be a continual challenge to further professional growth. To the question of this capacity for continued professional development, we wish to give the strongest possible emphasis. No physician in industrial medicine will ever be permitted to rest his claims to professional knowledge and skill on any given period or type of preparation. The unending changes in the nature of industrial hazards and the prevention and therapeutic measures, therefore, will force the physician either into a pace of rapid professional growth or into the dangerous calm of professional stagnation. It is for this reason that the student must achieve the capacity of independent work and study if he is to remain an effective worker and student in this field. This point of view is not to be construed to mean that consultation with the specialist is rare in industry. But consultation is always best used by those possessing the best medical background and the most initiative, adroitness and intelligence in their medical thinking.

Certain aspects of the course in medicine should, possibly, be singled out for special consideration. They are those phases which deal with the blood dyscrasias, with pulmonary pathology and dermatological lesions. In the realm of hematology the student should become thoroughly conversant with the normal differential count. The normal size and morphology of blood cells should be readily recognized. The more common departures from normal should be understood. In the detection of pulmonary disease, considerable skill should be developed. In this is included the ability to detect anomalies on the x-ray plate and to identify the more common lung affections. Some acquaintance should be developed with the x-ray appearance of tuberculosis and the pneumoconioses. In dermatology, not only should the student learn to recognize the common lesions, but he should also be fairly well grounded in the manifestations of sensitivities, in their underlying theories, the tests for their detection and the means for their control.

In the surgical clinics, beyond the usual contact with the major surgical problems, there should be a greater exposure to minor surgery in its various phases. As much as it may be possible to permit it, there should be actual participation of the student in the care of these cases. It may be said, in objection to this point of view, that sufficient experience in this field will be gained during the internship in the majority of hospitals. However, it is probable that a closer supervision of technique will be possible in the highly organized teaching hospital than will obtain in the students' later work in the emergency room.

One phase of clinical training which merits more stress for its value both to the general practitioner in private practice and to the industrial physician, is orthopedics. In fact, while the question is not pertinent to the subject of this paper, it appears that many physicians are of the opinion that a relative

indifference to orthopedic matters on the part of legitimate practitioners is one of the causes responsible for the development of certain cults. However that may be, the importance of orthopedics in general practice as well as in industrial medicine cannot be overemphasized.

There is another branch of clinical instruction which should be singled out for special stress: the laboratory. Allusion to laboratory methods of diagnosis has already been made. To what has been discussed should be added a mention of the need of continuous touch with the objective means of identifying disease, with the procedures common in toxicology, and also with the methods by which the concentrations of noxious dusts, gases, and other agents are ordinarily studied. Industrial medicine places considerable reliance on the laboratory for guidance; the industrial physician must, therefore, be cognizant of the nature of laboratory techniques and of the significance of the findings. Competence in these matters, will mark the difference between progressive and effective preventive programs in industrial medicine, and the static, purely therapeutic and legal concepts which, unfortunately, have not yet undergone complete eradication. There is one caution which should probably be mentioned in interpreting this recommendation. There is no suggestion that the industrial physician be relegated to the position of laboratory technician. He should, however, be capable of understanding the potential contributions of the laboratory and of guiding its activities.

