TEMPERATURE ALARM AND CUT-OUT SYSTEM FOR USE WITH HEATED WATER HUMIDIFIERS

P. WHITEHURST AND D. ST ANDREW

SUMMARY

The temperature of the inspired humidified gases of an intubated patient may be monitored accurately, close to the airway, by a commercially available thermistor probe and alarm/cut-out device for use with heated water humidifiers. The apparatus is designed to alarm when the inspired gas temperature exceeds the pre-set temperature and when the thermistor probe is in open or short circuit. When the temperature alarm is activated, the humidifier heater is switched off automatically, thus preventing prolonged transmission of excessively hot gases to the airway. The apparatus has been used successfully in this hospital for several months, requiring minimal observer attention and maintenance.

Humidification of the gases inspired via a tracheal tube is accepted as a routine in the intensive care unit and has been advocated for patients receiving general anaesthesia (Boys and Howells, 1972). In many hospitals heated water humidifiers are a relatively cheap, effective way of achieving suitable conditions. Clinical problems associated with these devices include hyperthermia (Kirch and Dekornfeld, 1967) and respiratory burns (Klein and Graves, 1974). To protect the patient in such instances, an instrument has been developed and it is now commercially available (Draeger Medical Limited) (fig. 1).

The instrument is an electronic over-temperature cut-out. A medical grade thermistor probe measures the temperature of the inspired gas at the tracheal or tracheostomy tube and is designed to alarm and prevent this temperature from reaching a dangerous value.

The instrument measures 20 x 15 x 8 cm and displays temperature in the range 10–50 °C. The alarm can be internally pre-set to activate at any temperature from 35 °C to 42 °C, but is normally set at 39 °C. The humidifier heater is plugged into a mains socket which is on the back of the cut-out and controlled by it. When the pre-set alarm temperature has been reached, visual and audible warning is given and at the same time the power to the humidifier is switched off. The power will remain off until it is restored manually. Restoration can be achieved only when the temperature decreases to less than the pre-set value.

The instrument is designed to recognize a faulty probe and carries a "probe fault" indicator light. It has facilities incorporated for calibration and alarm checks. When a TEST button is depressed, the instrument should read 40 °C and the alarm circuit should activate. It is suitable for use with any humidifier of power rating up to 200 VA.

DISCUSSION

British Standard (4494: 1970) states that the temperature at the patient end of the circuit should not exceed 42 °C. Siting the thermistor at the patient end of the circuit ensures that the temperature of the gases delivered to the patient is monitored. This
helps to avoid over-heating with its associated morbidity, and under-heating with the resultant decrease in humidification. In addition, it will register any increase in temperature occurring distal to the humidifier which, for example, may occur in a paediatric incubator where the delivery pipe crosses heated elements.

ACKNOWLEDGEMENT

The authors wish to thank Mrs S. Beeby for her secretarial assistance.

REFERENCES