

**A REPORT ON A PLAN FOR
TRANSPORTING
WOUNDED SOLDIERS BY
RAILWAY IN TIME OF WAR**

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A Report on a Plan for Transporting Wounded Soldiers by Railway in Time of War by George A. Otis

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GEORGE A. OTIS

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Otis, G. A. 1875.

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ON A PLAN FOR

TRANSPORTING WOUNDED SOLDIERS

BY

RAILWAY IN TIME OF WAR;

WITH DESCRIPTIONS OF VARIOUS METHODS EMPLOYED
FOR THIS PURPOSE ON DIFFERENT OCCASIONS.



BY GEORGE A. OTIS,
ASSISTANT SURGEON, U. S. ARMY.

WASHINGTON:
WAR DEPARTMENT,
SURGEON GENERAL'S OFFICE.
1875.

*Compliments of
George A. Otis.*

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GENERAL: I have the honor to report, in obedience to your instructions, on the plan proposed by the Russian engineer, Mr. A. Zavodovsky, for the railway transportation of the sick and wounded in time of war.

The pamphlet with its accompanying documents, transmitted through the State Department, gives a concise but lucid explanation of the proposed plan, and is accompanied by drawings illustrating its practical application.* The official correspondence on the subject, and a translation of Mr. Zavodovsky's paper, with reduced copies of the lithographed plates that illustrate it, are appended to this report.

Recent wars have exemplified the great influence of the direction of railroad lines upon the plans and strategic arrangements of military commanders; and, undoubtedly, in future campaigns this factor will become yet more important. The immense development of trunk lines and interlacing networks of railway in all civilized countries affords such opportunities for the transport and rapid concentration of men, munitions and stores, that, beyond question, this auxiliary will, hereafter, be more and more valued.

As the facilities afforded by railroad transport for the movement of troops and material to the theatre of warfare formidably augment the destructive power of armies, they also offer a useful and most effective means of saving lives

*ZAVODOVSKY (A.) *Transport Spécial des Malades et des Blessés en Temps de Guerre*, par Voies Ferrées, St. Petersburg, 1874.

and alleviating suffering, by the speedy removal of the sick and wounded from the scene of active operations. As it behooves the medical staff that, with every advance in the art of destroying men, as Louis termed it, methodically and gloriously, there should be corresponding improvement in the art of saving life and diminishing pain, the great advantages offered by railroads for disencumbering the active force of its disabled men, by conveying the latter to points where the best hospital accommodation can be enjoyed undisturbed, were not likely to pass unobserved by those charged with the administration of the medical service of armies; and we shall presently see that they hastened to avail of these new facilities. The proposition of Mr. Zavodovsky is therefore, in one sense, not a novelty. It is to be compared with various other systems proposed to fulfil the same object, with a view of determining whether it attains its end with greater simplicity, convenience, economy, and regard to the comfort of the disabled, than is accomplished by other methods.

While it is held by some military surgeons that certain of the severely wounded, as those with penetrating wounds of the great cavities, and of the large joints, and with shot fractures of the femur, should be regarded, with their attendants, as neutrals, and treated as near as practicable to the spot where they fall, yet no one questions the advantages of speedy removal, or, as the French say, *evacuation*, of the great bulk of sick and wounded from the theatre of hostilities.

By rapid dispersion of the disabled, the fighting force is less diminished than by any other plan. Fewer combatants are withdrawn from their proper duties to attend their sick and wounded comrades. With proper inspection of those sent to the rear, and such enforcement of discipline in the base hospitals as will ensure the prompt return of convalescents, the number of sick and wounded engaging in fresh active service will be greater than by any other arrangement; and a less proportion of division, brigade, and regimental medical officers and hospital attendants need be detached from the marching columns; which, in the exigencies of actual battle, are rarely adequately supplied with surgical assistance. Large accumulations of medical and hospital supplies with the army become superfluous. The *depôt* hospitals, frequently great lurking places for malingers, may be reduced to the smallest compass. If, without changes, the wounded can be directly placed in a fixed hospital not too distant, many primary mutilations may be justifiably avoided, with a view of employing more delicate special operations when the patients arrive at a safe place of rest. Lastly, the most important consideration is the most obvious, the distribution of the sick and wounded prevents the generation of those pestilences that are the greatest scourge of armies. The sick and wounded avoid infecting each other, and those who are well escape contagion.