OUR discussion now leads us to the more specialized graduate training which has become indispensable for the industrial physician. Up to this point we have sought to emphasize certain parts of the medical course which will play a particularly direct and vital role in the induction of the physician into industrial medicine. However, no suggestion has been made that the preceding recommendations will, if followed, complete the desired training. The undergraduate years are far too crowded to allow time for the more thorough, deliberate, and delimited study possible after graduation. When this point is reached, the immersion of the physician in the province of industrial medicine becomes complete. He will draw heavily on what he has learned; but he will add to his information and to his skills by contact with the highly specific problems of the industry which employs him. First of all, he will now observe the working environment and develop knowledge of industrial materials and processes and of the hazards which come to the worker from exposure to them. He deals, now, with human subjects whose health, safety, and occupational fitness are his personal responsibility. The extent of this responsibility will impose heavy burdens requiring constant attention. The physician now loses, in a measure, the ready recourse to books, for certain things he must come to know and to evaluate only from repeated, direct and persistent personal contact with them. It is vitally important that he know the character of his plant, the materials used, the processes, and the diseases and safety hazards of the job. This is fundamental as it will render his duties intelligible to him and his work effective. He must develop an intimate knowledge of a variety of subjects. The metals, their multiform assaults on the human economy, and the great complex of symptoms to which they give rise; the dusts, particularly silica and certain of the silicates; the gases, solvents, and fumes with the intricate problems provoked by such members of this group as benzene, the petroleum hydrocarbons, fluorine, chlorine, and carbon monoxide—to mention only a few; the dermatoses, which are far from rare and not an infrequent cause of headache to the physician; that remarkable entity, the industrial back which often threatens to be the proverbial last straw on the back of the harassed doctor; and the ever present hernias concerning which legal gentlemen will probably teach you things utterly baffling to the medical mind and utterly unsuspected by the embryologist, the anatomist and the surgeon. Besides, we cannot omit the occupational neoplasms, electrical injuries, and the disabilities associated with humidity and thermal hazards. The list is by no means complete, but space forbids greater details. And for these conditions, and many others, the physician must, of course, know the pathological findings, the symptomatology, the diagnostic procedures, the therapy, and the prophylaxis. He must be conversant with these matters if he is to escape the pitfalls which will constantly beset his steps. The intricacy of the problems involved is truly great. We may illustrate by giving a few examples, touching on one question alone—that of diagnosis. If, let us say, we confront a patient in convulsions, a worker in a plant where no conceivable noxious exposure could lead to this symptom, we may well run the range of causative factors from apoplexy to general paresis, cerebral tumor, hyperinsulinism, tetany, hysteria, etc. Yet, extended inquiry reveals lead exposure perhaps prior to his present employment and blood and urine study confirms the presence of plumbism. Manganese poisoning may produce such symptoms as a spastic gait, mask-like faces, a low monotonous voice, emotional disturbances such as uncontrollable laughter, cramps and muscular twitchings—among others. These complexities are, perhaps, even more evident when, from one main presenting symptom, a diagnosis must be sought. Take, for example, amblyopia. It may arise from methyl alcohol, carbon bisulfide, lead, mercury and other toxic substances. It may also be congential, or traumatic, or it may be due to hysteria or several other causes.

Now the reader may have met this enumeration of difficulties with unconcern. He may have indulged in the happy reflection that after all these are medical matters and that he, as a physician, will shortly find them part of a familiar and interesting medical venture.

But it must be remembered that the industrial physician is flattered with additional challenges to his abilities. He must be an able administrator. Besides, he must have some knowledge of the law and must, on occasion, adroitly find his way out of the maze of perplexities that opposing counsel will construct about him. These are matters which the physician should realize at an early stage of his industrial career and thereafter keep in mind if he is to avoid the shock of sudden impact with forces to whom medical facts are less sacred than they are to the devotee of science. And this is by no means all. He must be a safety engineer, since the mechanical factors of safety should fall under his control. And he may add much in the elimination of accidents through careful analysis. Then, too, the physician in industry is, without apology, called to function in a teaching capacity. Health education is of basic importance in preventive medicine, and preventive medicine is the ideal function of the industrial physician. He must, therefore, possess or develop the ability to translate all sorts of medical technicalities into lay terms. He must do this in his everyday contact with the worker, in the preparation of articles for publication, and in lectures to a great variety of groups. He must perform this delicate task without

sacrificing scientific accuracy and without compromising his reputation as a physician. There is a recompense, of course, for no group is so receptive to fundamental health facts as industrial workers.

WE HAVE discussed, at some length, the professional qualifications of the physician in industry. We have interspersed these qualifications with mention of the personal characteristics we believe desirable in such a physician. It might be well to terminate this discussion with a brief elaboration of certain traits which have merely been mentioned in passing. These traits, experience has apparently shown, are of crucial importance in the attainment of success. Intellectual ability of more than average order is obviously indispensable when we view the complexities of medicine in general and of any of its special branches—industrial medicine included. To this ability there must be added initiative and energy—traits which are basic in the origination of inquiry into the possibilities for service. The industrial physician should not wait for patients, but should go forth into the areas of potential danger and eliminate the hazards he finds. He cannot do this unless he is actuated by the initiative and the will to action which will make it difficult to find satisfaction except in positive vigorous effort. He must possess, moreover, courage and persistence to follow a desirable course when it offers obstacles or when special interests, through misunderstanding or for other reasons, erect artificial hindrances to progress. He must have high professional skill and must have well developed inclination toward study so that he may keep abreast of scientific developments. He must be committed to the thesis that prevention is the ultimate goal of medicine and that the prevention of disease is even a higher obligation than curative efforts. He must have a sincere interest in people so that he may enjoy their good will. He must be capable of emotional detachment from the vexations of his work, so that he may be able to compose differences on matters of health which occasionally arise between workers and management.

He must face such issues with that intelligent, informed and impersonal approach that will result in the trust and respect of both the management that employs him and the worker for whose benefit he serves. He must, in addition, possess some ability to convey ideas whether in writing or in speech in order that he may effectively reach the many groups with which he must maintain contact. He must possess maturity of outlook, tact and human understanding since his personal relationships must be happy if they are to be productive of the good he seeks to accomplish. He must at all times practice the Golden Rule in his relation with his colleagues. In all matters affecting the health of the community he must take a vital interest.

He must, indeed, be a moving factor in questions of public health, for to safeguard the health of the people is to protect the health of the worker.

These are the qualities of professional background and personal characteristics which are essential for the highest success in industrial medicine. They are precursors to rich and fruitful accomplishment. If it should be said that they are goals to be sought rather than qualifications which are usually found, one may reply that they are in fact both. We may, perhaps, never find them all in one person. We shall, however, find many in any successful physician in industry. Those which we do not find in any given individual remain for that individual goals yet to be attained—goals which when reached will make for a still higher type of service, for a more complete and happier career in this specialized field of medicine.

In closing, I wish to express the belief that our own paths might have been much easier if in our period of training we had been exposed to the fundamentals which I have attempted to present to you. We have all had to develop many of the qualities I have described while engaged in performing our duties as industrial physicians. I believe that through the type of preparation I have tried to outline, we might have been spared some of the difficulties and misunderstandings which we have met in the course of our careers. I cannot help but feel that the suggestions I have taken the liberty of making would bring the future industrial physician to his work with the essential preparation that many of us have had to develop through our own efforts during the course of years.

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Small Plant Physical Examinations

IN THEIR article last month* on the small-plant industrial health program of Snap-on Tools Corporation, Kenosha, Wisconsin, MR. H. V. ERICKSON and DR. C. E. PECHOUS state that "500 persons were checked physically." The following are the findings of the physicians making these physical examinations during the period from February 1 to June 20, 1944, on the employees who had been with the company prior to the increase of man-power resulting from the Lend-Lease program and continuing into war production:

I.	Chest rales and questionable lung condition (X-rays have been advised on six of these cases. X-rays were taken, and reports submitted)	13
II.	Heart diseases, including: bradycardia, tachycardia, enlargement, murmurs, degeneration, etc.	23
III.	High blood pressure	7
IV.	Low blood pressure (These employees are over 30 years of age, and have a blood pressure of less than 100)	8
V.	Potential and absolute hernias	41
VI.	Hemorrhoids	48
VII.	Venereal diseases (syphilis)	3
VIII.	Diabetes (Two of these employees did not know they were diabetics)	5
IX.	Generative organs—men and women—(Including hydroceles, enlarged prostates, uterine masses, ovarian cysts, etc.)	28
X.	Varicose veins—moderate and severe	36
XI.	Skin diseases (occupational dermatitis, 14; acne, 8; eczema, 2)	26
XII.	Enlarged thyroid gland	1
XIII.	Employees who either need dental care, or have enlarged tonsils, or gum infections	70
XIV.	Epileptic—very mild form. (He has had but one attack in the past year and a half)	1
XV.	Miscellaneous—one case of each disease: Possible colitis; albumin, 4 plus; chronic abdominal soreness; small mass on right breast; enlarged left posterior auricular gland.	

*Small Plant Industrial Health Program, Snap-on Tool Corporation, by H. V. ERICKSON and C. E. PECHOUS, M.D., INDUSTRIAL MEDICINE, 14:3, 184-188, March, 1945.