

lady medical missionary actively engaged in her work. The American missionaries have given us the *first*, and for many years the *only*, medical college. From within the walls of that institution about two hundred men have gone forth fully equipped to practice the healing art, and are now scattered all over Syria, Egypt and other countries in the Levant.

In this connection allow me to address a few words to you, gentlemen of the graduating class, not by way of advice but as an appeal. You are now going forth to give to the world the fruit of your preparation in one of the first institutions of the land; you have had the rare fortune of being trained under professors of the highest ability and of national and international reputation. You have entered upon the fruits of the labors of centuries of progress in your profession, and now you bear in your hands one of the most beneficial boons that has been allotted to men. What use will you make of this power? Shall it be only as a money-making scheme, to take advantage of men's necessity and make it contribute to your financial interest? Nay! but let me repeat to you what I am sure your worthy professors have enjoined upon you once and again: *Do not degrade your profession to the level of a trade.* It is true that every profession must provide an ample support to those that practice it, and that in proportion to their ability; but this should not be the sole end. It should rather be the means to the greater and nobler ends, the advancement of the profession and the welfare of humanity.

The strides that have been made by the medical science in all its branches during the last fifty years are marvelous, but, as you all know, the possibilities have not yet been exhausted. The doors are still open for you to study, to investigate, to discover, to apply. For it is to your country that the world looks up for leaders in this as well as in other lines. *Be among these leaders.*

And then there is another aim that might well claim a place in your hearts. If one of the ends before you in your professional life is to promote the welfare of your fellowmen, one of the best means in which this can be done is through medical missions, one of the grandest philanthropies of the present century, and destined to hold a still more prominent place in the century to come. There are many lands not as highly favored as your own, in which teeming millions of humanity suffer and die in ignorance and misery, and it is within the power of medical science to reach them and alleviate their suffering.

But then there is a higher and still nobler mission that the physician can perform. It is not only to relieve physical pain, but by so doing to reach the hearts of the sufferers with cheer and consolation, to administer to them with the *physical* the *spiritual* remedy.

I have one more word to say. It is to discharge the pleasant duty of expressing in my own behalf and in the behalf of my own country, the warmest gratefulness to the esteemed professors of this institution. Gentlemen, tonight you have added an important item to the indebtedness of my country to yours, by giving us two young physicians, who, inspired by your spirit and electrified by contact with you, shall be bright lights in the medical firmament of Syria. And in the future, if you ever wish to attempt the impossible and trace the wholesome influence that your institution has exerted, be assured that Syria shall not prove herself the least receptive, and from her distant shores there

shall be borne across the face of the mighty deep a deeper and mightier gratitude.

ORIGINAL ARTICLES.

FIRST AID IN RAILWAY EMERGENCIES.

Read at the Third Annual Meeting of the American Academy of Railway Surgeons, held at Chicago, Ill., Sept. 24, 1896.

BY JAMES E. PILCHER, M.D., Ph.D.

CAPTAIN IN THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY;
HONORARY FELLOW OF THE AMERICAN ACADEMY OF RAILWAY
SURGEONS.

COLUMBUS BARRACKS, OHIO.

Introduction.—About 9 o'clock in the evening of the 11th of last August, during a blinding thunder-storm, an express train dashed into a small freight train a short distance outside of the passenger station at Columbus. W. N. S., the fireman of the passenger engine, an unusually vigorous man of 38 years of age, was hurled violently down from the cab to the Scioto River, twenty feet below. So tremendous was the force of his ejection from the engine cab that his body was completely torn from his right foot which had been caught in the wreck, leaving a horribly lacerated stump midway between the ankle and the knee, while the soft parts above the latter joint were also severely injured, rupturing the anastomotic magna and giving rise to a considerable hematoma in the thigh. Throughout the accident, this man retained entire self-possession and when found some time after the disaster, he was engaged in tying a portion of his cotton jacket about the injured limb to check the alarming hemorrhage which was occurring from the wound. Unacquainted with the means of properly tightening his extempore tourniquet, sufficient compression to close the arteries failed to be exerted, and when he arrived at the University Hospital, an hour and a half after the collision, the bleeding from the external wound together with that from the ruptured anastomotic had brought him almost to the point of exsanguination. At the hospital, he was so fortunate as to be admitted to the service of the senior surgeon, my distinguished friend, Dr. R. Harvey Reed—to whose courtesy I am indebted for the privilege of quoting the case—and his colleague Dr. W. U. Cole. The patient's wet clothing was instantly removed, he was wrapped in warmed blankets, hot water bottles were placed about him, and other measures designed to restore the normal temperature and revive the vitality were employed, such as alcoholic stimulants, hypodermics of strychnin and nitroglycerin, and injections of hot saline solution. The hemorrhage was controlled by the elastic ligature, and the limb amputated as quickly as possible at the juncture of the middle and lower thirds of the thigh. Very little anesthetic was needed and very little given. The patient rallied promptly from the anesthesia but, owing to his bloodless condition and the impossibility of correcting it, he gradually became delirious and about an hour before the end experienced a tonic spasm, after which he sank rapidly, expiring about eighteen hours after the accident, a victim of exsanguination.

This accident occurred in the midst of a city of a hundred and fifty thousand inhabitants, containing a hundred and fifty medical practitioners, numerous hospitals, and two medical colleges. There were a dozen physician's offices within five minutes walk of the locality of the disaster, not to speak of numerous telephones by means of which dozens more might

have been quickly summoned to his relief. But he bled to death! Here was a man of mature age and well-regulated mind who, notwithstanding his frightful injuries, was in full possession of all his faculties and anxious to apply for himself the treatment which would stay the approach of the king of terrors. Had he been instructed in the simplest elements of first aid, the application of the simplest form of improvised tourniquet, W. N. S. might today have been about the streets of Columbus with a healthy amputation stump upon which a suitable artificial limb could readily be worn, and the statistics of the skilful surgeon, who attended him, might have been increased by one more success in addition to the large number already enumerated in his case-books.

