

## DISCUSSION

## SAFETY OF MECHANICAL RESUSCITATION APPARATUS

*Preliminary Statement:* Immediately following the publication in *SCIENCE* (December 24, 1943) of an article by the late Professor Yandell Henderson attacking the Council on Physical Therapy of the American Medical Association, a reply was prepared in which it was pointed out that *SCIENCE*, then edited by J. McKeen Cattell, should have submitted the attack to the council for its reply before publication. Unfortunately, both Professor Henderson and Dr. Cattell became ill and their deaths occurred soon after the publication of the article. This made it necessary for the council to revise its reply.

THE late Professor Yandell Henderson wrote an extensive paper entitled "The Return of the Pulmotor as a 'Resuscitator': A Back-Step toward the Death of Thousands," which was published in *SCIENCE* for December 24, 1943. He raised the question of the safety, efficacy and dangers of mechanical resuscitators and particularly charged the Council on Physical Therapy with inefficiency, unfair tactics and professional incompetence by accepting the E & J resuscitator.

Some of the statements of Professor Henderson are incorrect, some misleading and others unwarranted. This brief reply is for the information of the medical profession and the public.

Professor Henderson claimed that mechanical devices for artificial respiration known as resuscitators are essentially identical with a device formerly known as the pulmotor. The latter device, he asserted, was discredited by a Committee on Resuscitation from Mine Gases (about 1912), of which he was a member. The council does not propose any defense of the pulmotor, although he, as a member of the council at the time when that body first undertook to investigate resuscitators, was, of course, aware that the modern devices are essentially different from the pulmotor since they incorporate mechanisms for the control of pressure. In the resuscitators accepted by the council, dangerous pressures are not produced and evidence is available to indicate that the maximum positive pressure of 13 mm of mercury created in them is less than that which a human being can voluntarily produce in his own lungs without discomfort.

Professor Henderson wrote, "A delay of even a few seconds while apparatus is being brought and applied may lose a life." With this statement the council is in full accord. The council has urged<sup>1, 3</sup> that attempts should be made to train every competent person in the proper method of administering manual artificial respiration and that such methods should be applied at the earliest possible moment, even when awaiting the arrival of official agencies with such apparatus as they may have available. Manual methods should be ap-

plied whether those administering first aid are expecting the arrival of either an inhalator or a resuscitator.

He wrote, "In this respect, the American Medical Association is in direct antagonism to the American Red Cross." Actually the council has never voiced a criticism of any position taken by the American Red Cross regarding artificial respiration; it has repeatedly advocated the Red Cross training of persons giving first aid in the manual methods.

Both the title and the body of the article imply that the use of resuscitating devices will destroy life "by the thousands." The council has made repeated diligent efforts to ascertain instances in which loss of life or injury has been caused by the resuscitators that have been accepted. Not a single instance has been discovered in which either the opinion of a competent clinician or a post-mortem report would support the contention that loss of life or injury occurred due to the use of an accepted resuscitator.

The original reports mentioned by Professor Henderson appeared some thirty years ago and concerned devices the use of which has long since been discontinued. Again and again he was requested to submit a single authentic instance of loss of life because of the use of an accepted resuscitator, but not a single instance was submitted by him.

In his presentation, Professor Henderson insinuated a lack of "moral sense" in members of the Council on Physical Therapy because they accepted resuscitators without examination by any of them and asserts that this has been admitted by members in their letters to him. Actually, in 1937, two members of the council trained in physiology and medicine made careful experimental investigation of this equipment in the laboratories of the universities with which they are associated. Moreover, individual members of the council made independent investigations. Still further, the council consulted extensively with the late Dr. Pol Coryllos,<sup>2</sup> recognized as an authority in surgery of the chest, who had used the E & J resuscitator extensively in his own practice, had published papers concerning its use and had available evidence in the form of motion pictures as records of his experimentation. The records of the Council on Physical Therapy indicate that three other investigators, one of whom is a professor of physiology in one of the leading universities of the United States, submitted information and advice in relationship to the acceptance of the E & J resuscitator. Thirty-nine individual physicians submitted reports of cases which they had treated with this device and the vast majority of such reports were favorable to its use.<sup>3</sup> Dr. Ben Martinez submitted 500

<sup>1</sup> Annual Report: Council on Physical Therapy, *Jour. Am. Med. Assn.*, 118: 1468, April 25, 1942.

