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INDUSTRIAL SURGERY*

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I. HISTORY

INDUSTRIAL medicine and surgery has been defined as a combination of preventive and curative medicine, applied to groups of working men and women. This field of medical activity germinated and evolved with the transition of the country from an agricultural to an industrial one and has grown with mushroom-like rapidity during the last quarter-century, and more especially during the last sixteen years, until it is today a well-developed specialty. In the forty years between 1880 and 1920 there was a decrease of 33,000 farms in New York State, while over against this decrease in agricultural pursuits, we find an increase of 30,000 factories in the twenty-six year period from 1900 to 1926. Synchronous with this growth in the number of manufacturing concerns has come a complicity of mechanical devices, an intricacy of machinery requiring the nicest attention of the worker to detail, the closest concentration on each movement of foot or hand, and a rapidity and deftness of motion almost superhuman. So interdependent are the countless processes that go to make up a single product, in this era, that the ill-timed movement of one operator may endanger the lives of many. Unfortunately, in spite of the high degree of perfection to which man has brought the machine, product of his creative mind, he is powerless to remedy the faults in his own mechanism. "His movements fall into a natural rhythm indeed, but the beat is both less rapid and more irregular than the rhythm of most machines. . . . Fatigue overcomes him, slowing his movements, lengthening his reaction time, and diminishing his muscular accuracy, thereby trebly enhancing his liability to accidents." "Accidents, therefore, cannot be entirely obliterated and compensation cannot pay entirely the 'blood tax' of industry." Gradually this conception of the responsibility of the industrial world for its workers has come into being. Seventy-five years ago, the individualistic theory prevailed that the worker voluntarily assumed the hazards of his work when he was employed—that he was a free agent, knowing of the dangers to which he subjected himself and capable of guarding himself against them.

The principle of the state assessing the employer for the cost of medical and surgical aid and of monetary compensation during the period of disability, making it a matter of law and right as opposed to charity, is of German socialistic origin, the first important legal expression of it being the German Employers' Liability Law of 1871. So revolutionary was this idea that it was at first made applicable only to the more obviously hazardous occupations. This led to the compulsory industrial accident insurance laws of 1884. The various European countries followed Germany's lead—Austria in 1887, Hungary in 1891, Norway in 1894, Finland in 1895, France and Italy in 1898, Spain in 1900, Holland in 1901 and Russia in 1904. England passed an Employers' Liability Act in 1880 and a Workmen's Compensation Act in 1897.

In the United States this shifting of responsibility from the individual worker to industry as a whole, however, seems to have come with a tardy awakening of the industrial conscience, and it was not until 1908 that a faint stirring of it was felt in the law passed by the federal government compensating government employees engaged in hazardous occupations. In 1909, there was another slight quickening when Massachusetts enacted a statute which authorized voluntary plans of compensation. By 1911, ten states, of which Massachusetts was one, had passed workmen's compensation laws. The World War had much to do with emphasizing the importance of the conservation of man power, and during the years of the War and the years immediately succeeding, the remaining states passed compensation legislation.

II. PRESENT LEGAL STATUS IN THE VARIOUS STATES

According to Jones' digest of workmen's compensation laws in the United States (1925), in 42 states and in 3 territories the working man is now afforded this protection. Six states have

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no compensation laws. In 12 states and in 2 territories compensation is compulsory in some or all private employments. In 28 states and in 2 territories it is compulsory as to some or all public employments. In 30 states and in 1 territory compensation is elective as to all private employments affected, in 9, it is elective in all public employments.

Insurance

Insurance, security, or proof of responsibility is required by 40 states, while 2 states and 1 territory demand neither of these three guarantees. Insurance is secured by a state fund in 17 states and in 1 territory; 25 states have no state fund insurance.

Administration

There is some variance in the manner in which compensation laws are administered in the various states. The method used in 31 states and in 1 territory is that of a single Commissioner, or else that of a Board or Bureau of Commissioners. The courts administer the law directly in 7 states and in 1 territory. The other 4 states have some slight divergence from the regular methods: in New York, for instance, there is a single Commissioner, who generally administers the law, but judicial questions are decided by an Industrial Board.

Compensation

The British law, which was the foundation of our own, allows for total disability a compensation of one-half the weekly wage, and for partial disability a compensation of one-half the loss of earning capacity. For disability of less than one week, no compensation is allowed, nor is there compensation for the first week if the incapacity lasts for but two weeks. Under the British law, the employer is individually responsible.