Railway mortality.—The average number of persons injured yearly in railway accidents during the seven years from 1888 to 1894 was 38,500, of which number 6,500 were killed, and in the year of the Columbian exhibition there were 47,000 casualties of which 7,000 were fatal. For the treatment of these cases numerous magnificent surgical systems have been devised. The surgical staff of so many of our railroads at the present day is so highly organized that to mention one would be an invidious distinction. The statistics of injuries accentuate the need for such organization and it is to the credit of humanity that so many railways have provided for it.

The field for first aid.—There is a period, however, for which most roads have as yet made no provision—the period between the occurrence of the accident and the arrival of the surgeon. The opinion has been advanced that on some roads the stations are so near together and the local surgeons so readily accessible that this period is inappreciable and does not require to be provided for. Esmarch in his Samariter-briefe has well shown the fallacy of the idea that such provision is required only in sparsely peopled localities, reciting an instance of a fire in the city of Berlin where, after an apparently suffocated person had been brought out of a burning house, it was two hours before a physician could be brought to the spot, the life of the victim being saved only because of a knowledge of first aid upon the part of the firemen. And even in our own case of W. N. S., it was an hour and a half from the avulsion of his leg to the application of the elastic tourniquet in the University Hospital, although the accident occurred within touch of the best possible surgical treatment. There is no question but that everywhere on earth emergencies are liable to occur in which life or death may hang upon the presence of a person with a knowledge of the simple elements of first aid, and no where is this more profoundly true than in the emergencies of railway practice, unless perhaps it be on the battlefield.

Existing first aid arrangements.—In order to ascertain what may have been done in this respect in the railway service, in the course of my study upon the present subject, I addressed to the chief surgeons of fifty prominent railways, a letter containing the following questions:

1. Have you any organized system of rendering first aid in illness or injury aside from your medical staff?
2. What, if, any, of the employes of your road are instructed in first aid?
3. What, in a general way, is the character and scope of the instruction?
4. What advantages have been derived from the instruction?

To these letters I received twenty-nine replies.¹ Of this number five replied in the affirmative, six in the affirmative to the extent of a first aid surgical dressing case with printed instructions for the use of its contents, and eighteen replied wholly in the negative. It is a fair presumption that those who did not reply at all, would also have given a negative answer. It is evident then that but little has been done in the organization of first aid in railway emergencies. Indeed, it would seem that even on the roads on which efforts, looking to the first-aid instruction of the non-surgical employes, have been inaugurated, a complete and definite organization has hardly yet been attained.

Advantages of first aid.—The advantage of first aid in those cases in which life may be saved by the prompt application of temporary assistance is evident, but it is no less a fact that it is of proportionate value in less serious cases. The ability to cope with possible injuries inspires men with self-confidence in emergencies. They are not so apt to lose their heads. And yet it can not be denied that even under comparatively favorable circumstances some men will become confused. Instruction in first aid will, however, reduce this to a minimum in accidents.

A knowledge of the subject is valuable, if for no other reason than because it will teach men to avoid improper or dangerous methods of treating emergencies. The use of the tobacco-quin saturated with the indescribable ingredients of the saliva of the habitual tobacco chewer, the cobweb with its collection of filth from all quarters, the sweat-permeated cloth torn from the dirty garment, and perhaps, worst of all, the mucus-laden handkerchief are banished from contact with open wounds. Cleanliness is learned and wounds do not come to the surgeon already infected by filth.

Familiarity with proper methods of handling the injured is of the greatest advantage in four respects: 1. It renders it possible to remove the wounded from wrecks more expeditiously, a feature which may be of vital importance in case, for example, of the not infrequent instance where fire is an accompaniment of an accident. 2. It may be an infinite saving of suffering to the injured. The infliction of pain in moving a patient is an evil so easily corrected that there is but little excuse for not knowing how to do it painlessly. The saving of unnecessary suffering to a patient means diminution of shock and a more favorable condition for the treatment of the surgeon. 3. It prevents the aggravation of injuries so frequently due to improper handling. A wealthy Englishwoman, in alighting from her carriage, slipped and sustained a simple fracture of the leg. The well-meaning and intelligent enough people, who helped her back into her carriage so that she might return home, had not been taught the way to lift and handle the disabled. That her leg was turned in the attempt and the simple fracture was transformed into a compound fracture, was not so much their fault as the fault of the neglect of the proper instruction of the public in such

¹ The gentlemen, who so courteously answered my questions, were: Drs. W. A. Adams, F. W. & D. C. Ry.; F. P. Bancroft, U. P. D. & G. Ry.; C. E. Brayton, N. Y.; N. H. & H. Ry.; F. H. Caldwell, Plant System; G. F. Conn, C. & M. Ry.; H. P. Cooper, A. & W. P. Ry.; Walter Courtney, N. P. Ry.; C. M. Daniels, W. N. Y. & P. Ry.; C. M. Drake, Southern Ry.; W. H. Elliott, C. of G. Ry.; W. L. Estes, L. V. Ry.; W. J. Galbraith, U. P. Ry.; A. P. Grinnell, V. C. Ry.; S. S. Halderman, C. P. & V. Ry.; G. H. Hogeboom, A. T. & S. F. Railway; J. H. Jenne, C. V. Ry.; S. Marks, C. M. & St. P. Ry.; P. H. Millard, C. G. W. Ry.; S. Mitchell, J. T. & K. W. Ry.; R. D. Mussey, C. H. & D. Ry.; J. E. Owens, C. & N. W. Ry.; N. J. Pettijohn, K. C. F. S. & M. Ry.; J. F. Pritchard, M. L. S. & W. Ry.; R. H. Reed, C. S. & H. Ry.; W. B. Rogers, K. C. M. & B. Ry.; Stuart & Boyles, H. & T. C. Ry.; S. S. Thorn, W. & L. E. Ry.; J. F. Valentine, L. I. Ry.; F. B. Tibbals, M. C. Ry.

