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HOW NURSES CAN PREVENT THE SPREAD OF INFECTION IN THE SURGICAL WARDS

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(Adapted for nurses from an article in "The Antiseptic")

All wounds and surgical conditions are infected, if organisms have been allowed to enter them and have produced harmful effects. In this article, however, only those infections will be considered which, in the same way as the so-called infectious diseases, can be spread from one case to another in a surgical ward if precautions be not taken for their control. Briefly, these infections are of two kinds:

- (1) those which involve septic wounds, or other open injuries, the infective organisms of which can, by carelessness in their nursing or dressing, be communicated to other cases; and
- (2) diseases such as post-operative pneumonia, tetanus, and erysipelas, which do not necessarily involve wounds, but which are infectious or contagious.

In both these categories the same holds good as in all branches of medical science—Prevention is better than Cure.

I. Sepsis which is liable to spread

Hospitals were first established only a few hundred years ago, but until the days of Lister (about 1860) hospitals even in the most highly civilised countries were abodes of horror, of terrible stench, and of lurking death. The nature of infection had not been discovered, so methods for its contravention were crude and empirical. Such processes as the dipping of amputation stumps into molten tar, and the cauterising of wounds with red-hot iron or boiling oil, were among the more intelligent and effective, albeit the more barbarous, of the measures then adopted to save the poor patient from his otherwise almost inevitable death from erysipelas or the so-called "hospital phagedaena". The necessity of opening septic tissues, and for leaving open septic wounds, was not discovered until 1810. But in the wards of a hospital a hundred years ago the organisms gained in virulence as they passed from patient to patient, so that we find old

statistics informing us that the percentage mortality in the surgical wards of hospitals was at least fifty. No wonder then that, even after the advent of anaesthesia, operations were dreaded so much that surgical disease usually remained untreated except by quack external applications. He who entered a hospital as a surgical case abandoned at least half his hope of life, slender though that hope might be; operations were seldom performed except to deliver patients from certain death.

Although the discovery of antiseptics (1860) and of asepsis (1878) have put an end, we hope for ever, to those days, yet it is still true, as we all know to our cost, and sometimes to our disgrace, that sepsis spreads alarmingly round a ward from time to time. It is the proper training and organisation of the nursing staff that provides the best safeguard against this spread of sepsis in a surgical ward.

(1) *The inculcation of a "surgical conscience"* is perhaps the most important thing in the whole of a nurse's training. If a properly washed-up hand (with or without gloves) should touch anything that is unsterile in the course of its duties, the nurse should be so trained that he or she should at once feel acutely the spot so touched, and have in it almost a sensation of pain, a feeling of real discomfort in the place, that is only relieved when that hand or arm is washed, or painted with spirit, or when that glove has been changed. Unless a young doctor or nurse develop this sense, a kind of surgical "sense of shame", he or she is not trustworthy as a dresser in any surgical ward.

(2) *The arrangement of cases to be dressed* is important. In a mixed surgical ward which contains both clean and septic cases (a thing which should be avoided when possible, but which in some hospitals is unavoidable), the nurses who look after the clean cases should have nothing to do with the septic ones. In a small hospital where owing to shortness of staff this ideal is unattainable, no septic case should be dressed until the clean cases have all been disposed of, and gloves should be worn for all the septic dressings, if not for the others as well;—best of all, for both classes of case.

It is a bad plan to have, in a large ward, a single large tray or bowl full of wet, sterile dressings, as is often done. One careless act, and the whole bowlful may be infected. If a number of small bowls or dishes be used, a careless act may bring disaster to one or two patients, but not to more. In a large ward attended by a number of nurses, certain patients should be allotted to one nurse only. For instance, all cases whose wounds show the presence of streptococci must be under one nurse, those in which *B. Pyocyaneus* is found should be under another, and so on. Rectal dressings, such as piles, colostomy, fistula in ano, etc., being almost certainly infected with *B. Coli*, *B. Welchii*, etc., must be in a separate category. A useful idea in a septic ward is to have coloured labels on the beds, each colour representing an organism, such as *B. Welchii*, *Streptococcus*, *B. Coli*, etc.

I remember a period, about fifteen years ago, when a succession of clean operation cases went septic, and caused me much worry. Full inquiries were made, and it was found that owing to the shortness of staff one of the nurses employed in the theatre had also to work in the ward where cancer of the mouth was dealt with. In the course of his duties he had to deal with oral sepsis, a particularly virulent variety, and no doubt he occasionally put his bare finger into the mouth of a patient. We made some experiments which showed us that a finger put into a septic mouth will still yield streptococcus on culture, even after washing in soap and water for ten minutes. Thereafter a rule was established that nurses on duty in the theatre may not deal with cases in any septic ward. The sepsis among operation cases at once fell to its normal low level of very well under one per cent. Some years ago another similar epidemic of sepsis in operated cases was experienced. Investigation failed to reveal the cause of this, but it stopped at once when only boiled water was used for washing up before operations. The sepsis was thereby traced to the water supply, and when the tank which supplied the water was examined, it was found that a decayed piece of cancerous jaw, which a crow had evidently taken from the theatre and dropped down the ventilator of the tank, was lying in the bottom of the tank, where it must have been for several weeks. A clean-out of the tank and a pound of potassium permanganate put this right, and the tank has been improved so that no crow will ever be able to do this again.

(3) *Constant examination of cases in the laboratory.* The pus from septic cases should repeatedly be examined under the microscope, both by smear and culture, in order that special organisms may be discovered before they have time to do harm. Only thus can really adequate measures be applied for the isolation of those cases which require it, and for the application of appropriate remedies.