Thirteen of our states follow the British law and allow, for total disability, one-half the average weekly wage, and for partial disability, one-half the loss of earning capacity. In eleven states, the proportion is two-thirds the average weekly wage; in seven states, 60%; in four states, 65% of the average *weekly* wage, and in two states, 65% of the average *monthly* wage; in two states the percentage allowed is 55; and three states have each a wording peculiar to itself: thus, in Oregon, the law reads "from 40% to two-thirds of the wages according to the employee's domestic circumstances during disability." In Wyoming, a lump sum is given and so much a year for each child. There is great variance in the maximum weekly amount allowed, ranging from $12 in Alabama to $21 in Connecticut. Many states make special provisions where there are children.

Definition of the Law

The definition of the compensation law as carried out in the various states hinges on the words "personal injuries," which may be said to be the crux of the confusions and difficulties which have arisen in connection with the administration of this law from the time of its inception. The English compensation act (1897) used the phrasing "personal injury by accident arising out of and in the course of employment," and that wording is followed by Arizona, Colorado, Indiana, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Nebraska, New Hampshire, New Jersey, Oklahoma, Oregon, and Rhode Island. The words "by accident" are omitted by the other states except Illinois and Wisconsin, where the wording is "while engaged in the line of his duty as such employee." Maine, Massachusetts, Montana, Ohio, Texas and West Virginia omit the word "accident" and qualify "personal injury" only by the phrase "arising out of and in the course of his employment." In England, the term was not satisfactorily defined until 1903, when Lord MacNaughten interpreted it as "denoting an unlooked for mishap or an untoward event which is not expected or designed," and in 1906, a separate statute enumerated twenty-four diseases in which compensation should be allowed.

Medical Attendance

In most of the states the legal phraseology respecting medical attendance is: "The injured employee, if requested by the employer or ordered by the Board, must submit to medical examination at reasonable times and places. The employee may have his own physician present. Refusal to submit suspends, and unless justifiable, forfeits the right to compensation during continuance." There is some difference in wording in some states, but in general the phrasing has this import.

III. THE LAW IN MASSACHUSETTS

The Massachusetts law is administered by the Industrial Accident Board, consisting of seven members appointed by the Governor with the consent of the Council, one member being designated Chairman by the Governor. The Chairman appoints five members to serve as a Reviewing Board.

The employer is required to report any injury to the Industrial Accident Board within forty-eight hours, and a conference for the adjustment of any difficulty may be arranged between a member of the Industrial Accident Board, a representative of the insurance company, and the person making claim for compensation. If no satisfactory agreement is arrived at, a claim for review may be filed, and after a hearing of the parties by the Board, the decision of the member of the Board may be revised if it seems

necessary. Any party interested may then present certified copies of an order or decision of the Board, a decision of a member from whom no claim for review has been filed within the time allowed, or a memorandum of agreement approved by the Board and all papers in connection therewith to the Superior Court for the county in which the injury occurred, whereupon a decree will be rendered by the Court. From this decree there is no appeal on questions of fact.

Insurance (Massachusetts)

By the Acts of 1912 the Massachusetts Employees Insurance Association was created with power to transact any kind of liability insurance which mutual companies may transact. Any employer in the Commonwealth is eligible to membership and the vote in the Association is *pro rata:* each subscriber is entitled to one vote, but if he has 500 employees, he has two votes, and an added vote for each additional 500 employed, with a maximum allowance of 20 votes. By the laws of 1912, also, mutual insurance companies were authorized to transact the business of employers' liability.

Definition (Massachusetts)

In Massachusetts, the word "injury" includes "whatever lesion or change in any part of the system produces harm or pain or a lessened faculty of the natural use of any bodily activity or capacity." Thus the Massachusetts law admits of broad interpretation, allowing compensation for quite remote sequelae of the immediate accident. When the causal connection is indisputable, even such distant results as insanity or suicide may be brought within the meaning of the law, and it is applicable in cases where the injury has been the cause of an acceleration of preëxisting disease. In this state, too, occupational diseases come under the compensation law, while in Connecticut, Michigan and Ohio they are not included.

IV. MEDICAL ASPECTS

This brief review of the history of indemnity for injury and of the law as it stands today in the United States will show the transitional steps which have led to its present somewhat imperfect status. The differences in wording and conception in the various states demonstrates that it is still in a state of flux. Not yet is the law so clearly defined that there is no room for dispute, nor the machinery for administering it so well-lubricated that there is no chance for friction. Thus the physician or surgeon called in on an industrial case has much at stake. To a great extent he can control the amount of permanent disability, influence the compensation to be paid, and act as the arbiter of disagreements which would otherwise have to come before the Industrial Accident Board. It is, therefore, necessary that the industrial surgeon be conscientious; every case which is brought to his attention should be considered as serious from its inception, for very often it is the small wound which causes the most trouble. The larger wound, by reason of its very extent, will drain well and often heal under adequate surgical care, and though the drainage wound of necessity brings the responsibility of a major problem, in case of doubt, a consultation can be arranged.