matters. Were all such cases fully known and recorded, there is not the shadow of a doubt that hundreds of instances of such aggravation of injuries would be found in the history of railway surgery. The prevention of such occurrences may detract a little from the experience of the surgeon, who will certainly receive less credit for the successful treatment of a simple wound than for the cure of a complicated injury, but it will improve his results, simplify his labors, and enable him to accomplish more work in a given time. 4. It is to the pecuniary advantage of the railway company for, (a) the fact of thorough preparation having been made for every emergency will give the public increased confidence in the road, which will result in increased patronage, and, (b) the diminished severity of injuries due to prompt attention and careful carriage will materially reduce the amount of damages which may have to be paid to the injured.

Hemorrhage is perhaps the complication of railway accidents in which first aid would be more particularly applicable, although it must be admitted that the bleeding is often surprisingly limited, especially in crushed wounds where the lumina of the injured arteries have been occluded by the compression which caused the accident. Nevertheless bleeding may be placed at the head of the list of complications, the failure to immediately correct which, may convert an otherwise curable injury into a fatal one. A Lieutenant-Colonel in the Army, while fighting at the head of his command, was wounded in the thigh by a band of hostile Indians, sustaining a division of the femoral artery. The surgeon was at the rear of the small command and, while a messenger was despatched for him, some of the line officers endeavored to arrest the bleeding as well as they could, but not being expert in the application of improvised tourniquets, they were not successful in entirely checking it. When the surgeon arrived in a few moments, the patient presented all the evidences of fatal hemorrhage, from which he never rallied. That was before the institution of first-aid instruction in the army. Now, every subaltern and a large proportion of the enlisted force would be competent to step in and apply an extempore tourniquet which would amply control such hemorrhage until the arrival of a surgeon, rarely far away in military service.

But hemorrhage is not the only accident in which prompt action may avert impending death. In cases of submersion under water as may occur in case of a fallen bridge, prompt action is notoriously of advantage. In cases of suffocation by smoke or heat, such as may occur in a railway fire, the prompt application of artificial respiration is equally efficacious. The advantage of prompt treatment even of apparently fatal shock is too well known to demand repetition; while the prompt and easily-learned treatment of heat stroke may also mean the difference between death and life.

A little acquaintance with the treatment of foreign body in the eye is apt to be of particular service to a railway man, since this accident is probably more liable to occur in his experience than in that of any other class of individuals.

First aid may be applied with advantage in many other less serious surgical incidents. Not only simple wounds, but bruises and sprains may be prevented by prompt and intelligent treatment from developing into serious and disabling injuries. While fractures

can not be permanently treated except by the surgeon, their treatment can be greatly assisted by the exercise of proper measures to prevent the aggravation of the injury and to conduce to the ease of the patient. Burns and scalds, on the contrary, when not severe or extensive, may be sufficiently treated by the first-aid man, while colic and diarrhea may often be controlled by the exhibition of simple remedies.

And, as already suggested, not the least advantage to be derived from instruction in first aid in railway emergencies is the obtaining of organized discipline and intelligent conduct in case of accident. Instead of careering like so many decapitated chickens or crowding about the injured like so many bucolics about a prize beef, the men will naturally fall into places where each one can be of the most service and order will readily be brought out of chaos.

So many, indeed, and so forcible are the arguments in favor of the thorough instruction of railway employes in first aid that the discussion might be prolonged almost indefinitely. But, admitting the desirability of such knowledge, we naturally fall upon the consideration of the questions, as to what men should be instructed, whether all should receive the same amount of instruction, how the instruction should be given, what facts should be taught, and whether men qualified in first aid should be distinguished by a badge to indicate their training.

Who should be qualified to apply first aid.—As employes who are in command of men may not only be required to apply first aid themselves, but to direct others in rendering assistance, such men as conductors, yardmasters, station agents and foremen of shops should particularly be instructed.

All men connected with passenger trains should be qualified, not only from the standpoint of humanity, because of the relief which they may afford to injured passengers, but from the standpoint of the interest of his railway company, since prompt attention to injured passengers may prevent aggravation of injuries and possibly increased claims for damages.

Both of these classes of men should be taught not only the application of first aid, but should be instructed in the organization of first aid parties in extensive accidents and in the best methods of showing others how to apply it.

All other employes should be taught the subject in a less complete manner perhaps, although in view of the changes which transfers and promotions may make, it would be well enough for them all to receive the same amount of training.

Substance of first aid instruction.—Of what then should the instruction consist? In a recent paper on "Methods of Instruction in First Aid," I recommended that the instruction of the enlisted men of the army be given in five lectures, each occupying a full hour; it might be of advantage in railway work to add a sixth lecture. The course thus arranged would be as follows:

1. The Human Body—the skeleton and the circulation in particular.
2. Bandages and Dressings—the triangular bandage in particular.
3. Wounds and Bleeding.
4. Broken Bones.
5. Unconsciousness—suffocation and shock in particular.
6. Other Emergencies—including the use of the emergency box.

