STERILE PARENTERAL FLUIDS AND THE HOSPITAL PHARMACIST.*

BY EVLYN GRAY SCOTT.[1]

During the past few years there has been a steady increase in the amount of parenteral fluids used in hospitals and from it has grown the problem of securing a safe, economical and easily prepared supply. When only small amounts were required the sterile solutions were generally prepared by graduate and student nurses in the operating division, mainly because this department prepared sterile supplies for the hospital rather than any desire or special knowledge on their part to do so. As the demand grew larger the preparation of the required amounts became more difficult. The percentage of reactions was large but little was known as to their cause. Some of the more progressive hospitals tried to solve this by putting the responsibility for the preparation of sterile solutions on the pharmaceutical department. Others walked around the problem by buying them from commercial concerns.

At our hospital we have a separate room from the Pharmacy proper in which to prepare, sterilize and store solutions. This is all done under pharmaceutical supervision. At the present time the bulk of the sterile solutions prepared consists of:

Sodium Chloride 0.85% and 5%
Dextrose 6%
Dextrose 3% and Sodium Chloride 0.425%
Hartmann's
Soluble Iodophthalein
Sucrose 50%
Sodium Citrate 2½%
Sodium Iodide 12½%
Procaine Hydrochloride ½%, 1%, 2% and 4%
Saturated Boric Acid
Distilled Water
Glycerin.

From this one can readily see that we have barely scratched the surface of what is yet to be accomplished in this field. The National Formulary VI has many more official ampuls which, if the demand warranted, could easily be added to the above list with a material saving to the hospital. The chief objections to commercial solutions are their prohibitive price and their lack of flexibility for every type of emergency.

For the first half of November 1935 our hospital used approximately one million cc. of the above-named solutions prepared at a production cost of 0.008 cents per cc. This price included every item of expense except that of the original equipment, such as still, sterilizer, cupboards and sinks. If this original equipment cost is spread over several years and then added to the cost of solutions the price is still well under that of commercial solutions and has the added advantage of being easily and quickly adopted to the needs of the individual hospital.

The solutions are prepared from fresh, singly distilled water. This water must

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meet the U. S. P. requirements for distilled water. The important test in this case is that for organic or pyrogenic material. It is a known fact that a great number of the reported reactions have been caused by water containing pyrogen which is a product of living bacteria. Although the writer believes that some safe, easy way can be found to store distilled water, at the present time she finds it easier to mix, filter and sterilize the solution within two hours from the time that the water is distilled. Although sterilization prevents the formation of pyrogen it cannot remove that which has already accumulated.

The chemicals used are of C.P., Reagent or U. S. P. quality. The proper amounts are weighed, the solution is well mixed and then filtered directly into pyrex flasks. A fine grade of filter paper such as Carl Schleicher and Schüll No. 575 or ground glass Jena filters is used. The flasks are prepared, if new, by treating them with sulfuric dichromate solution, otherwise the flasks are washed on bottle washers similar to those found in soda fountains and then inverted on racks to drain dry. If these flasks are not used within several hours they are washed again. After the proper amount of solution is placed in the flask it is then capped with two pieces of vegetable parchment and one of cellophane. The flasks are never filled more than two-thirds of the volume, because of the danger of wetting the tops by bubbling as the pressure is being lowered in the sterilizer. The paper is held in place by string which is tied as tightly as possible at the top of the flask and again about an inch down the neck. These flasks are labeled by fastening printed paper labels around the neck of the flask. The various procaine hydrochloride solutions are put up in hard glass bottles with aluminum screw caps or rubber vaccine stoppers. The intravenous solutions are outdated two weeks from the day in which they are sterilized. Although the solution remains sterile as long as the top remains intact there is a slow loss of water by evaporation and a change of p_H value due to the air, so that it is believed safer not to hold the solutions too long before using. There are several methods of permanently sealing these flasks that are being used by various hospitals at the present time (1). All solutions are sterilized between 115° and 121° C. Amounts up to 500 cc. are sterilized 10 minutes, those between 500 and 1000 cc. for 15 minutes, and between 1000 and 2000 cc. for 20 minutes. Liquids such as oils are sterilized by dry heat for one hour at 150° C. Solutions that deteriorate when heated are made sterile by putting through a Seitz filter that has been properly prepared.

All intravenous solutions are administered by fitting the flasks containing the proper solutions with a special two-hole stopper (2), fitted with the necessary glass connectors, rubber tubing and glass adaptor with needle. The needle is inserted by a doctor and the solution flows in by means of gravity.

This form of medication, regardless of the purity of the solution itself, might become contaminated unless the rubber tubing and glass connectors have been properly treated and prepared. To rid the rubber tubing of its sulfur bloom it is necessary to treat it with some alkali and then to wash well and treat with an acid. I think the plan established by the University Hospital of Syracuse University—to place all this under one supervision (3)—has suggested the logical method of attack. Our pharmaceutical responsibility should not end with the solution but should be made to include these various sterile sets which are necessary in using these carefully prepared solutions.

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WHAT DIFFERENCE DOES A CENTURY MAKE?*

BY JOHN E. KRAMER.[1]

Yesteryear's events, especially those of interest to a group such as the Historical Section of the AMERICAN PHARMACEUTICAL ASSOCIATION, are of more interest and value when compared to current events. For instance, historians point out that pharmacy in the early nineteenth century was probably at a lower ebb than it had been for many years, with ready sale for cheap drugs, and substitution, adulteration and other evils prevalent. Contemporaries contend rather contemptuously that pharmacy is again at a rather low ebb to-day.

A recent event in the newspaper world affords us an opportunity to study the situation. On March 25, 1936, the *Philadelphia Inquirer*, one of the larger daily news sheets of the City of Brotherly Love, celebrated the hundredth birthday of the *Philadelphia Public Ledger*, which the *Inquirer* had merged with, or, to state it correctly, had absorbed on April 15, 1934.

With its regular issue of March 25, 1936, the *Inquirer* included a facsimile of the small, four-page, closely printed, unillustrated inaugural issue of the *Ledger* of 1836. The following are three of the advertisements that can be read only with eyesight good enough to overcome and decipher the atrocious print.

> PAINTS, DYE STUFFS, &c.—100 brls. English Venitian Red; 40 kegs do. Chrome Green, dry; 2000 lbs. Verdigris; 300 lbs. Verdigris, distilled; 20 cases China Vermillion; 100 brls. Yellow Ochre; 10 casks French Stone Ochre; 25 do. Pumice Stone; 25 do. Rotten do; 10 do. Turkey Umber; 20 tons Camwood, in stick; 10 do. Red. Sanders, in do; 25 do. Fustic, in stick; with an assortment of oil ground dye woods, paints, anuriatic and nitric acid, aquafortis, oil Vitriol, &c., for sale by G. D. Wetherill & Co., 56 North Front st.
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> CROMMELIN & JENKINS, No. 154 North Third st., offer for sale, of their own manufacture, English and American, Mustard, in jars, kegs and bottles, Chocolate, No. 1 and 2, in boxes and halves; Ground Ginger, brls. and kegs; Cayenne and Black Pepper; ground Alspice; Cinnamon and Cloves; prepared Cocoa; Flour, Rice and Nutmegs; all of which they can sell lower than any other manufactory in this city.
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> N.B. Orders from any part of the United States will be thankfully received and punctually attended to.
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> SCARLET FEVER—SMALL POX—A cure for these diseases has been discovered by an eminent French Physician, from whence it has been introduced into this country, and thus far has never failed. The article may be procured at No. 121 North Second st.
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> ATTENTION—No sooner than a good medicine is offered and the public begin to receive the benefit, and before the proprietor has time to receive a re-

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