In considering the common forms of trauma for which compensation is sought, one finds certain types common to specific classes of work. Injury to the human body is brought about in one of three ways: (1) the human body, as a movable object, is projected against a stationary object; (2) the human body, as a stationary object, is struck by the movable object; (3) the human body is injured by a tool, utensil, or mechanical appliance. An interesting diagrammatic analysis of the causes of accidents in the steel industry, published in the United States Steel Corporation Bulletin No. 11, shows that the largest number are caused by hand labor (43.35%) and that of these, 14.42% are the result of material falling upon the hand worker, 7.08% are occasioned by sledge hammers, 5.92% by the worker being caught between material, 5% by strains, 4.66% by slivers or sharp edges, and 4.27% by the worker running into something. In the steel industries, mining accidents are second in frequency to those of hand labor, burns coming third, eye injuries fourth, falls comprising the fifth larger class, and accidents caused by machinery are least often met with. It is rather remarkable that of the injuries produced by falls, the largest proportion was due to slipping or tripping on the *level* ground, and that in the accidents by machinery, only 0.22% were due to the machinery's breaking, the largest number being the result of the workmen's getting caught in the machinery or being struck by it.

We find, also, in the industrial accident field that posture often enters into the type of trauma to which the worker is most subject. For instance, men who work at great heights, as in the building trades, are exposed to falls. Death may take place immediately, or, very commonly, there may result a fracture of the vault or base of the skull, or a fracture of the upper part of the spinal column. On the other hand, the worker who assumes a bending position, as the laborer using pick and shovel, exposes the lower part of the spinal column to injury by the falling of a heavy object upon his back. This may cause serious crushing of the lower vertebrae and pelvis, or muscular strains of various sorts at or about the sacro-lumbar region.

While fractures are of paramount importance in industrial surgery, comprising a large number of the cases seen, the treatment here is

no different than in general practice. The aim is to give not only good operative but the best possible functional results, and to restore the the worker, if possible, to his former occupation; or, if this is not within the surgeon's power, to enable him to do some other form of work. "Satisfactory function" is a term capable of different interpretation by the surgeon and by the worker, but it should be borne in mind that serious malposition, infection, or persistent pain can have no place in "satisfactory function" from the worker's standpoint.

The question of hernia is one of such moment in industrial surgery that it is the subject of definite rules laid down in the compensation acts of many of the states. It is said to occur with such frequency as to be regarded as "the greatest single frailty of the American worker," and that the immigrant laborer, whose food is not muscle-building, is most prone to be affected by it. It is, however, a condition which admits of fraud and malingering and, even where the intentions are of the best, of varying interpretations. The Oregon Commission requires affidavits to prove the non-existence of hernia before the accident. The Washington Commission requires proof that the hernia is of recent origin, is accompanied by pain, was immediately preceded by an accidental strain, and that it did not previously exist. It is the policy of the California Commission to compensate for any hernia, whether complete or incomplete, resulting from a strain, a wrench, or other industrial injury; but a chronic hernia, if injured or aggravated by injury, is not ordinarily compensable. A hernia which was merely incipient and was subsequently completed through injury is ordinarily compensable and in that state it is not necessary that there be immediate collapse or disability; it is only necessary to show pain or discomfort accompanying the alleged injury. The number of *bona fide* traumatic herniae is very small; one author affirms that less than one in a thousand is of this type. Because of its frequency, however, because it is a disputable problem, and because it is to the best interests of industry to return the worker to his employment as quickly as possible, it is the established policy of many industries, where occupation is even a remotely contributing factor, to repair surgically all herniae amenable to this type of treatment and to provide trusses where herniotomies are contra-indicated. In this manner, disputes as to malingering are done away with and industry has the benefit of an often-time faithful and deserving worker restored to his work with least expense and time lost.

Another important point in industrial surgery is the relationship of trauma and the late neurological manifestations of syphilis. Errors in diagnosis may lead to uncalled for compensation, since neurosyphilitics are especially liable to injury, inasmuch as they are subject to fits, optic atrophy, unsteadiness in gait, ataxia of the arms, diplopia, and mental changes. Mock gives the history of a painter whose symptoms were diagnosed as due to lead poisoning, whereas later, more careful examination led to a final diagnosis of syphilitic spinal meningitis. Loss of eyesight may be due to tabes optica; or an injured knee, supposedly damaged in an accident, may prove to be a Charcot joint. Thus, neurological examination, too often neglected, is a significant adjunct to the pre-employment examination, as well as to examination following injury.