It is impracticable, in the limited time at our disposal at present, to specify in detail the facts, methods and theories which should be taught. I have endeavored to do this in my little book on *First Aid in Illness and Injury*,² which may be familiar to some of you. It is worth while, however, to go over briefly the subjects that will naturally segregate themselves into groups suitable for treatment in the several lectures.

1. The lecture on the human body should include a simple description of the body, its chief component parts and the principal vital functions carried on by it; a little knowledge of bones and muscles; something about the nervous and digestive systems; more about the respiratory function and the organs involved in it, and still more about the circulatory system. Experience has led me to consider this introductory lecture as absolutely essential to a proper comprehension of the practical subjects to be taken up later. It is never safe to presume upon the prior existence of any anatomic or physiologic information whatever. Even the most intelligent laymen often display an amount of ignorance that would be laughable if it were not lamentable, and still less acquaintance with the subject must be expected in the less educated.

2. The second lecture, on bandages and dressings, is also foundation work, and its mechanical characteristics ought especially to appeal to the interest of the mechanically inclined railway employe. The triangular bandage, the basis of all surgical first aid, should be taught in all its uses. It is not sufficient simply to talk about it, but it must be shown in actual use. And even that is not enough, for its application can not be satisfactorily understood until every man has himself applied it in all its various modes of employment. The manner of improvising dressings and some suggestions as to the sources from which they may be extemporized is an essential feature of this lecture.

3. The third lecture, on wounds and bleeding, is the natural sequel of the first two—the practical application of the materials learned in the second upon the parts taught in the first. This is really the most important lecture in the course and may often with advantage be expanded into two, treating in some detail of wounds of various kinds, and in particular, crushed and lacerated wounds; reviewing the circulation of the blood and especially the course of the principal arteries, with the location of the most appropriate points for compression in order to control bleeding; the differentiation of the varieties of hemorrhage and the treatment appropriate to each, including the arrest of arterial bleeding by digital pressure and by the tourniquet, will all come within the scope of this lecture.

4. In the fourth lecture, on broken bones, the nature, character and most frequent location of fractures are to be taught, together with their possible effects on the tissues adjacent to this break. The signs of fracture and cautions against unnecessary handling may be followed by a description of the methods of retaining the parts safely and comfortably until proper surgical attendance may be secured. The improvisation of pads, cushions and other supports should also be considered in detail.

5. The fifth lecture, on unconsciousness, is a most important one in connection with railway emergencies, involving, as it does, the treatment of severe shock and collapse, cerebral concussion and compression of the

brain, as well as simple fainting. Suffocation in its various forms, including compression of the chest, drowning and inspiration of hot air or smoke, is most important. If inebriation does not often come under the eye of the railroad man, sunstroke certainly may, and convulsions sometimes do. The use of position, hot and cold applications, the administration of stimulants, the employment or avoidance of friction and the application of artificial respiration should all be well understood.

6. The sixth lecture, on other emergencies, may be a collection of the facts not taken up in the others, such as the removal of foreign bodies, the treatment of the effects of heat and cold—burns, scalds and frost bite—cramps and diarrhea, and the like. Here may also be taken up the use of the emergency box and its contents.

In connection with each lecture, some method of transporting the disabled should be taught. This proves an excellent relief to the monotony of a long talk and helps not a little in impressing the facts taught upon the minds of the hearers. Moreover, it is so exceedingly important a feature of first aid work, that advantage should be taken of repeated opportunities to impress its methods upon one's auditors.

Methods of instruction.—With regard to methods of instruction, each lecturer will determine the way in which he can himself best impress his audience. In a paper³ upon this subject in its military relations, read at the last meeting of the Association of Military Surgeons, I arrived at the following conclusions among others: 1. The best method of instruction is a combination of the lecture, the demonstration and recitation from a text-book, neither of these being sufficient without the accompaniment of the other two. 2. The best instruction is characterized by extreme simplicity of diction and the avoidance of all technicality of language. 3. The best instruction is progressive in character, beginning with anatomy and physiology and advancing to bandages and dressings, and then to emergencies proper. 4. The work is advantageously supplemented by home study of a first-aid text-book.

Excellent charts are available for assisting in the graphic presentation of the subject, and they should be freely used, but nothing can impress men so strongly as a demonstration upon a human subject, and this plan should be utilized whenever practicable. An excellent method in lecturing upon the circulation before male classes is to demonstrate the course of the arteries and veins by red and blue outlines painted upon the skin of a living man. It is not difficult to find men with sufficient enthusiasm to willingly serve in this capacity, and the subject is rewarded for his self-sacrifice by the especially strong impression which the lesson makes upon himself.

Recitations from a text-book, which are used with great advantage in military first-aid work, are not always practicable among the frequently changing forces of railway work, but I can not too strongly urge the great desirability of encouraging the men to the private perusal of a suitable first-aid book. Every station should be provided with one of these—one of the more complete works—and every train should have one in its emergency box. A most useful place for such a work would be in the drawing-room car together with the hotel directory and the railway

²"First Aid in Illness and Injury." By James E. Pilcher; fourth edition, 8vo, pp. 322. New York: Charles Scribner's Sons, 1897.

³Methods of Instruction in First Aid, New York Medical Record, Sept. 5, 1896.

guide. But, more than that, each employe should be advised and encouraged to provide himself with proper literature upon the subject and, in the light of the lectures and demonstrations of the surgeons, he should study it carefully and conscientiously. This plan is followed with success in numbers of the National Guard organizations, where every member is required to provide himself with a first-aid text-book and to make it the subject of home study. Information received *viva voce*, as in lecturing, is easily forgotten and demands reinforcement by subsequent reading.

