

TEMPERATURE CHANGES IN CHILDREN DURING GENERAL ANAESTHESIA*†

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The state of anaesthesia depresses and renders inefficient the temperature-regulating mechanisms of the body. Placed in conditions of high ambient temperature with which its deranged compensatory mechanisms cannot cope, the body temperature of the anaesthetized patient has been shown to rise. This is especially so in children in whom there are the additional factors of small body mass, high internal production, and immature regulatory mechanisms. The foregoing and the evil effects of hyperpyrexia in the anaesthetic state—notably convulsions and death—are well documented.¹⁻⁴

The air conditioning of operating theatres—originally recommended by Huntington in 1920⁵—is a logical solution to the problem of heat accumulation during anaesthesia and is now widely accepted in the normal design of operating theatres. There are, however, no published observations on the body temperatures of subjects anaesthetized in such surroundings.

The advent of halothane, which appears to cause a more profound disturbance of the body-heat regulatory mechanism than does ether, the agent most commonly used in the papers referred to, provided a further stimulus to this study.

We report here on a statistical analysis of observations of body temperature made on 248 infants and children undergoing general anaesthesia and surgery.

The operating theatre. The operating theatre in which these observations were made is air conditioned, the average temperature range being 70° - 75°F., with a relative humidity of between 70 - 75%.

Anaesthesia

1. Halothane group: 166 cases were anaesthetized with halothane, nitrous oxide and oxygen.

2. Miscellaneous group: 82 cases were anaesthetized with nitrous oxide and oxygen and ether, and/or cyclopropane or trilene. Of these the majority were given ether.

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RESULTS

1. There was a mean fall in temperature during general anaesthesia. This was 2.1°F. in the group of cases anaesthetized with halothane and 1.0°F. in a group anaesthetized with other anaesthetics.

2. The benefit of the air conditioning of the operating theatre is stressed. Over the observed range of theatre temperatures there was a positive relation between this and the patient's change in temperature. In this range of theatre temperature the comparatively narrow range of relative humidity observed had no bearing on the change in temperature of the patient.

3. Small infants (less than 20 lb.) cool to a significantly greater extent than the larger and this fall is progressive with time. Mean fall in temperature in children of under 10 lb., 10 - 20 lb. and 20 - 50 lb. weight was 4.3°F., 2.3°F., and 1.5°F. respectively. The larger infants (more than 20 lb.), after an initial rapid fall in temperature (especially with the use of halothane), attain a relatively static temperature. Similar conclusions follow an analysis of the fall in temperature in relation to the patient's surface area.

4. The fall in temperature is related to the site of operation; the greater the exposure, especially of viscera, the greater the fall in temperature.

5. The pre-operative presence of pyrexia had no bearing on the change in temperature during anaesthesia.

6. The transfusion of blood led to an increased fall in temperature.

7. The mean fall in temperature in neonates was 5.9°F. When hot-water bottles at 101°F. were placed under the patient, the mean fall was 3.2°F.

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