In addition to the above-mentioned conditions there is a large range of pathology which is the direct result of some attribute of the material worked upon—the so-called "occupational diseases." Mock, quoting Hoffman, tabulates forty-two industries which are the source of dust inhalation. This dust is classified as: (1) metallic dust, such as brass workers, printers, engravers, and jewelers are exposed to; (2) mineral dust, which menaces marble workers, plasterers, and paper hangers; (3) vegetable fiber dust, which comes from cotton ginning, flax and linen manufacture, and cabinet making; (4) animal and mixed fiber dust, to which furriers and taxidermists, carpet makers and upholstery makers are exposed. Then there is the group of industrial poisons, which may be subdivided according to the effect produced upon the body: (1) poisons which act superficially, producing lesions of the part of the body they touch; (2) poisons which are absorbed by the blood, having a deleterious effect upon it; (3) poisons which act upon specific organs or tissues, such as the nerves or heart. Lead poisoning is the most wide-spread of metallic industrial poisonings. One writer on the subject says that lead is used in not less than 138 industries. These cover a wide range: glazing and decorating pottery, tiles, etc., the production of storage batteries, painting processes, rubber goods manufacture, laying electrical cables, making artificial flowers, etc. It is typically a cumulative poison, the symptoms appearing either as those of an acute or chronic intoxication.

Zinc poisoning takes the form of an ague, with an acute malaria-like chill, sometimes accompanied by fever, lasting one-half to three hours, terminating in profuse sweating and exhaustion. It is consequent upon the inhalation of zinc fumes by workers in brass and bronze industries. Arsenic poisoning may set up an eczema and ulceration of the skin, or general poisoning may be caused by the ingestion of salts of the metal or inhalation of arsenical fumes. Those exposed to this form of poisoning are workers engaged in the manufacture of candles and wax ornaments, japanned goods, gloves, artificial leather, oil-cloth, linoleum, cut glass, etc. The silvering of mirrors, making of thermometers and barometers, electrical meters, and the manu-

facture of mercurial salts or explosives, all expose the worker to mercury poisoning. In the distillation and purification of phosphorus dangerous fumes, both of phosphorus and phosphoretted hydrogen, arise and are a menace to those engaged in the manufacture of cartridges and cannons.

Because of the dangers in these industries, in many states there has been special legislation to safeguard the conditions under which the worker is employed and to protect women and children. In 1911 California, Connecticut, Illinois, Michigan, New York and Wisconsin passed laws requiring notification of occupational diseases. Maryland and New Jersey followed in 1912; Maine, Massachusetts, Minnesota, Missouri, New Hampshire, Ohio and Pennsylvania in 1913; Rhode Island in 1915.

Prevention

As prevention in medicine is coming more and more to the foreground as the primary object of the profession and stress on this aspect is superseding the importance formerly only given to *cure*, after the disease was well on its way, so in industrial medicine and surgery, more and more emphasis is being laid upon pre-employment and periodic post-employment examinations. While at first glance a health examination may seem a hardship in that it may deprive an unsound but deserving man of a job, on analysis it does not seem to work out that way. Wm. B. Fisk, Chief Surgeon of the International Harvester Company, states that scarcely 1% have been rejected by them as unfit. On the other hand, an examination serves to fit the worker to the type of employment for which he is best suited physically and mentally, resulting in conservation of man power. Periodical examinations, likewise, at least every six months, will better industrial conditions, protect coworkers, and benefit the diseased worker himself by detecting and putting under treatment at the earliest possible moment an incipient tuberculosis, or by discovering a cancer while it is still in the operable stage. Moreover, a physical examination before a man is transferred from one department to another, or put upon a different kind of work, will make it certain that he is kept on jobs suitable for him.

V. PROGRESS IN INDUSTRIAL MEDICINE AND SURGERY

Starting with a "company doctor," perhaps only called in as necessary, and a nurse, who, because there was no one higher in attendance, must be a physician and surgeon, even performing minor operations, the medical personnel of the modern industrial plant has come to include full-time physicians and surgeons of the highest type, adequately compensated, nurses and orderlies, and all the armamentarium of a well-equipped hospital. Industrial medicine and surgery, from being rather looked askance at, has attained the dignity of a specialty, with journals or sections of journals devoted specifically to it and special medical school courses designed to teach it.