The emergency box.—While every man should be taught to extemporize dressings from any available source, it must not be forgotten that better results may be obtained by the use of properly prepared dressings. This is what contributes value to the emergency chest. Every ambulance association has devised one and not a few have been constructed by railway surgeons. I am inclined to think that the chief defect in these chests has been that too much has been left to the judgment of the railway employes. Such a box should not be stocked with a supply of bandages, a package of gauze, some antiseptic tablets and a paper of pins, each article by itself, to be combined as needed for accidents. In order to get at the articles which they need the first-aid men will handle over the lot with their travel-stained hands, until in a short time the entire chest is too filthy to be used. A plan which avoids all this and which also saves the layman the responsibility of grouping the proper articles, is the collection of all dressings into the form of first-aid packets. These packets may well be an extension of the military first-aid dressing packet. The form commonly used in the army was devised by Esmarch of Kiel and contains in a small space: 1, two compresses of sublimated gauze, each wrapped separately in oiled paper; 2, one roller bandage two yards long, of sublimated cambric with safety pin, and 3, an illustrated triangular bandage. One of these packets contains dressings ample for wounds of considerable size, and for very extensive ones two or even three may readily be employed. In addition to wound dressings, the box might with advantage contain a few simple remedies, put up in tablet form when practicable, and with exact dosage; diarrhea tablets, colic tablets, anodyne tablets and, in a bottle of colored glass studded with points to prevent confusion, a number of antiseptic tablets for making solutions for wound cleansing. A bottle of aromatic spirits of ammonia, some packages of bicarbonate of soda for burns, and a few light and small splints might be introduced with advantage; a pair of shears and of dressing forceps should not be omitted and a good first-aid book should always be added. Such an emergency box should form a part of the outfit of every conductor, station agent and foreman, who should be thoroughly instructed in its use and held strictly responsible for its availability and serviceability at all times.

Uniformity in first aid.—The course of instruction given should, as far as possible, be uniform for each road; indeed it would be better still if a uniform plan were adopted for all roads. Men transferred from point to point, or exchanged from road to road would not then be confused by varying instructions and, wherever they might be, they would naturally fall into suitable first-aid positions. Absolute uniformity, of course, would not be sought for—opportunity must be left for the individuality of the teacher—but the desired

result would be obtained by the adoption of a uniform syllabus of instruction.

Frequency of instruction.—The course of lectures should be given by each surgeon at least once a year to the men connected with his section of the railroad. On account of the constant change in the *personnel* of the employes, a not inconsiderable proportion of his hearers will be new each year and in any event no one can fail to be benefited by one or two repetitions of such instruction, particularly at annual intervals.

Rewards for proficiency.—The St. John Ambulance Association of England and other societies for the propagation of first aid hold examinations upon the subjects taught in their classes and issue diplomas and medals to those who pass. It is worthy of consideration whether a similar plan might not be of advantage in the railway service. If those men who had been found qualified were decorated with a red cross, to be worn in a conspicuous place, it would render them more easily discernible in case of accident and the possibility of winning the decoration might add a little to the general interest in the subject.

Conclusion.—The results of such organization, if thoroughly applied, will be surprising. In the accident in which W. N. S. made so gallant a fight against impending death, only two other persons were fatally injured. I am not so presumptuous as to assume that the percentage of cases, fatal without first aid, would be present in every railway accident, and assert that one-third of the deaths might be avoided by the proper administration of first aid, but I am prepared to assert, and that with the positiveness bred of actual knowledge, that by the faithful employment of first aid in railway emergencies a distinct improvement in the result of the treatment of railway injuries may be obtained, a material reduction in the mortality of railway accidents may be achieved, and an unspeakable amount of suffering may be saved to the unfortunate victims of future railway disasters. Simple in organization, inexpensive in application, easy in accomplishment, the results will be out of all proportion to the cost. The general adoption of first-aid, then, will not only benefit both the railway service and the traveling public, but it will be a distinct ethical advance introducing into railway work an era of realized responsibility, elevated humanity and genuine altruism.

DISCUSSION.

Dr. HENRY HATCH (Quincy, Ill.)—I was very much pleased with the paper just read and it coincided with my ideas, as I have claimed to be the first surgeon who has put emergency boxes up for a railroad at his own expense. I have devised some emergency boxes of my own which I have in use at the prominent offices in Quincy station; I put up seven of them. In the box I have adhesive plaster, carbonated gauze and absorbent cotton. I have the absorbent cotton put in separate bandages, and the gauze put in a jar, each containing about one-eighth of a yard. The adhesive plaster is put in tin boxes in little coils; in this connection, I have a little stick which I give instructions how to use as a torsion key, and in the cover of the box are printed instructions how to use this material. To the head of every one of the offices where the box is placed, I have taken pains to give special instructions. So far as the boxes are concerned on my part, they are original with me; I never had seen and did not know of any. It has had an excellent moral effect upon the men; while they do not know who put them in, they feel better toward the railroad—the C. B. & Q. They feel as though the railroad company had some heart and is looking to their interest. The C. B. & Q. also has

a relief system, whereby the men are entitled to surgical relief free by paying their monthly stipend to the relief association. While I have not had these boxes in but, I think, five months, it has been a saving to the relief department, because a great many of the smaller accidents have been attended to by the men themselves; and for that reason it would be a financial advantage to all railway companies to have these emergency boxes at every station and at every point in that station where there are liable to be accidents. I have one in the freight house, passenger depot, one in the switch office and round house, where they keep the engines. It is my intention to be at Galesburg soon to see the officials and try to induce them to put boxes along the line. I have sent one to Galesburg and one is up at the master mechanic's office. I am exceedingly pleased with this paper.