<sup>2</sup> P. N. Coryllos, "Mechanical Resuscitation in Advanced Forms of Asphyxia: A Clinical and Experimental Study of the Different Methods of Resuscitation," *Surg., Gynec. and Obst.*, 66: 698, April, 1938.

cases<sup>4</sup> in which newborn infants had been resuscitated with this device. In the consideration of other resuscitating devices additional evidence has been submitted. Finally, reports were made available of incidents in which rescue teams had used the resuscitator, and this material is available as part of the report on the survey of methods for artificial respiration by Dr. Bernard D. Ross.<sup>5</sup>

Professor Henderson referred to the original adverse report which he wrote for the council in May, 1934, on the E & J resuscitator and made the statement, "but at that point unfortunately the E & J Company learned—or were informed—that the report was adverse." The invariable practice of the council is to transmit to any firm which submits equipment a copy of the report on the device whether favorable or unfavorable. In the case of the E & J resuscitator the usual routine was followed.

Again Professor Henderson stated that the original adverse report was suppressed by the Board of Trustees of the American Medical Association. This statement is untrue. In view of further evidence which became available previous to the publication of Professor Henderson's report, the council became convinced that the report should be held in abeyance until further and more extended studies could be made. Again he implied that the ultimate acceptance of the E & J resuscitator was the result of improper influence exerted by the firm on the secretary of the council. This statement is untrue. The decisions of the council are solely those of its members. The secretary of the council does not have a vote for acceptance or rejection. The secretary of the council is not a physician. Such opinions as he submits are purely with relationship to physical or engineering aspects of the devices under consideration.

Again Professor Henderson implied that the secretary of the council did not refer to that body his invitation to delegate a subcommittee to join with him in testing a resuscitator on animals. Here are the facts: A bulletin is sent to all members of the council every two weeks. Professor Henderson wrote on November 30, 1938, that he had borrowed an E & J apparatus and could retain it only until December 15. In the bulletin dated December 8 appeared the reply which was made to him. Actually Professor Henderson acknowledged receipt of this letter on December 13. In the article, Professor Henderson charged that the secretary did not reply. Certainly it was impossible to

appoint a subcommittee, arrange a meeting and provide transportation within the fifteen-day limit that he mentioned.

In the booklet of the Council on Physical Therapy called "Apparatus Accepted" appears a statement regarding resuscitators and inhalators and also a complete description of the prone pressure method. Professor Henderson was himself coinventor of the Henderson & Haggard inhalator which he claimed had "never been patented." A patent number appears on the device, but that patent is not assigned to him. The council has accepted the appliance.

The available evidence indicates that by far the great majority of those well informed regarding inhalators, resuscitators or other devices in the field of physical therapy have confidence in the objective attitude and integrity of the Council on Physical Therapy of the American Medical Association.

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<sup>3</sup> "E & J Resuscitator and Inhalator Acceptable." Report by Council on Physical Therapy, *Jour. Am. Med. Assn.*, 112: 1945, May 13, 1939.

<sup>4</sup> D. Ben Martinez, "The Mechanical Resuscitation of the Newborn: Report of 500 Cases," *Jour. Am. Med. Assn.*, 109: 489-490, August 14, 1937.

<sup>5</sup> Bernard D. Ross, "A Survey of Methods for Artificial Respiration," *Jour. Am. Med. Assn.*, 122: 660, July 3, 1943.