No better illustration of what can be accomplished by a homogenous group can be cited than the industrial welfare work of the United States Steel Corporation. The growth of this work is best told in a brief résumé of the steel industry in this country, which began with the building of the first furnace for smelting iron on the James River, in 1621, by Englishmen under the guidance of John Berkeley. It has not been until within the last fifty years, however, that the steel industry has increased so enormously as to now employ over six hundred thousand people and produce annually more than sixteen hundred million dollars' worth of material. In the early days, all attention was necessarily concentrated on building up this great industry. In 1901, ten separate steel companies organized to form the United States Steel Corporation. Gradually, with the work established on a firm footing, the attention of the industrial managers was drawn to the finer details respecting efficiency and economic production. In 1906, a Safety Committee was appointed to study welfare matters, and in 1911, a central Bureau of Safety, Sanitation and Welfare, with subsidiary committees in the various companies. This Bureau is in constant communication with state and national authorities, with other employers of labor, and with representatives of foreign countries engaged in like work. Each Subsidiary Company has committees composed of foremen, master mechanics and skilled workmen, who investigate particular problems. There are also among the rank and file committees which report accidents and make recommendations to the central Bureau. Trained under the supervision of the company doctors are crews of six voluntary first-aid assistants, who take immediate charge in case of a serious accident, administering artificial respiration and resuscitation, or provide the necessary aseptic dressings to prevent infection of wounds. Each Subsidiary Company has an emergency hospital, to which all cases, no matter how trivial, are immediately sent and treated by competent surgeons and trained nurses, to be transferred later, if necessary, to a base hospital, usually a public one. On December 31st, 1925, the Corporation had 11 base hospitals, 383 emergency stations, 58 training stations for first-aid and rescue work, and employed 233 company surgeons and 117 outside surgeons on a salary basis.

In 1910, the United States Steel Corporation established a voluntary accident relief plan, a year previous to the passing of compensation laws by the earliest states legislating on this subject. This voluntary plan has now, of course,

been superseded by the workmen's compensation laws of the various states in which the Subsidiary Companies are located.

Supplementing this well-organized scheme of accident prevention and care for the injured, every attention is given to the minutest detail which will aid in physical, mental and moral well-being: gardens where the workmen may do wholesome, out-of-door work; a market, run under the best sanitary conditions, where he may dispose of his surplus garden truck and buy good food; restaurants, where he may eat economically yet healthfully; playgrounds, picnics, musical organizations; day nurseries, where the children of widows who must work will be cared for; visiting nurses, who will instruct mothers in the care of their children and how to run a home with thrift and yet so as to supply the men and children with nourishing food. No slightest detail which will contribute to a "sane mind in a healthy body" is neglected.

Moreover, it has been found that all of this pays, not only from an humanitarian point of view, but also on a cold dollars-and-cents basis. The serious and fatal accidents are now only about one-half of what they were in 1906. Experience has taught that fully 80-90% of the industrial accidents can be eliminated if the work is properly organized, and the necessity of educating the worker is demonstrated by the fact that statistics show 70-80% of all accidents to be attributable to thoughtlessness or carelessness on the part of the workman himself, or that of his fellow-workmen. The Government, a few years ago, made a careful investigation, the results of which showed that the steel mills in this country are the safest in the world, and that in spite of the attention given to accident prevention in Germany, the rate of accidents in the steel mills there, over a period of 13 weeks, was more than 17 per 1,000 employed, as against a rate of 10 per 1,000 employed in the mills of this country.

VI. FLAWS IN THE PRESENT SYSTEM AND RECOMMENDATIONS

On June 12th, 1926, the American College of Surgeons appointed a Research Group of the Committee on Traumatic Surgery to make a report on existing conditions. A questionnaire was sent out to well-qualified surgeons throughout the country, covering the following points: (1) Type of surgeons doing industrial surgery: their standing and qualifications, and whether they give value received; (2) Tendency of industrial surgeons to attempt treatment of cases beyond their skill, and disinclination to seek consultation; (3) Surgeons' fees; (4) Type of surgery which the insurance companies seek—whether it is of the highest type; (5) Hospitals and their charges; (6) Value of physiotherapy; (7) Control of surgical care versus privilege of injured to select his own physician; (8) Traumatic appendicitis; (9) Tendency of doctors and claimants to couple to the injury any disability arising through sickness, on the theory of "aggravation"; (10) Advisability or inadvisability of adopting rules governing the maximum cost of surgical obligation; (11) Fracture problem.

A brief summing up of the answers received brings out the following facts:

(1) In small towns and outlying districts the surgical service is inadequate because there are available one or two doctors only, and these are often not competent to render adequate service. In the larger cities, the best surgical service has often not been procurable because, owing to the large amount of "paper work" required, or due to the fact that it did not offer sufficient interest, the better type of surgeon has not cared to undertake this type of work. While a few clinics have been established, organized along ethical lines, in which good service is rendered, many of these clinics have sprung up which have been unethical.

(2) There has been a widespread tendency on the part of industrial surgeons to neglect to call in the necessary consultants.

(3) In general, the fees paid have been found to be greater than those in private practice.

(4) There has been a tendency on the part of the insurance companies to employ a low grade of service, or to allow the injured to select his own surgeon, with the result that inadequate care has been given.

(5) As a rule, hospital charges in the larger cities have been standardized and are satisfactory. The Research Group made an exception of X-ray fees in hospitals, which they found excessive.

(6) Physiotherapy is a problem which, the Research Group believes, needs further investigation by reason of the commercialization of this type of treatment. Often it becomes mechanical, with physician and injured failing to coöperate, and is carried on from week to week and from month to month until the patient becomes a psychological case as well as an anatomical one.

(7) The control of the selection of surgical care and the selection of a hospital should be left to the insurance carrier, through the employer.

(8) From a consideration of cases coming to the attention of the Research Group, it would seem that appendicitis should not be recognized as a condition growing out of injury.

(9) There is a growing tendency to exaggerate the theory of aggravation of preëxisting lesions by injury.

(10) The formulation of rates governing the maximum cost of surgical service is advisable.

(11) The question of fractures was considered to be the most serious from the standpoint of human wastage and it was recommended that these cases should be provided with emergency splints and proper transportation and immediately sent

to a recognized hospital where proper care could be given. The Research Group deplored the very prevalent practice of employing the open operation as the initial treatment of fracture by surgeons with limited experience and limited hospital facilities, also the tendency of Commission Examiners to base compensation on anatomical deformity rather than on loss of function.

(12) Attention was called to the fact that practically all of the Compensation Boards are composed of laymen. The position of the Medical Examiner to the Board is such that he can only pass his opinion and make recommendations which the Board can accept or deny as it sees fit. The Board's problems are largely surgical: a decision on types of injuries, extent of injuries, and percentage of impairment. It would, therefore, seem fitting that a surgeon be appointed as an acting member of such Board.

With the results of the investigations of this Group may be compared those of the special commission to investigate the operation of the Workmen's Compensation Law in Massachusetts, appointed by the Governor, as a result of a Resolve of the Legislature, in September, 1926. Dr. Samuel B. Woodward of Worcester was a member of this Commission. This appointment was most fitting inasmuch as Dr. Woodward has long stood as representative of the highest type of physician and public servant, having been the President of the Massachusetts Medical Society, served on the Board of Trustees of a State hospital, and ready at all times to use his time and influence in behalf of humanity. The final report made by this Commission was a lengthy and exhaustive consideration of the whole subject and there is only space here to outline it briefly.

Certain minor recommendations were made: the inclusion under the Act of those employed in violation of the law; the simplification of proceedings before the Industrial Accident Board; a provision to enable the Superior Court to reserve Workmen's Compensation Cases for the Supreme Court; the question of leaving to a single member of the Board who had the case under advisement the matter of cessation of weekly payments; the confinement of compensation to accidents occurring actually on the premises of the employer or while the employee was engaged in business for the employer.

Regarding compensation the Commission recommended: that no compensation be paid for any period for which wages were received, thus doing away with duplication of pay in those cases where disability did not begin until after the date of the accident; that compensation might be given in a lump sum at the discretion of the Board; that the maximum compensation per week be raised to $19 and the minimum to $9; that a distinction be made between compensation for right and for left hand; that a more effective way of measuring loss of vision be substituted; that there be a distinction of value between loss of thumb and forefinger and other fingers, and between the loss of the great toe and other toes; that compensation for loss of hearing and for facial or head disfigurement be included; that a workman once injured be permitted to waive compensation if he so desires, to obviate the difficulty of an injured workman's getting a second job.

Various questions relating to medical care were considered. The Commission felt that hospitals should not be forced to accept compensation cases as charity and should be adequately compensated. It did not feel, however, that hospitals should be allowed to charge according to their own discretion, but that a maximum rate should be set, as is at present done. It was of the opinion that this rate should be regulated by conference with a hospital committee frequently, say every two years, and that the present maximum of $21 a week and "reasonable extras" is below the average cost of such service in the hospitals of the state, and is a matter which should be conferred upon. Suggestion was also made that all records and reports of hospitals, clinics and physicians of the insurer or of the employee should be open to inspection by the Department.

