A Technic for Dressing Septic Wounds

by Sara E. McAllister, R.N. and Edwin J. Pulaski, M.D.

ISTER is properly credited with the recognition of bacteria as the cause of putrefaction in wounds. As a result, principles laid down by him have culminated in a manifold series of procedures for the prevention of infection in clean operative wounds. It is only recently(1) that attention has been called to the application of these principles to the contaminated or actually infected open wound. There is now proof that infection frequently is implanted and perpetuated in open wounds because a strictly aseptic technic is not applied in their management(2, 3).

The purpose of this paper is to describe a ward setup and procedure for the care and management of the septic wound. This technic has been carried out effectively for nearly two years in a septic surgical ward of an Army hospital. The aim is to emphasize the importance of carrying over aseptic precautions to the proper handling of open wounds. In so doing we hope to develop in the dressing room the same "sterile sense" that is required in the operating room.

Open wounds, in contrast to closed wounds, are characterized by exposed damaged tissue which is a ready culture medium for bacteria. Bacteria can enter this prepared soil and establish themselves from a number of sources:

I. Air.

- 2. Wet or soaked dressings and contaminated bed clothes.
- 3. Mouths, noses, and fingers of the patients, as well as of the dressers.
- 4. Instruments and receptacles.

A properly designed dressing unit aims at elimination of all of these potential sources of infection.

To reduce the possibilities of cross con-

Authors' acknowledgment is made in the preparation of this acticle of the continued interest and co-operation of Lt, Col. Jeannette Blech, ANC, Principal Chief Nurse, Halloran General Hospital. tamination, it is essential to set up a routine simple and thorough enough so that, even with a constantly changing ward personnel, the routine may be carried out without breaks in technic. Each member of the dressing team must be aware of the sources of infection and must be on the alert for possible breaks in technic. These breaks, when they do occur must be reported promptly and corrected immediately.

Setup for dressing procedures

A room is set aside exclusively for dressing procedures. This room (Figure 1) has complete and adequate facilities for carrying out all procedures without drawing on routine ward supplies. It is advisable to locate this room where a minimum amount of traffic occurs, since the frequent passage of people in and out of a room increases the circulation of bacteria-laden dust particles.

Cleaning of this dressing room is completed at least one hour prior to the dressing period, to allow for the settling of dust. The room is thoroughly swept, using moist sawdust to keep down dust particles, and is mopped with hot, soapy water. All articles in the room are thoroughly dusted with a damp cloth. Windows are closed and kept tightly fastened until the dressing period is completed.

Ultraviolet lamps are turned on for one hour preceding the dressings, and are left on for an hour after the procedures are ended. Ultraviolet irradiation removes micro-organisms from the air at a far greater rate than is attainable by most mechanical types of ventilation(4, 5, 6).

Nurses should be aware of the fact that many dust particles are scattered by careless manipulation of bed clothing. Others (7, 8) have shown that blankets and woolen articles, even when clean, harbor bacteria. Sheets on the occupied bed are invariably contaminated. Bed coverings should be handled carefully and fresh sheets should be used on the litter for each patient. Towels and sheets which have been freshly laundered should be used, since they are relatively sterile when steam-laundered.

All concerned, including the patients in the dressing room, wear masks over mouth and nose to prevent spread of droplet infection. Clean masks are kept readily available at the entrance to the dressing room. The dressing room door is conspicuously marked to remind all those entering the room to wear masks. Persons with upper respiratory tract infections should not be in the dressing room at any time.

Dressing procedure

All patients, except those in traction, are brought to the dressing room for change of dressings. The patients come to the room on a wheeled litter, and remain on the litter for the dressing. Crutch



This article was prepared while CAPTAIN Me-ALLISTER, ANC (Johns Hopkins, Baltimore) and MAJOR PULASKI, MC, AUS, were at Halloran General Hospital, Staten Island. They are now stationed at Brooke General Hospital, Fort Sam Houston, Texas, where Major Pulaski is chief of the surgical research unit.

patients walk to the room and are dressed on stationary litters. A surgical carriage is set up so that patients in traction may be dressed at the bedside. When bed patients are dressed, all persons on the ward wear masks and the windows are closed.

The dressing team consists of a doctor and nurse who scrub, and another nurse who circulates. The doctor and nurse scrub to the elbows for three minutes over a knee-action scrub sink. The doctor alone is required to scrub between dressings, since the nurse is working in a clean field. The hands are dried with sterile towels. It is felt that rubber gloves give a false sense of security, and their use is not recommended. An all-instrument technic is employed, and the hands are considered dirty at all times. To avoid contact with known sources of contamination, the hands of the dresser and scrubbed nurse never touch the following:

- 1. The wound itself.
- Skin surrounding the wound which has been covered by dressings.
- 3. Inner dressings.