Dr. REED—In reference to the paper, which was an admirable one on the subject treated, and which has given us considerable material for thought, I wish to say that when I was appointed surgeon of the Pennsylvania Company some twelve or fourteen years ago, I found on the Pittsburg, Fort Wayne and Chicago Railway some old boxes scattered here and there, on engines, cabooses, stations and about the road. They were small tin boxes and contained some bandages, cotton I believe, and a few instruments, I do not remember just what they were, perhaps a pair of scissors, something of that kind; very few were complete, and the general superintendent, Mr. Thomas, called my attention to the matter and made the remark that they had been placed on the road years before that and the road was well supplied with them, but owing to the fact that no instructions had been given the men or given those in charge of the men, the boxes had fallen into disuse; when a man would hurt his finger, hand or arm, he would go to the box, pull out a piece of this material and bind up the wound, and close the box; perhaps when something more serious occurred that required the material, it was not there. That was one objection. Another objection was that under these circumstances they did not know how to use it—this was before the days of antiseptic surgery and dressing of an aseptic character—and as there was no one to keep the boxes replenished and no one to report when they were used, the boxes fell into disuse. But notwithstanding that fact, if this matter is taken up properly by the railroads, and proper parties instructed in the use of the material which should be placed and kept in them, I think that something very valuable can be developed out of it. Whether or not we can use all the suggestions made by the writer of the paper in practical work is a question. Those of us who have had some practical experience in this line on railways know that it is quite a task to instruct the employes in many things which we would be obliged to teach if it were carried out in full. For example, I was called on by the superintendent on the Northern Pacific Railroad, who had known me some years ago when he was on the B. & O., and asked to write out a few simple rules which would govern the men in an emergency, and he emphasized the fact that the rules should be so short and simple that they could be either remembered or read in a moment, and he suggested: If you make the rules explicit, if the men do read them they will not remember, and if they want to apply the rules under an emergency they will not take the time to read them. That was the practical difficulty. I also had a letter from a gentleman from one of the roads in California who had written to me, and it was strange that those two men should have written to me on the very same subject. Again, on the Pennsylvania road I was requested by Mr. Thomas to prepare rules, and the same thing occurred again; three practical men wanted rules, but insisted that they should be short and readily applied, without going into details. And the question comes whether or not we would be able to get the employes to read a long list of instructions and be able

to retain them so as to apply them. The plan is certainly an admirable one, and contains a great deal that I think we should consider, but I think it will require some practical work to bring it into full development.

Dr. SMITH (Streator)—I have had the pleasure of listening to the very good paper by Dr. Pilcher, also the pleasure of reading his book; I believe it would be beneficial to every chief and local surgeon to get Captain Pilcher's book and read it; I do not know any way that he could employ his time better. He gives some practical ideas and instructions. So far as this box is concerned it is a pretty good thing, but I think very poor without instructions; the first thing you know when a man has an accident he goes and tears off a bandage and puts on a chew of tobacco and lets it go for six or seven days, and then comes to the doctor, and you have a poisoned wound, may be syphilitic, and without instructions I do not believe the box amounts to much. Dr. Wood—I believe he organized the first surgical association on the Wabash—had these boxes, had printed instructions in the lid, and I do not suppose you can find one on the road. The Santa Fe, when they started up, had emergency boxes in every passenger and freight car, and when Dr. ——— took charge of the road I succeeded in getting two of them for Streator. I wish the gentlemen would see Captain Pilcher's book and read it; it is a good one.

Dr. McCURDY (Pittsburg)—In order that we may have the benefit of all the best knowledge, I think the best thing that can be done by the Association at this time is to see that copies of this paper reach every manager of every road in our country. In that way it will be able to do some good. As railway surgeons we know that everything that Captain Pilcher has said is of great importance and for him to prepare this paper as exhaustively as he has without having that paper reach the roads and bring some practical results would be a great pity; and I move you that this matter be referred to the executive committee with power to take this action.

Motion seconded by Dr. Reed and carried.

Dr. HARNDEN—I have listened to the paper with a great deal of interest. I suppose the author is competent to give a good paper and good advice on this subject, and there is no doubt but what theoretical advice is excellent, and if it could be carried out as he has indicated so ably it would be attended with good results. But in my experience in such matters I have found instructions to employes leave them somewhat in the position of a half-educated doctor—they kill more than they cure. In giving instructions to employes, especially as to the application of ligatures applied with the idea of controlling hemorrhage; I think nine times out of ten the hemorrhage will be increased for the relief is not intelligently applied. A method of teaching employes might be carried out so thoroughly and exhaustively as to render them capable to fulfil these instructions, but unless you append to a law a penalty you will not make it effective, and unless you append to these instructions some requirement under the head of organized relief association, or on the part of the management of the company requiring such employes to show by answers to questions or by oral examination that he has learned those instructions and remembered them and has some idea of carrying them out practically, then the instructions will not have accomplished much. I think about as amusing an instance illustrating the value of such instructions, a man came into my office one day and said a man was injured in the arm and there was considerable hemorrhage attending it; I went to him, and found both limbs above the knees wound tightly with cords, I asked what that was for, and one of the boys said he had heard that if you shut off the arteries in the limbs it would prevent hemorrhage in the rest of the body. That is about the way they would carry out instructions. And the recommendation of this same form was brought before the Erie Railway surgeons and it was discussed and it was decided to

place the matter in the hands of a committee to formulate instructions and recommendations to the manager of the company. The committee reported at the next meeting with a majority and minority report; the minority report was a long detailed list of recommendations and instructions to the employes and the majority report was a very brief one and consisted simply of some of the most simple forms of instructions; in case of hemorrhage elevate the extremities, which, as we all know would in a large majority of cases of ordinary hemorrhage, control it; this was one of the instructions, another was to place a clean towel or other clean bandage of some kind immediately over the wound and apply compression and run for the doctor, and I think that was about the extent of the instructions—they were very simple indeed. They were presented to the company and immediately adopted and circulated and placed in all offices and given to the employes. Now, I think our Fellow, Dr. Estes, chief surgeon of the Lehigh Valley system, by personal supervision of it, has been able to carry out some method of controlling hemorrhage by ligation, by which he has been able to accomplish some wonderful results. And I say Dr. Pilcher's ideas are most admirable if they can be carried out by personal supervision on the part of the head of the management or the relief department.