The Italian war of 1859 was the first in which transportation of the sick and wounded by railroads was extensively employed. The Austrian, French

and Sardinian armies availed of this resource; yet, after the carnage at Solferino, the hospitals at Milan, Brescia, Pavia, and Turin were frightfully overcrowded. Baron Hippolyte Larrey, who accompanied the French Emperor as Physician-in-Chief, in an address before the Academy of Medicine of Paris, boasted of "the rapid intervention of the railways, by which the work of evacuation of the wounded was achieved."* But he did not state what arrangements, if any, were made to adapt the cars to the special service required; and, it would appear that the passenger trains were used, for the most part, without alterations.

The first published proposition to suspend litters in freight cars, as the means best calculated for the rapid transit of sick and wounded, while providing for the concussions caused by the swaying and jarring of these vehicles, the first, at least, that I have met, emanated from Dr. E. Gurlt, now a celebrated professor of military surgery at Berlin. In 1859 Dr. Gurlt† submitted a project for carrying the wounded in hammocks, suspended to the panels of freight cars by iron hooks. A commission was appointed by the Prussian Government to test the feasibility of this system. An adverse report was made. It was found in practice that the roofs of the freight cars would not sustain the weight of the loaded cots; the screws drew out, and the hooks and hammocks fell. Moreover, the swaying movement of the hammocks induced vertigo, or led to collisions. After repeated experiments, the commission recommended, in 1860, that the floors of the freight cars should be thickly covered with straw, and that the severely wounded should be carried to the trains on straw mattresses furnished on either side with three strong loops of webbing, through which stretcher poles or lance staffs could be passed to constitute a sort of stretcher. The mattresses were laid directly upon the loose straw.‡ This mode of transport was adopted on a large scale by the Prussian army in the Danish war, and in the Silesian or Six Weeks War of 1866.

* LARREY (H.) *Discussion sur la Salubrité des Hôpitaux*, in *Bulletin de l'Acad. de Méd.* T. XXVII, 1861-2, p. 464: "Si les brancards, les caçolets et les voitures d'ambulance nous ont parfois manqué, nous avons trouvé partout le dévouement ingénieux qui invente et multiplie les ressources, jusqu'à ce que l'intervention rapide des chemins de fer et des bateaux à vapeur eût garanti complètement et achevé l'œuvre des évacuations."

† GURLT (E.) *Ueber den Transport Schwerverwundeter und Kranker im Kriege, nebst Vorschlägen ueber die Benützung der Eisenbahnen dabei*; in *Medicinische Zeitung des Vereins für Heilkunde in Preussen*, Berlin, 1858, S. 232.

‡ This plan, largely employed in the Army of the Potomac in 1863-64, was approved by the Prussian Government. An order, issued by the Prussian Minister of War, July 1, 1861, of which an abbreviated translation may be found in Professor LOMMORE's *Treatise on the Transport of Sick and Wounded Troops*, 1868, p. 501, directs that in transporting sick and wounded soldiers by railways, the first, second and third class passenger carriages will be appropriated to the less severely wounded, first and second class carriages to be used by officers and men requiring the most care, third class for slight cases. The severely wounded and those injured in the lower extremities will be moved in luggage vans or baggage cars. These are 20 feet long and 7½ feet wide. The floors are to be strewn with loose straw, and then seven or eight severely wounded can be placed on straw mattresses, with pillows fastened to them, in each car. Great care must be taken to guard against fire, &c., &c.

Next, in chronological order, are the plans employed during the recent civil war in the United States for moving the sick and wounded by railway. After the action at Wilson's Creek,* and minor engagements in central Missouri, in August, 1861, the severely wounded fell into the hands of the enemy. They were soon paroled, and concentrated at Rolla, the southwestern terminus of the St. Louis railroad, whither two hundred less grievously injured, and carried off by the retreating army, had previously been sent. Here, the freight cars available were fitted up for the transportation of this large body of wounded to the hospitals established at St. Louis. Various expedients were employed to adapt the cars to the requirements of the different classes of patients. In some cases



FIG. 1.—Interior of an improvised hospital car.