In planning the dressing program for the day, the postoperative patients who are due their initial dressing are dressed first, the septic wounds are dressed subsequently. The patients are brought to the dressing room on litters by ward attendants. It is the responsibility of the circulating nurse to fold back the sheet, to unwrap carefully the outer ace bandage, and to



Figure 2. Waste disposal can. JUNE 1947



Figure 3. Individual dressing set.

arrange the lights, disposal cans, and tables properly. When the doctor so indicates, the circulating nurse removes the outer dressings. The doctor then removes the inner dressings with sterile hemostats, and drapes the wound with sterile towels. All sterile articles are passed to the dresser with sterile sponge forceps. The dresser does not touch the sterile dressing set with the hands.

All used dressings are discarded in metal, drop-lid disposal cans (*Figure II*), the lids of which are kept closed at all times, except when in use. The containers are never allowed to become too full to interfere with closure of the lids.

One wound is exposed at a time, and the exposure time for the dressing is kept to a minimum. The use of temporary dressings is condoned. When multiple wounds are dressed on the same patient, each wound is cared for as a separate entity, and a new set of instruments is used for each wound. Extensive body surface wounds such as burns are dressed one area at a time, and a separate setup is used for each area. It is beyond the scope of this paper to outline specialized technics for dressing special types of wounds.

Once the dressing procedures have

started, the dresser does not touch anything in the room with the bare hand. Sterile towels and other materials required are handed to him. The dresser's fingers never touch:

- 1. Sterile dressings, swabs, or ointments.
- Inner surfaces of containers holding sterile materials.

His dressing forceps touch only:

- 1. Inner dressings (old and new).
- Sterile material passed with forceps by his assistant.
- 3. The wound itself.

After the wound is dressed, the contaminated or exposed instruments are dropped by the dresser into a vessel containing 4 per cent cresol solution. No instruments are returned to the packet once they have been touched. By means of this procedure the dressing packet is kept clean. A practical consideration is the fact that this routine conserves wrappers and materials, thus decreasing laundry demands.

Medications are applied to wound surfaces with sterile tongue blades. Lips of flasks of sterile solutions are always flamed before the contents are poured.

Dressings are changed only as necessary,

since too frequent changing enhances the possibilities of contamination, and increases exudation. Wounds are kept hygienically clean, and the skin surrounding the wounds is shaved as necessary.

When the limb is in a cast, windows large enough for access to the wound are cut, and edges of the cast are protected with impervious silk. All instruments used for cast cutting are sterilized immediately after use, since casts are contaminated.

Equipment and preparation

The supply cupboard is designed to hold the sterile and unsterile supplies conveniently. The top shelves are for sterile dry packages. Sterile jars and containers are placed on the next shelf. Sterile solutions for intravenous administration and flasks of irrigating solutions are on the third shelf. The lower shelves are used for linens and unsterile supplies waiting to be prepared for autoclaving.

The dry sterile supplies include: individual dressing sets, enamel bowls and curved basins, medicine glasses, irrigating bulb and luer syringes, catheters for wound irrigations, irrigating sets, intravenous sets, individually wrapped cotton pads, ace bandages, and parachute silk. Sterile towels, gauze sponges ($4'' \times 8''$, $4'' \times 4''$, and $2'' \times 2''$), spatulas, and applicators are kept in sterile containers. Xeroform gauze is kept in sterile oblong containers.

The individual dressing set (Figure III), which we designed, is made with a 3-ply plywood board, 14" x 10", as a base. This is cushioned with non-absorbent cotton, which is covered with stockinette material. This material is easily changed when repeated sterilizing has deteriorated the original covering. White tape or gauze bandage pinned in place keeps the instruments neatly in order through the autoclaving procedure. A double thickness unbleached muslin wrapper 36" x 36" is used as the outer wrapping. This set contains two sterile towels, 4" x 4" and 2" x 2" gauze sponges, applicators, 1 knife handle, 1 scissors, 1 tissue forceps, 1 straight hemostat, 1 curved hemostat, 1 grooved director, and 1 probe.

Double thickness muslin wrappers of various sizes are used for the wrapping of most equipment. For other dressing materials, paper bags and paper wrappers are used.

The packing and removal of gauze in extensive wounds subject patients to an excruciating procedure. This is relieved considerably by tamponing the wound with non-adhesive material of such mesh that it is not penetrated by granulation tissue. Parachute silk or nylon serves admirably. It is cut in desired sizes, washed with soap and water, rinsed thoroughly, dried and autoclaved.

All materials are sterilized by autoclaving, in so far as possible. This is considered the most effective means of sterilization. The small instrument sterilizer shown in the diagram is used only for heating solutions or melting ointments. Razor blades and knife blades are sterilized by soaking for 20 minutes in 70 per cent alcohol (Caution: Will not destroy spores!) (9) as autoclaving tends to dull the blades. Hand brushes deteriorate rapidly with repeated autoclaving. They are sterilized by soaking 20 minutes in a solution of "metaphen" or "mercresin" 1:1000.

Care of equipment following dressing procedures

Contaminated dressings are destroyed by burning. Garbage pails are washed daily with a 4 per cent cresol solution. Ace bandages are washed well with soap and water, dried, and then sterilized by autoclaving.

Enamel basins and syringes used for irrigations are immersed in a solution of 4 per cent cresol, and soaked for 30 minutes before they are washed and dried for reautoclaving.

Used masks are boiled for twenty minutes in soapy water. After boiling, they are washed and thoroughly rinsed before being dried.

Instruments, after soaking thirty minutes in 4 per cent cresol solution, are scrubbed, oiled as necessary, and reautoclaved.

Summary

1. Cross infection is a constant threat to the exposed open wound. Infection increases tissue damage and prolongs disability.

2. Common sources of wound infection include a) air; b) wet or soaked dressings and contaminated bed clothes; c) mouths, noses, and fingers of patients as well as dressers; d) instruments and receptacles.

3. A physical setup for the dressing of septic wounds is described, which aims at elimination of potential sources of infection.

4. A dressing technic, found practicable in a general hospital, for the management of septic wounds is suggested.

Bibliography

- Medical Research Council War Wounds Committee and Committee of London Sector Pathologists: The Prevention of "Hospital Infection" of Wounds, February 1942.
- MELENEY, FRANK L.: Surgical Bacteriology, S. Clin. North America, Vol. 22, pp. 319-332 (April) 1042.
- CALDWILL, GUY A.: Secondary Infection of Wounds, Ann. Surg., Vol. 122, pp. 641–651 (Oct.) 1945.
- BUCHBINDER, L.: The Transmission of Certain Infections of Respiratory Origin, J.A.M.A., Vol. 118, pp. 718–730 (Feb. 28) 1942.
 MUDD, STUART: Air-Borne Infection, The
- MUDD, STUART: Air-Borne Infection, The Rationale and Means of Disinfection of Air, Bull. N. Y. Acad. Med., pp. 393-418 (Aug.)1945.
- PERKINS, JAMES E. : Evaluation of Methods to Control Air-Borne Infections, *Am. J. Pub. Health*, pp. 891–897 (Sept.) 1945.
- BOURDILLON, R. B., and COLEBROOK, L.: Air Hygiene in Dressing Rooms for Burns or Major Wounds, *Lancet*, Vol. 1, pp. 561–565 (April 20) 1946.
- WILLITS, R. E., and HARE, R.: The Mechanism of Cross Infection of Wounds in Hospital by Haemolytic Streptococci, *Canad.M.A.I.*, Vol. 45, pp. 479–488 (Dec.) 1941.
- PULASKI, E. J.: Antisepsis and Disinfection in Surgery, Surg. Gynee, & Obst., Vol. 84, pp. 107– 121 (Feb.) 1947.

Chemotherapy of Wound Management

r is important to emphasize the limited rôle of chemotherapy in the management of wounds. The basic tenet of the current philosophy in this regard is sound surgical care. Blood transfusion and chemotherapy are important features of a supportive program designed to expedite the surgical treatment of the wounded. Of all the measures devised to prevent infection, only active immunization with tetanus toxoid may be said to have achieved its purpose completely. The only other prophylactic procedure of comparable value is initial surgical management of the wound. The greatest usefulness of antibacterial drugs has been in the therapy of impending or established infection complicating the surgical management of the wound. . . .

Suppuration of a wound is believed to be due more to the presence of a pabulum of wound protein than to any specific bacterial virulence. No available antibacterial agent can completely sterilize an open wound. Topical, or local, chemotherapy has been discarded as ineffective and deleterious. . . .

..... Efforts to abolish infection are necessarily integrated with efforts to expedite the healing of the wound. The most important accessory procedures in this regard are the correction of anemia and the restoration of tissue protein deficits. The known depressant effects of sulfonamide compounds on hematopoiesis, the intestinal synthesis of essential metabolites and the appetite in general are further reasons to establish penicillin as the chemotherapeutic agent of choice in the management of wounds.—Lvoss, Citsmp: Chemotherapy in the Management of Wounds, J.A.M.A., Vol. 133 (Jan. 25) 1947.