Dr. GARDNER—I have listened to the paper with a great deal of interest. In our own line [Southern Pacific] we have had boxes some time. The boxes alluded to that we have had on our line (with the exception of the passenger train from San Francisco to New Orleans, the limited, on that a box is placed in the dining car) were ordinarily only a few boxes placed along but they were failures; the contents were mistreated and when they were wanted they were not to be had. The emergency bandage is just the same as the army bandage, but we added the cotton. With that I have printed instructions with every package; these we have placed in the round house, the machine house and every caboose; in every caboose a dozen bandages and printed instructions in every box. We found it was impossible to give instructions to our employes because our road is far west and the employes change often and we do not have the different employes long enough to instruct them; I made an application for a thousand bandages and they were distributed to the different departments and gave great satisfaction; our instructions are simple and very short so anyone can adapt them.

Dr. REED—I beg the pardon of the Academy and ask permission to add one remark I intended to make and forgot. I wish to say Dr. Pilcher's book should be in the hands of every railroad surgeon, but what I intended to convey in my remarks is I think it will do better work in the hands of the surgeon than in the hands of the average employe. The instructions to the average employe should be short and concise, and be backed by intelligent instruction to the average surgeon, who is fully as ignorant as to what should be done in an emergency many times as the average man.

Dr. PILCHER—It has given me very great pleasure to learn from this discussion that the Academy is so nearly unanimously in favor of the extension of first-aid work in the railway service. The remarks, however, of the gentleman who seems to doubt its practicability, remind me of the not entirely unknown anecdote of the peripatetic old chap who was wandering about Southern Europe some four hundred years ago circulating a rumor that the world was round. Nobody believed him. But those of us who visited Chicago three years ago can say most emphatically that he was right. The fact that any particular individual had not seen it to be round did not make the world any less spherical. And the fact that some gentlemen, who have not made the effort, think that first-aid instruction will not be a complete success does not in any way militate against the fact that success in railway first-aid is not only a possibility but an actual living fact. Five roads have already used it to

some extent, and the chief surgeon of the Lehigh Valley Railway, Dr. W. L. Estes, writes me that upon his road, first aid has saved no less than seventy-five lives which would otherwise have been lost. These facts alone would seem to amply demonstrate that the doubts expressed by the skeptical gentleman are an unwarranted reflection not only upon the teaching capacity of railway surgeons but upon the intelligence of the vast body of railway men, many of whom are daily entrusted with matters requiring exceptionally keen judgment and comprehension, and all of whom are necessarily above the average grade of intelligence. Neither the public nor the railway service will tolerate such a reflection for a moment. First aid is not a theory nor an untried practice but it is a thoroughly proven instrument, the value of which has been amply demonstrated not only in railway work, but to a far greater extent in military and in civil life. No flag is so much honored today in the civilized world as the white field bearing a red cross, the symbol of aid to the injured and afflicted.

The point that has been suggested with regard to the possible danger of mistaking the inadequate information acquired through first-aid instruction for a complete medical education is a matter that every first-aid instructor should look after himself. In the little book of which some of the gentlemen have spoken so kindly, I have endeavored on nearly every page relating to treatment to call attention to the fact that the aid rendered is only temporary and pending the arrival of a medical man, who should be summoned at the earliest possible moment. I have too much confidence in the ability of our railway surgeons to have any doubt as to whether or not they will impress upon their men the fact that, except in the very simple cases, their assistance should attempt only to tide over the time until a surgeon can be secured. With regard to the emergency box of which so much has been said, I believe it to be an important feature of railway first aid, although it would hardly seem to deserve the prominence which has been thrust upon it in this discussion. The instructions in the emergency box are also important. No emergency box should be without its instructions, clearly printed and conspicuously placed, nor should it be without a copy of a good first aid book, for the further information of its custodian at his leisure, not for hurried consultation in the face of the emergency. You all remember the peculiar cerebral condition which often takes hold of men in emergencies, and manifests itself either in amaurosis or paralysis of the center of comprehension, so that they can not grasp the meaning of any sort of printed matter. But the previous instruction in first aid not only enables men to apply the necessary treatment in the majority of cases without reading the printed rules, but in case they may desire to refresh their memories before applying first aid, it gives them the self-confidence which would enable them to go over the rule intelligently and profitably. But the preliminary teaching is indispensable! It is hardly necessary to repeat what I have already stated in my paper, that an emergency box gotten up after the plan described will do away with the objections already made to these first-aid helps, and the plan of issuing the boxes to certain individuals, who should be held responsible for their serviceability entirely obviates the difficulty arising from their becoming damaged or defective.