an arrangement not unlike that of Mr. Zavodovsky was essayed. Seasoned tent-poles were shaved down to give them as much elasticity as was compatible with requisite strength, and secured transversely near the roof, passing through holes in the side studs of the car. Ropes attached to these poles and also to the floor suspended two tiers of field stretchers, on which pallets were laid. With this plan, a feeling of insecurity was common to the patients and attendants, and additional lashings, and constant inspections were necessary to prevent accidents. Another method consisted in placing a double row of upright stanchions which were erected on either side of the car (FIG. 1) connecting the floor and roof, at intervals of seven feet lengthwise. To these firm posts, tiers of two or three litters were securely lashed. In other cars rough wooden bunks were built along the sides of the vehicle, and filled with straw, and made more comfortable by being floored by narrow elastic slats. In all cases, large window-spaces were sawn out of the ends and sides of the car to afford ventilation. There was often cause to remark on the great ingenuity displayed, on this and other similar occasions, by the line officers, quartermaster's men, and the soldiers themselves, in improvising various contrivances for the comfort of the wounded subjected to these rough modes of transportation. With an intelligent adaptation of the means at hand, it was found practicable

* Also known as the battle of Springfield, where the Union commander, the lamented General NATHANIEL LYON lost his life. Major General FRENCH'S official report states the Union loss at 223 killed, 721 wounded, 291 missing. Assistant Surgeon H. M. SPROUX, U. S. A., who remained with the wounded on the field, records their number as 1175. See *Appendix to Part I, Medical and Surgical History of the Rebellion*, p. 17.

to make the condition of the wounded on freight cars very tolerable, with the aid of articles belonging to the field equipment alone. As the official who vouchsafed to assume charge of the models of hospital equipment and means of transport sent by this Office and by the Quartermaster's Department to the Paris Exposition, in 1867, and to exhibit them, with other contributions, as material supplied by the United States Sanitary Commission, has represented that the system of supporting litters on upright frames was introduced by a member of that Commission,* it is as well to expose here the fact that this plan was in use before the Commission was organized.

After the Army of the Potomac left the vicinity of Washington, the sick and wounded were removed mainly by the hospital transport steamers on the Potomac, Rappahannock, York and James rivers. The short lines from Savage's Station to White House, on the York, and from Aquia Creek to Fredericksburg were largely utilized, however, for the same purpose; and when the theatre of hostilities was transferred to Maryland and Pennsylvania, numerous railway lines became available. Medical Director J. Letterman recorded the transfer† of no less than nine thousand sick and wounded over the Aquia Creek road, on June 12th, 13th, and 14th, 1863, when the Army moved northward after the disasters of Chancellorsville. All patients that would be injured by sitting up, were carried by hand to the railway, on the beds they occupied in hospital, the beds being placed on hay-covered floors in freight cars.

The following year, when this Army was massed before the entrenched line at Petersburg, a large depôt hospital was erected at City Point, the base of supplies, at the junction of the James and Appomattox rivers. This depôt was connected with the positions of the several army corps by a railroad with branches, and the sick and wounded from the division hospitals were brought to the depôt, chiefly in the box-cars which had carried forward supplies for the troops, and were transferred to hospital steamers, or retained at City Point for treatment, at the discretion of the medical director for transportation, Surgeon E. B. Dalton, U. S. V. There were, at first, two, and, subsequently, a larger number of passenger cars converted into hospital cars by the erection of rows of stanchions, to which litters were suspended by elastic rubber rings, each car having accommodation for thirty recumbent patients. The box-cars, with doorways at the sides, five feet in width, and an interior height in the centre of 6 feet 9 inches, had a floor space of 25 feet 2 inches in length by 7 feet 8 inches in breadth, or about 192 square feet. They afforded comfortable accommodation for nine recumbent patients; but were sometimes packed with as many as twenty. When the floors were covered with a thick bed of fresh straw or hay, on which well-filled bed-sacks or mattresses could be laid, the concussions from

* Dr. T. W. EVANS, in his book entitled: *La Commission Sanitaire des États-Unis*, Paris, 1865, p. 138.

† LETTERMAN (J.) *Medical Recollections of the Army of the Potomac*, New York, 1866, p. 150.