there is no doubt that nearly all these injuries can and should be prevented. To this end the following suggestions are made:

1. Intensive propaganda by posters exhibited in public conveyances, hospital and clinic waiting-rooms, schools, and cinemas. Such propaganda should give information as to the number of burns and scalds per year, with mortality rates; and a description, with diagrams, of the ways in which the accidents occur, how they may be prevented, what first-aid treatment should be applied, and where further treatment may be obtained.

2. Closer co-operation between hospital staffs and the social services. All such accidents involving children should be notified to a statutory or voluntary organization dealing with the welfare of children, or to the hospital almoners. The house concerned should be visited within 48 hours by a trained social service worker—preferably a woman—who would inquire into the circumstances of the accident, give advice regarding the prevention of a recurrence, and make a confidential report to the hospital or organization.

There are few, if any, circumstances more distressing than those attending the burning or scalding of an infant or young child. At once all is confusion and concern. While recognizing the difficulties and stress under which home treatment is carried out, the methods that had been employed in this series call for comment. The state of the injuries to which various types of coagulant jellies had been applied was creditable neither to the person who applied the treatment nor to the jelly concerned. When used properly on a suitable case such jellies may be valuable and efficient agents, but their employment by those not conversant with the indications for their use and with their inherent dangers is to be discouraged. A recommendation that the patient be removed to hospital without any form of local first-aid application may be thought callous, but it cannot be too strongly stressed that first-aid treatment of the kinds commonly found in this series is unnecessary, meddlesome, and almost invariably harmful. The guiding principles are two: the treatment of shock already present, and the prevention, so far as is possible, of further shock; the latter implies protection of the raw surface, but not its over-medication. Both principles can be followed by interfering as little as possible with the patient and the lesion. The details of first-aid treatment have been fully stated in E.M.S. Memorandum No. 7, Department of Health for Scotland, 1941.

Summary

A review has been made of 366 children up to 12 years of age, suffering from burns and scalds, who were admitted to the Royal Hospital for Sick Children, Edinburgh, from June 1, 1938, to July 31, 1942, with special regard to the social aspect of the injuries.

The circumstances of the accident, including the time of day, causal agent, age of patient, and the extent of the injury, have been analysed. The results of these analyses, combined with the geographical and social distribution within the area served by the hospital, show that the problem of burns and scalds is primarily a social one, which, it is believed, can best be solved by suitable educative propaganda directed to that part of the community most affected.

The first-aid treatment given to these patients was also examined; in the great majority of cases it had been badly done or was of an undesirable nature.

The mortality rate in this series of 366 burns and scalds was 4.9%.

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Standard rates of pay for all nurses in mental hospitals and institutions in Scotland are recommended by the Scottish subcommittee on nurses' salaries, and the general effect is to increase salaries by 4s. or 5s. a week, thus bringing pay and also conditions of service generally into line with those in England. The starting salary of male nurses will be £2 18s. a week, rising to £4 11s. 6d. as charge nurses; the rates for women are 11s. less. There is to be an additional 4s. a week for nurses on night duty, and a standard working week of 48 hours is suggested, except in the Royal Asylums, where, in accordance with practice, the standard week varies between 48 and 54 hours. Nurses in mental institutions will receive a cash payment of £2 10s. on passing the preliminary examination and £5 on passing the final. Annual leave is to be 21 days. It is hoped that the new scales will result in increased recruitment of nurses for mental hospitals, where training is given not only for the State Register examination but also for the certificate of the Royal Medico-Psychological Association.

HEAT IN THE TREATMENT OF SHOCK

BY

ANDREW W. KAY, M.B.Glas., F.R.C.S.Ed.

Hall Tutorial Fellow, University of Glasgow

The application of heat has become fully established as a cardinal principle in the treatment of traumatic shock. It has been believed to exert a favourable influence, mainly by relieving the cutaneous vasoconstriction and thus augmenting the venous return. The possibility that the cutaneous vasoconstriction is a compensatory mechanism and that heat may be harmful has only recently been entertained.

To assess the value of heat in clinical cases of traumatic shock is difficult, for the level of shock is influenced by many variables which cannot be controlled. It seemed useful, therefore, to investigate the effects of heat, as usually applied in the treatment of shock, upon normal subjects. This report relates to such an investigation carried out upon healthy adults exposed to heat under a "heat cradle." While the results cannot properly be regarded as applicable to shock, they do at least suggest that the value of heat in shock deserves further critical assessment.

Experimental Method

Subjects used in this investigation were young adult males who were either convalescent from minor surgical procedures or were awaiting such operations as herniorrhaphy or excision of haemorrhoids. Observations made were: (1) arterial blood pressure; (2) venous blood pressure; (3) pulse rate; (4) oral temperature; and (5) the patient's clinical condition.

The venous-pressure apparatus employed consisted of a No. 19 intravenous needle fitted to a three-way stopcock. This stopcock is connected at one inlet to a reservoir of normal saline and at its other inlet to a manometer of 4 mm. calibre. Venous blood pressure is therefore recorded in millimetres of saline solution. Zero was arbitrarily set at the level of the manubrium sterni. When the apparatus is in use repeated observations can be made, and between these readings a continual drip of saline prevents clotting within the needle. By this method the normal range was found to be 60 mm. to 80 mm. of saline solution and the average resting venous pressure in 40 young adults was 69.5 mm. At least five minutes must elapse after venepuncture before readings can be accepted as being reliable.