The question of the advisability of a state fund was given careful consideration by the Commission and turned down for the following reasons: A major criterion of the value of any method of paying compensation is the length of time required for the first compensation to reach the injured, after injury. A comparison was made with Ohio, which has the most efficient system of state fund compensation, and it was shown that this period, in Ohio, was 37 or 38 days, while in Massachusetts it was a little better than half this, 18.9 days. Also statistics prove that under the state fund system, the state is more rigid than the insurance companies in allowing compensation. Three members of the Board, however, dissented from this opinion in minority reports, in which they recommended a state fund.

The Commission also favored the restatement of classes employed by the Commonwealth or by counties, cities, towns or districts, coming under the law (now restricted to laborers, workmen, and mechanics) to include other classes if desired.

A Suggested Rehabilitation Amendment was appended to the proposed changes in the law, according to which the insurer would pay to the state a certain percentage of the amounts payable to employees, to be held as a fund for rehabilitation. For every dollar paid by the insurer, a dollar would be paid by the Commonwealth, and those two dollars would be used to obtain the federal allotment, which matches whatever a state may spend on rehabilitation work, dollar for dollar. Thus, for every dollar contributed

by the insurers, there would be spent for rehabilitation four dollars.

While this paper was still in process, the text of the Amendments to the Workmen's Compensation Law which were consequent upon the investigations of the commission appointed by the Governor, late in 1926, has just become available. Most of the recommendations of the Commission have been enacted into the Acts of 1927, Chapter 309, and very significant improvements have been effected thereby. All medical records and reports of hospitals, clinics and physicians of the insurer or of the employee have been made open to inspection; compensation has been extended to cover injury at any place within or without the Commonwealth, if the employee was engaged in business for the employer; restriction has been placed upon claiming compensation for any period during which wages were earned; the limit of time during which medical aid is furnished previous to the payment of compensation has been extended in unusual cases, or cases requiring specialized or surgical treatment, at the discretion of the Department. While the amended law does not quite reach the sum stipulated by the Commission as the maximum weekly compensation—nineteen dollars—it has raised the amount from $16 to $18 and the minimum from $7 to $9; also the total amount of compensation paid has been brought up to $4500 from $4000. Provision, too, has been made for the payment of compensation in a lump sum. While formerly a widow was allowed $2 a week additional compensation for each of three children, this section has been so altered that no limit is set upon the number of children for which added compensation is allowed. The recommendation of the Commission that, at the discretion of the Department and with its approval, an employee peculiarly susceptible to injury be permitted to waive his rights to compensation has been incorporated into the Law, as has also its recommendation that the class of employees of the state, county, city, or town coming under the law be extended to include, besides laborers, workmen and mechanics, also foremen, subforemen and inspectors.

These are all changes of inestimable value, but a retrospective view of the recommendations of the American College of Surgeons Research Group and those of the Commission appointed by the Governor, which formed the basis of these amendments to the Law, confirms the following points:

No plan or system will meet the problem adequately which does not provide for consultation facilities. No one surgeon can be equally proficient in traumas, in abdominal surgery, and in disease of the ear, eye, nose and throat. While industrial clinics have been established to meet this need, under our present system this is only an added facility which may, if desired, be taken advantage of, but at added expense.

Another incontrovertible fact is that one member, at least, of the State Compensation Board should be a physician. The inadvisability of having compensation cases judged entirely by a board composed of laymen only is obvious.

The objections to physiotherapy have been met rather adequately in Milwaukee by the so-called "Curative Workshop." Here physiotherapy, mechanotherapy and occupational therapy are combined under an efficient system. Each patient must have a prescription blank from his physician, indicating the treatment required. The physician makes the appointment for the patient and is kept informed of the kind of treatment he is receiving and his progress. A full history is taken of every case so that everything bearing upon it may be known. Treatment is given by a registered therapist. Careful records are kept: a treatment sheet, a workshop sheet; if posture is faulty, a posture sheet; if there has been injury to nerves or muscles, a nerve or muscle sheet; a record of the patient's mental attitude and degree of co-operation. A report is made to the employer or insurance carrier, indicating the time spent in the workshop and the name of the physician who has had charge of the case. If the patient is sufficiently restored to go back to his former occupation, he is returned to the employer or insurance carrier, or if not, he is sent to the rehabilitation agency so that he may be trained for some other work.