(4) *Misuse of antiseptics.* It cannot be too strongly stressed that antiseptic dressings are often very harmful to the tissues, and increase the infectivity of wounds, as well as making them remain infected for a very long time. If an antiseptic is strong enough to kill organisms it will also be strong enough to kill, or to prevent the formation of, the much more delicate newly-formed cells which Nature manufactures in her attempts to heal wounds and to protect the body against harmful organisms.

The antiseptics of the acriflavine group (including flavine, brilliant green, gentian violet, and some other aniline derivatives) are among the very few antiseptics which do not seem to be harmful to these tissues. Dressings of normal saline are incapable of damaging even the most delicate tissues. If it is desired to promote the transudation of lymph, 12% sodium sulphate is probably the best solution, and has been found to be very effective in practice. Carbolic acid and the phenols, also all mercurial drugs, can be very harmful to delicate tissues; eusol and glycerine are less so. Boric acid and iodine or iodoform are useless in the presence of serum,

which destroys their antiseptic effect; moreover they are slightly irritant.

(5) *The uses of immobilisation* in limiting the spread of sepsis in a limb, and the Winnett-Orr system of dealing with compound fractures and similar injuries that are septic, must be borne in mind in the fight against sepsis in a surgical ward. It is of great importance to get the septic cases quickly free from danger to others, and immobilisation will do this far more quickly and reliably than repeated antiseptic dressings. In chronic ulcers, too, elastoplast dressings may be left on for a week or more at a time, and in this way no handling of the septic surface is done by the nursing staff, and the possibility of spreading infection to other patients is minimised.

(6) If cases in a hospital that should be "clean" are found to be going septic, a complete list of all operation cases should be started, in which record is made of all assistants in the theatre, who does the dressings, etc. Thus blame can often be traced to a certain individual or other cause.

II. General Infectious Conditions

Apart from the direct spread of sepsis dealt with above, there are other dangers connected with surgical cases which it is necessary to prevent whenever possible.

(1) *Post-operative Pneumonia*. Many abdominal cases, with whatever anaesthetic they have been performed, develop bronchitis, and a proportion of these go on to pneumonia, often of an infectious nature.

Pre-medication for some days with small doses of pneumococcus (mixed) vaccine or immunogen is of great use in some cases in preventing these complications.

Further prevention can be done by modifying the actual technique of anaesthesia and operation. Inhalation anaesthesia is a frequent source of pulmonary complications; some operators have reported as many as 60% of abdominal cases, anaesthetised by inhalation, as developing lung trouble afterwards. Basal anaesthesia, too, is apt to be followed by chest trouble. Spinal anaesthesia shews some 5 to 10% of lung complications, and regional novocain only 2% or less. Thus regional or spinal anaesthesia should be used for abdominal cases wherever possible. To these precautions may be added, when the patient is in the ward after operation, two more:

(i) Sit the patient up with a bed rest, or put him in Fowler's position, as soon as possible after operation; within a few hours if possible, unless there is a definite contra-indication. (N.B. Spinal anaesthetics do not act for more than three hours, and a patient may safely be sat up after that time has elapsed, even after a hypo-baric spinal injection has been given, i.e., one that is lighter than the cerebrospinal fluid.)

(ii) On the slightest suspicion of cough, give at once a mixture such as the following:

Ammon. Carb. grains x
Tinct. Ipecac. minims xx
Aq. ad one ounce.

To this there is only one contra-indication—extreme liability of the patient to vomit or to hiccup. Even gastrectomy cases tolerate this mixture well, within a few hours of operation.

If preventive measures have failed, and the patient develops bronchitis or pneumonia, it is then that it is important to ensure that other cases in the ward are not infected. Isolation must be done at once. In India many hospitals are fortunate in that the wards are so often surrounded with verandas, and a patient's bed can simply be moved out into a veranda where he can be isolated in fresh air, which will help his resistance against the chest condition, and at the same time be under no necessity to change the doctor and nurses who have been looking after him. It is most important that post-operative pneumonia cases should not be allowed to remain in a ward with other newly operated cases.

Intravenous alcohol (20 c.c. of 20% or 30%) and colonic lavage of 0.1% potassium permanganate (2 pints) are among the better methods of aborting an attack of pneumonia.

(2) *Tetanus*. Cases of the spread of tetanus in a ward, though rare, are known to occur; and strict isolation of a tetanus case from all other surgical cases should always be practised. It is better to treat a case of tetanus in a single-bedded room, for the sake of his own rest and quietness, as well as for the sake of other patients.

(3) *Erysipelas* is far more infectious, and was one of the chief scourges of the dirty hospitals of a century ago. It must invariably be isolated, and attended by nurses who do not deal with other surgical cases. In sulphonamide we have a rapid cure for erysipelas, but one which has no power to render it non-infectious. The local lesion remains a source of danger to others until it is completely free from streptococci, and the patient free from fever. In a small hospital where a special nurse cannot be spared to be detailed to look after these cases, rigorous precautions should be taken, such as the wearing of a gown while attending the infectious case, and the thorough washing of the hands after doing so, before other cases are touched.

However well trained a nurse may be, it is very easy to become casual with regard to the matters with which this article deals, and it is hoped that its readers will be enabled to take in future all possible care lest infection of one sort or another be spread in his or her wards. In three cases out of four, it is the fault of the nurses, and a fault which can be avoided, if sepsis spreads in a surgical ward from one patient to another. Develop your "surgical conscience" and let it be your guide, never to be set aside or disregarded.