Heat was applied by means of the hot-air cradle for one hour, the temperature varying between 38° and 40° C. Observations were made before the application of heat, at ten-minute intervals during its application, and for 40 minutes thereafter. To bring the experiment into line with the treatment of shock, normal saline was administered intravenously to 10 subjects in amounts ranging between 200 and 1,200 c.cm. In 5 other cases plasma was administered intravenously in amounts ranging from 250 to 700 c.cm.

Experimental Findings

The record of Case 5 is given in detail (see Table), with a graphical record (Chart I). The combined records of all cases are shown in Charts II and III. Mean curves are used in place of tables, and it is to be noted that the curves of individual cases approximate closely to the mean.

Certain constant changes were observed: (1) a progressive fall in arterial blood pressure; (2) a rise in venous blood pressure; (3) a rising pulse rate; and (4) a rise in oral temperature. In addition to these findings, however, the most striking observation was the effect of the hour's exposure to heat on the patient's general condition. Three experiments had to be abandoned owing to the severity of symptoms and the resulting anxiety expressed by the patient. In these cases headache, nausea, and exhaustion were prominent symptoms. *Flushing* was evident before the termination of the period of exposure to heat in every case. *Frontal headache* was common, and frequently lasted from 12 to 24 hours after the end of the experiment. In 9 cases symptoms of *dehydration* were present in varying degree—viz., dry tongue, weakness, and thirst. In all cases general perspiration was noted. In 6 cases *nausea* was present, and vomiting occurred in two of these. Other symptoms were abdominal discomfort, muscular

pains, and exhaustion. These subjective effects were not prevented or lessened by concomitant intravenous administration of saline or plasma.

Discussion

It is not the purpose of this paper to give a detailed explanation of the circulatory changes observed. It is suggested, however, that the essential factor is a general peripheral dilatation. This is borne out by the flushing of the face and trunk which was observed in every case. This peripheral dilatation results in a diminution of the pressure gradient between the arterial and venous sides of the circulation. A lowering of the arterial blood pressure and a rise in venous

TABLE I.—Detailed Record of Case 5

Time in Mins.	Pulse Rate	V.B.P. (mm. N/Sal.)	A.B.P. (mm. Hg)	Oral Temp. (° F.)	Clinical Notes
0	80	73	130/75	98.2	
10	80	75	130/75	98.2	Heat on. Temp. under cradle. 39° C.
20	82	50	126/75	—	
30	86	65	120/75	98.3	Patient feels very warm
40	86	80	120/75	98.5	Perspiration on trunk
50	90	88	118/70	98.8	Perspiration on forehead
60	90	96	116/65	99.0	Complaints of frontal headache
70	96	104	115/65	99.3	Face flushed. Heat off
500 c.cm. of saline given intravenously during this hour of exposure					
80	90	100	118/68	99.3	Tongue dry; thirsty
90	88	95	120/70	99.2	Sensation of nausea
100	88	85	120/70	99.0	
110	86	85	125/70	98.8	No change in symptoms; headache for 12 hours. Feeling of exhaustion persisted for 8 hours

CHART I.—Record of Case 5.

blood pressure are so produced. The increase in pulse rate occurred in all subjects quite independently of their excitability. It may be a direct result of increased pressure on the right side of the heart reflexly producing a rise in heart rate (Bainbridge, 1915).

It is considered that the result of this study shakes the confidence which has for so long been placed in heat therapy for patients suffering from traumatic shock. In the normal subjects investigated definite evidence of dehydration occurred after exposure despite the concurrent administration of intravenous fluid. This is not consistent with the aims of treatment for patients already suffering from the effects of fluid loss.

No one has defined adequately the term "shock," although many have their own conception of this complex clinical entity. Most, however, will concede that a lowered arterial blood pressure is present in all but a small minority of cases. These experiments have revealed a constant and progressive lowering of blood pressure when normal subjects were exposed to the hot-air cradle. Most accepted forms of treatment aim at raising blood pressure, and so, for this further reason, prolonged heat must be regarded as harmful.

It is also recognized that in shock there exists arteriolar constriction (Meek and Eyster, 1921). This is primarily a compensatory mechanism. The flushing which was observed so constantly after application of heat indicates peripheral dilata-

tion. In addition to overthrowing the compensatory mechanism this leads to increased fluid loss by capillary filtration, and thus adds to the state of dehydration which already exists and which has been augmented by perspiration.

CHART II.—Mean curve of 10 cases receiving saline intravenously.

CHART III.—Mean curve of 5 cases receiving plasma intravenously.

Summary

Fifteen normal subjects were exposed for one hour to the hot-air cradle. Intravenous saline was administered to 10 of these, and intravenous plasma to 5.

A progressive rise in pulse rate and venous pressure, together with a progressive fall in arterial blood pressure, was observed in all cases. Symptoms resulted, including nausea, vomiting, dehydration, headache, perspiration, muscular pains, and exhaustion. In certain cases these were severe.

These findings would appear to contraindicate the prolonged use of heat in the treatment of patients suffering from traumatic shock.

I wish to express my grateful thanks to Prof. C. F. W. Illingworth and Prof. Noah Morris for their encouragement and helpful criticism. This work was done while in receipt of a grant from the Medical Research Council.

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