Some of the gentlemen have referred to the fact that the introduction of first aid into the railway service will require work. There is no doubt of that, it will require work, both upon the part of the railway surgeons and on the side of the other employes. It will require some expenditure also upon the part of the railway companies, but this will be more than counterbalanced by the amount of expensive litigation that will be avoided. Personally, I have no direct interest in the matter except that of a more or less frequent traveler who may on some occasion be in a position to be greatly helped by first aid. I speak in the interests of the thousands of injured

persons who might every year be helped by the adoption of systematic first aid in railway work. If, as a consequence of the increased confidence of the people, the receipts of the railways are increased I do not object. If, because of the diminished amount of litigation, the expenditures of the railways are diminished I should be pleased. But these are mere trifles, hardly to be mentioned in comparison with the enormous benefit to the great traveling public, which will accrue from the adoption of a system of first aid such as has been urged.

AMPUTATIONS.

Read at the Meeting of the Western Surgical and Gynecological Association, Topeka, Kan., Dec. 29, 1896.

BY J. P. LORD, M.D.

PROFESSOR PRINCIPLES AND PRACTICE OF SURGERY, CREIGHTON MEDICAL COLLEGE; ATTENDING SURGEON TO ST. JOSEPH'S HOSPITAL, OMAHA, NEB.

The reasons for presenting a paper upon this particular subject are, that the writer has had a considerable experience and observation in this line of work. It is a subject which has received little attention during the period represented by the age of this society, the profession having been fully occupied, studying and discussing the newer problems in our science and art, which have brought with them pressing demands for solution. It is only necessary to turn our mental skiascope upon the history of the last decade, in order to fully perceive and appreciate its marvelous achievements in these newer fields.

The development of specialism in surgery, with its perfected technique, has made its influence felt all along the line even to the "saw bones." When low, it may be said that to amputate a limb in a modern manner, that is, ideally, without drainage, and securing primary union, requires as much, and sometimes more, skill and experience than to do a hysterectomy.

Infrequently as some individual members of the profession are called upon to do an amputation, their experience is insufficient to keep them in line with the more advanced practices; therefore, inasmuch as the subject has received little recent attention, its consideration and discussion is thought to be desirable at this time.

The conditions necessitating amputation are so various that fixed rules can not be followed, either in determining the necessity for amputation, or the manner in which the amputation is to be done. With modern methods of wound treatment, there is not the same necessity for early amputation for injury, as formerly; this, in itself, saves many limbs and possibly lives. But when delay is made without the institution of proper methods, there is the same danger that drove our forefathers to immediate amputation and the necessary sacrifice of many limbs or portions of limbs, because the life should not be jeopardized. Crushing injuries and compound fractures represent this class of cases, and their successful treatment requires not only thorough surgical knowledge, but experience. A better understanding of my meaning can be obtained perhaps by the recitation of cases, of which we have, and doubtless all other surgeons have, too great a number, and is another reason why this paper is written.

A packing-house employe had great toe crushed by wheels of street car. His shoe and foot were necessarily very infectious from saturation with animal matter, and had been imperfectly cleansed, closely sutured and dressed with absorbent cotton. Septic lymphangitis and spreading gangrene occurred. Am-

putation at middle and upper thirds of legs; return in stump; reamputation middle of thigh, general sepsis and death.

Boy of 12 had foot crushed by street cars; no bones broken, soft parts over metatarsus badly injured and skin burst longitudinally on outer and inner borders of foot; wounds tightly closed by suture and small drainage tubes introduced by physicians called in emergency. Dry iodoform gauze and cotton dressing were secured by bandage; the scant discharge dried into dressing, sealing all parts of drainage. Presented third day septic lymphangitis, temperature 104.5, gangrene halfway to the knee, amputation three inches below the knee, flaps too doubtful to suture. Left wound entirely open, iodoform gauze loosely laid over end of stump between cellulose-cutaneous flaps, copious wet hot carbolized dressing applied. Dressed third day, slight loss of margin of anterior flap, trimmed with scissors and edge of posterior flap curetted, closed with silk-worm gut, primary union, but some pus; recovery uneventful.

These cases represent a class very common, a full half dozen of which could be detailed, from a comparatively recent period. This observation I have made: that general practitioners are too prone to make attempts at repair of these injuries, with results that are worse than useless, and often most pernicious, as illustrated in the cases reported. In cases of this character, the wounds should not only be left wide open, but freely enlarged, if necessary, to allow all discharges to find the most ready and free outlet. Not only this, but many free incisions should be made to allow free exit of the stagnated venous blood. In many of these crushed and lacerated wounds, the trouble may not be so much with the lack of arterial supply (though this may be much affected), as of venous return; the engorgement of the veins increasing the swelling, and devitalizing the tissues by the pressure, thus favoring and initiating the pathologic changes which are prone to culminate in a diffuse, acute, septic lymphangitis with accompanying thrombo-phlebitis and possibly gangrene. In addition to this treatment by free incision to guard against strangulation, the very large gauze, hot wet carbolized dressing is used by the author. This proving inadequate, constant irrigation by hot water is resorted to, which treatment has proven of greatest advantage to the writer in several almost hopeless cases of secondary compound fracture, and cases of crush injuries of the extremities.

In those instances where amputation is subsequently demanded, as well as many primary cases, it has been found that much of the limb can often be conserved by leaving the stump unsutured, thus placing no tax or strain upon the flaps of very questionable vitality. This course in secondary amputation admitting of the incision passing through tissues already much inflamed, the subsequent free drainage produced by this open method quickly restoring the waning vitality of the tissues, beside appreciably lessening the risk of amputation during the inflammatory period. In these cases a preference is also made for the wet carbolized dressings, which are always very ample in character, extending well above the affected part.

It has been demonstrated by the writer that the time-honored custom of going sufficiently high in an amputation to get flaps to cover, need not necessarily be followed in all cases, as is illustrated by the following: