its irritating properties and the difficulty of finding the exact strength in which to use it: he feared to use it too strong, lest it should impair the vitality of the tissues and thus prevent healing; and he feared to use it too weak, lest its antiseptic qualities should be insufficient for the object in view. As dressings for wounds he used various chemical substances, which, being mixed with carbolic acid, were intended to give off a certain quantity of carbolic acid in the form of vapour, so that the wound might be constantly surrounded by an antiseptic which would destroy any organisms approaching it, and, at the same time, not interfere with its healing. At first, although he prevented pyaemia in a marked degree, he, to a certain extent, irritated the wounds and prevented rapid healing. He began his historic experiments in Glasgow and continued them on his removal to the chair of clinical surgery in Edin­burgh. After many disappointments, he gradually perfected his method of performing operations and dressing wounds, which was somewhat as follows.

A patient was suffering, for instance, from disease of the foot necessitating amputation at the ankle joint. The part to be operated on was enveloped in a towel soaked with a 5% solution of carbolic acid. The towel was applied two hours before the operation, with the object of destroying the putre­factive organisms present in the skin. The patient was placed on the operating table, and brought under the influence of chloroform; the limb was then elevated to empty it of blood, and a tourniquet was applied round the limb below the knee. The instruments to be used during the operation had been previously purified by lying for half an hour in a flat porcelain dish containing carbolic acid (1 in 20). The sponges lay in a similar carbolic lotion. Towels soaked in the same solution were laid over the table and blankets near the part to be operated upon. The hands of the operator, as well as those of his assist­ants, were thoroughly cleansed by washing them in carbolic lotion, free use being made of a nail brush for this purpose. The operation was performed under a cloud of carbolized watery vapour (1 in 30) from a steam spray-producer. The visible bleeding points were first ligated; the tourniquet was removed; and any vessels that had escaped notice were secured. The wound was stitched, a drainage-tube made of red rubber being introduced at one corner to prevent accumulation of discharge; a strip of “ protective ”—oiled silk coated with carbolized dextrin—was washed in carbolic lotion and applied over the wound. A double ply of carbolic gauze was soaked in the lotion laid over the protective, overlapping it freely. A dressing consisting of eight layers of dry gauze was placed over all, covering the stump and passing up the leg for about six inches. Over that a piece of thin mackintosh cloth was placed, and the whole arrangement was fixed with a gauze bandage. The mackintosh cloth prevented the carbolic acid from escaping and at the same time caused the discharge from the wound to spread through the gauze. The wound itself was shielded by the protective from the vapour given off by the carbolic gauze, whilst the surrounding parts, being constantly exposed to its activity, were protected from the intrusion of septic contamina­tion. And these conditions were maintained until sound healing took place. Whenever the discharge reached the edge of the mackintosh the case required to be dressed, and a new supply of gauze was applied round the stump. Whenever the wound was exposed for dressing the stump was enveloped in thc vapour of carbolic acid by means of the steam spray-producer. At first a syringe was used to keep the surface constantly wet with lotion and then a hand-spray. These dressings were repeated at intervals until the wound was healed. The drainage-tube was gradually shortened, and was ultimately removed altogether.

The object Lister had in view from the beginning of his experiments was to place the open wound in a condition as regards the entrance of organisms as nearly as possible like a truly subcutaneous wound, such as a contusion or a simple fracture, in which the unbroken skin acted as a protection to the wounded tissues beneath. The introduction of this practice by Lister effected a complete change in operative surgery. The dark times of suppurating wounds, of foul discharges, of secondary haemorrhage, of pyaemic abscesses and hospital gangrene constitute what is now spoken of in surgery as the pre-Listerian era.

As years went on, surgeons tried to simplify and improve thc somewhat complicated and expensive measures and dressings and chemists were at pains to supply carbolic acid in a pure form and to discover new antiseptics, the great object being to get a non-irritating antiseptic which should at the same time be a powerful germicide. Iodoform, oil of eucalyptus, salicylic acid, boracic acid, mercuric iodide, and corrosive sublimate were used.

For some years Lister irrigated a wound with carbolic lotion during the operation and at the dressings when it was exposed, but the introduction of the spray displaced the irrigation method. All these different procedures, however, as regards both the antiseptic used and the best method of its application in oily and watery solutions and in dressings, were subsidiary to the great principle involved—namely, that putrefaction in a wound is an evil which can be prevented, and that, if it is prevented, local irritation, in so far as it is due to putrefaction, is obviated and septicaemia and pyaemia cannot occur. Alongside of this great improvement the immense advantage of free drainage was universally acknowledged. Moreover, surgeons at once began to take greater care in securing the cleanliness of wounds, and some of them, Lawson Tait and Bantock, for example, produced such excellent results by the adoption merely of methods of strict cleanliness, and became so aggressive in their championship of them, that many of the older practitioners were bewildered and unable to decide as to where truth began and where it ended in the new doctrine. But though the actual methods, as taught and practised by Lister, have, with the spray-producers, passed away and given place to new, still the great light which he shed in the surgical world burns as brightly as ever it did, and all the methods which are practised to-day are the direct results of his teaching.

By 1885 the carbolic acid spray, which to some practitioners had apparently been the embodiment of the Listerian theory and practice, was beginning to pass into desuetude, though for a good many years after that time certain surgeons continued to employ it during operation, and during the subsequent dressings of the wound. Surgeons who, having had practical experience of the unhappy course which their operation-cases had been apt to run in the pre-Listerian days, and of the vast improvements which ensued on their adoption of the spray-and-gauze method in its entirety, were, not unnaturally, reluctant to operate except in a cloud of carbolic vapour. So, even after Lister himself had given up the spray, its use was continued by many of his disciples. It was in the course of 1888 that operating surgeons began to neglect the letter of the antiseptic treatment and to bring themselves more under the broadening influence of its spirit. Certain adventurous and partially unconvinced surgeons began to give up the carbolic spray gradually, by imparting a smaller percentage of carbolic acid to the vapour, until at last the antiseptic disappeared altogether, apparently without detriment to the excellence of the results obtained. But while some surgeons were thus ceasing to apply the anti­septic spray to the wound during operation, others were pouring mild carbolic lotion, or a very weak solution of corrosive sub­limate (an extremely potent germicide) over the freshly-cut surfaces. These measures were in turn given up, to the advan­tage of the patient; for it was hardly to be expected that a chemical agent which was strong enough to destroy or render inert septic micro-organisms in and about a wound would fail to injure exposed and living tissues. Eventually it became generally admitted that if a surgeon was going to operate upon the depths of an open abdomen for an hour or more, the chilling and the chemical influences of the spray must certainly lower the vitality of the parts exposed, as well as interfere with the prompt healing of the wounded surfaces. With the spray went also the “ protective,” the paraffin gauze, and the mackintosh sheeting which enveloped the bulky dressing.