

of equal or greater importance. When the premature nurseries at the Children's Hospital were kept at relative humidity between 25 and 50 percent for two weeks or longer, the body temperature became unstable, gain in weight diminished, the incidence of gastro-intestinal disturbances increased, and the mortality rose. On the other hand, continuous exposure to air conditions with 55 to 65 percent relative humidity gave satisfactory results over a period of years. The initial physiologic loss of body weight (loss occurring within first four days of life) was found to vary inversely with the humidity. In the old nurseries with natural humidity it averaged 12.4 percent of the birth weight; in the conditioned nurseries it was 8.9 percent with 25 to 49 percent relative humidity, and 6.0 percent with 50 to 75 percent relative humidity. The number of days required to regain the birth weight was correspondingly maximum in the old nursery, and minimum in the conditioned nurseries under high humidity.

Maximum gains in body weight occurred in the conditioned nurseries under high humidity (55 to 65 percent) in infants weighing less than 5 lb. The gains were less under low humidity (25 to 50 percent) in the same nurseries, and in the old nurseries prior to use of air conditioning apparatus.

The incidence and severity of digestive syndromes, with diarrhea, persistent vomiting, diminishing gain or loss of body weight, and other symptoms, were generally from two to three times as high under low as under high humidity.

Summarizing, the best chances for life in premature infants are created by maintaining a relative humidity of 65 percent in the nursery, and by providing a uniform environmental temperature just sufficiently high to keep the body temperature within normal limits. Medical and nursing care are, of course, factors of equal and sometimes of greater importance.

Air Conditioning Equipment

Many of the installations now in use are of the central system type providing for filtration, for humidification and heating in cold weather, and for cooling and dehumidification in hot weather. A ventilation rate between 8 and 12 air changes per hour is desirable to remove odors and maintain uniformity of temperatures in extremes of weather. Recirculation should not be used in these wards owing to odors and the possibility of infection. There should be a frequent change in spray water.

Control of Airborne Infection

The protection of the premature and older infant against infection is of the utmost importance. It was found in one installation equipped with air conditioning, germicidal lights and mechanical barriers that air conditioning alone did not prevent the spread of respiratory cross-infections.⁴² Bacterial ultraviolet barriers, air conditioning and mechanical barriers are efficient. However, infections are brought in by, and often spread by, ward personnel in spite of these measures.

FEVER THERAPY

Artificial production of high fever in man can be considered an imitation of nature's way of overcoming invading pathogenic organisms. The action may be direct and specific by destruction of the invading organism within the safe limit of human temperatures, or indirect in the case of heat resistant organisms, by general mobilization of the defensive mechanisms of the body.

Although the action may be direct and specific by destruction of the

invading organisms within the safe human limits, fever therapy exerts much of its benefit through the improvement of the mechanism of bodily defense. A serious challenge to the theory on which fever therapy is based comes from the demonstration that high fever causes a reduction in the concentration of circulating antibodies in experimental animals.

Patients for fever therapy should be carefully selected. The most serious complications which may arise are heat stroke, heat exhaustion and circulatory collapse. The chief minor complications are heat cramps, fever blisters and mild dehydration.

The limits of induced systemic fever are usually between 104 and 107 F (rectal), and the duration from 3 to 8 hours at a time. The total period of fever treatment varies with the type of the organism involved.

The diseases which respond favorably to artificial fever therapy are gonorrhea and its complications (which include arthritis, pelvic infections in women, and involvement of the eye), syphilis and chorea.

The most striking results are seen in gonorrhea and syphilis, since the causative organisms can be destroyed at temperatures compatible with human life. However, the use of fever therapy has decreased since penicillin has been found so effective in the treatment of gonorrhea and syphilis. Mild fever, up to 101 F for one hour, has recently been used in the treatment of rheumatoid arthritis. This degree of fever is not bactericidal, but is believed to stimulate the body defense mechanism.

Equipment for Production of Fever

Artificial fever can be induced by injections of various crystalloid or colloid substances, bacterial products of typhoid and malarial organisms, or by physical methods using hot baths, radiant heat cabinets, hot humidified air cabinets, or by short wave diathermy in combination with a cabinet.

The relative advantages of various methods have been evaluated clinically.⁴³ Among the devices for the production of fever by physical means, the one most widely used is the hot humid air or *air conditioned* cabinet. This apparatus was developed at the *Kettering Institute for Medical Research* at Miami Valley Hospital in Dayton, Ohio.

In the earlier studies of the Society, temperatures were elevated more easily using saturated atmospheres. A fever therapy apparatus⁴⁴ using these same principles has proved efficient as a means of inducing and maintaining fever in a body, with small likelihood of burns because of the comparatively low dry-bulb temperatures.

When heat is necessary in treating legs or arms, such media as short or long wave diathermy, micro-waves, infrared, water baths, etc., have been used extensively. A recent development, a saturated atmosphere heating unit, similar to one previously described has proven satisfactory, because heat may be administered over longer periods which render deep heating possible without fear of burns or shocks. Local heating has been somewhat satisfactory in relieving the painful symptoms of peripheral vascular disease. This procedure, however, is not without danger. Elevation of tissue temperature increases cell metabolism and the need for oxygen. The inadequate blood supply and oxygen deficiency may lead to tissue death or gangrene. Application of heat to the trunk or abdomen, with consequent reflex dilatation of the vessels of the extremities, eliminates this danger of local heat application.

Short wave diathermy within the cabinet during the induction phase has