Progress in any line is gradual and is brought about by experimentation and by education. We will not have achieved a millenium in industrial surgery until the surgeon has been inculcated with an ideal of what is expected of him, and the laity has been imbued with a conception of what it may rightly expect. That a milepost has been passed on the way to reaching this goal is shown by the fact that on the day on which this paper was being written a newspaper contained a popular health article relative to X-ray examination which said: "Our compensation or other boards are inclined to take the view that as the X-ray shows nothing, there cannot really be any trouble. An Edinburgh surgeon, speaking about the large number of genuine back injuries that are not revealed by the X-ray, tells his colleagues that they should remember this and not treat workmen suffering with backaches as malingerers or as though they are shamming. Unfortunately, a number of individuals with long, slender bodies will take up occupations where considerable lifting is required. Also individuals, slender or heavy, often use their bodies at a mechanical disadvantage while working. The trouble, in the majority of cases, occurs about the joints in the lower back . . . ."

Finally, the ultimate intent of industrial medicine and surgery should be a closely knit, unified system which will eliminate waste in time, effort, and money, which will contribute to the general good of industry as a whole by restoring the worker as quickly and completely as possible to

his former usefulness, and which will tend to harmony and reciprocal good-will between employer and employed.

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ORIGINAL ARTICLES

A CASE OF CHRONIC NEPHRITIS MAINTAINED FOR SIX MONTHS ON AN AVERAGE DAILY PROTEIN INTAKE OF 0.26 GRAMS PER KILOGRAM OF BODY WEIGHT

BY MILLARD SMITH, M.D.*

THIS case is reported in order to illustrate the application of the principles which have been discussed in a previous paper[1], and to show that very low protein diets may be utilized for long periods of time.

An Irish boy of 17 years entered the Fourth Medical Service of The Boston City Hospital, December 19, 1922, on the advice of his family physician, who had been treating the patient since the appearance of a convulsion eleven weeks previous to admission. A second convulsion appeared six days before admission. Family history irrelevant. As a child he had measles, parotitis, pertussis and several attacks of tonsillitis followed by tonsillectomy at the age of five years. His weight was 130, 140, 150 and 123 pounds, one year, seven months, and four months previous, and at admission, respectively. The present illness shows an insidious onset, but probably begins during the summer of 1919, when he had frequent tonic cramps in the calves of his legs and thighs. During October, 1920, he had a severe attack of tonsillitis. He noticed that during the same school year he could not concentrate on his studies at night, and in the spring of 1921 his memory became capricious. In October, 1921, another severe attack of tonsillitis developed, and in February, 1922, he noticed that his stomach was becoming irritable, especially after exercise. He saw bright specks before his eyes beginning in June, 1922. He had considered himself quite well until June, 1922, and had indulged actively in high school athletics. At this time the irritability of his stomach became sufficient to cause frequent vomiting, which was preceded by only slight nausea, and usually came immediately after eating. Soon after this, he noticed that his face was filling out, but neither he nor his parents recognized that as edema. During the summer the edema increased, and one morning in the latter part of September, he awoke feeling very weak and having a severe frontal headache. He remained in bed all day, and at 11:00 p. m., while asleep, had a convulsion and did not regain consciousness for one and one-half hours. The next morning his physician was called and found that his blood pressure was high, and the urine contained albumin and casts. A Carrell diet and frequent adminstration of magnesium sulphate were prescribed. The edema subsided and no more convulsions appeared until six days before admission. Frequent blood pressure observations showed that this remained high. The last convulsion occurred in the morning shortly after rising and was attributed by the patient to some cheese which he had eaten the evening before. There were no prodromal sensations whatsoever, and he was unconscious for one and one-half hours.

Physical examination disclosed a well developed and nourished but weak young man, mentally alert and in no distress. His face was slightly edematous but there was no evidence of edema in any other part. The skin was of sallow color, but normal in texture. Pelvis and line of pubic hair were feminine in type. Conjunctivae were pale, and ophthalmoscopic examination negative. Tonsils had been only partially removed, contained many crypts and showed chronic injection. Left border of heart was 13 cm. to left of midsternal line in the fifth intercostal space; no abnormalities in rate and rhythm, but a blowing, functional systolic murmur was heard over the entire precordium. Blood pressure was 195/95. Other physical findings were essentially normal.

Upon admission the patient's twenty-four hour urine specimen was acid to litmus, of normal color, specific gravity 1.010, did not reduce Benedict's solution, but showed a large trace of albumin. It contained 6.2 grams of non-protein nitrogen and 0.25 grams of albumin. The centrifuged sediment showed two to four red blood and ten to twenty white blood cells per high power field, with numerous hyaline and brown granular casts. Phenolsulphonephthalein

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