HYPERTHERMY BY ELECTRIC BLANKET

BY

R. R. WILLCOX and W. A. FLYNN

(Late of the Military Isolation Hospital, Harrow Road, W.9)

The place of the hyperterm in the treatment of venereal diseases is not as secure as it was and, indeed, its use has never been practised to the same extent in Great Britain as in the U.S.A. Even so, during the years immediately preceding 1945 before penicillin came into general use, it was much in demand for the treatment of chronic sulphonamide-resistant gonorrhoea and non-specific urethritis, gonococcal arthritis and Reiter's disease. It was also used for salpingitis, gonococcal and syphilitic iritis, interstitial keratitis and neurosyphilis.

Nowadays penicillin, streptomycin, aureomycin, chloramphenicol and terramycin, apart from the sulphonamides, are the first lines of attack upon gonococcal and non-gonococcal urethritis and, as a result, fever therapy is but rarely required. In any event before calling upon the hyperterm, with its specially allocated trained staff, there is pyretotherapy by intravenous T.A.B. which can first be tried. In the case of neurosyphilis, also, penicillin has done much to minimize the indications of fever treatment with both hyperterm and artificially produced malaria, although there is still some difference of opinion as to whether the results are better with penicillin alone or with penicillin combined with fever. However, the risk of severe reactions with fever limits its use at least until penicillin has been given a fair trial. Syphilitic optic atrophy, a much more serious condition, may, however, benefit more by the addition of fever. King (1946) considers "there is little doubt but that the hyperterm will keep its place."

During World War II the treatment by hyperthermy in the Army was, for several years, under Lieut.-Colonel King at Netley Hospital, and the facilities there were used by the other Services. The results obtained at this centre on 319 cases of sulphonamide-resistant gonorrhoea have been published by King, Williams, and Nicol (1943), and on 129 cases of infective arthritis (49 proved gonococcal) by King, Williams, Nicol and Loundou (1946). The gradual decline of the effectiveness of the sulphonamides, together with the not infrequent occurrence of complications, necessitated the increasing employment of fever at the other centres not so equipped.

The experimental ventures in the improvisation of a hyperterm by the use of an electric blanket are described in this paper. The work, suggested by W. A. F., was performed by the authors in association with Dr. (then Lieut.-Colonel) James Marshall, now of Johannesburg, during the
months February through May 1943. The results seemed to suggest that the experiment was a technical success but a therapeutic failure.

**Technique Adopted for "Hyperthermega" Therapy (Fig. 1).**

The patient's own bed was used for the purpose and the head of it was raised on blocks to facilitate the drainage of sweat towards the feet. A wooden board was placed over the wires of the bed over which was laid a mattress. On the mattress was placed the first of two "Thermega" electric blankets covered with a mackintosh sheet in order that it should not become drenched with perspiration. The patient then lay on the mackintosh and was covered from neck to feet by a second mackintosh. The ends of both waterproof sheets projected from the foot of the bed and there was a potential opening between them so that perspiration could be drained into a bucket placed in position for the purpose.

Over the upper mackintosh was laid the second electric blanket which covered the patient except for the face and neck. Over this four woollen blankets were used to tuck the patient securely into bed, except at the foot where they were only loosely secured. The patient was then ready for the treatment to commence.

![Diagram of technique adopted for "Hyperthermega" therapy.](image)

**The Treatment**

Both blankets were then switched on and the patient's temperature and pulse were recorded by an orderly in constant attention. The temperature nearly always rose fairly rapidly reaching 103° F. in one and a quarter to two hours—after which time it could be maintained at that figure without further rise by switching off one of the blankets. We had no difficulty in inducing the temperature or in maintaining it. In one case it rose very rapidly to 106.8° F. and the patient became delirious. When both blankets were switched off the temperature returned to normal in an average of three hours.

No medicaments, apart from sips of fluid, were given to the patient while under treatment. The degree of pyrexia, and the length of time it could be
maintained were in all cases dictated not by the powers of the electric blanket but by the tolerance or otherwise of the patient, and risk of electric shock from leakage of perspiration into the blanket.

**ILLEFFECTS**

The patients, while between the blankets, usually complained of heat, backache and headache and perspired freely, losing into the bucket from one to two pints of sweat. At first, in some instances, the perspiration drenched the blankets and tinglings were felt by the patient from the under blanket. This was regarded as an indication to terminate treatment. On one occasion, when taking the temperature, the orderly himself received an electric shock although the patient was comfortable. The more dangerous electrical defects were remedied by putting an additional waterproof cover over each electric blanket although static charges were never entirely eliminated.

One patient suffered from hyperpyrexia. He was placed between blankets at 1215 hours. At 1315 hours his temperature had reached 101.4°F (fig. 2), and at 1415 hours to 104°F when one blanket was switched off. The other blanket was left on until 1445 hours when his temperature was 105°F. At 1500 hours he became delirious and bit the thermometer when it was placed in his mouth. His axillary temperature was then 106.6°F. The second blanket was likewise switched off and the patient was uncovered, tepid-sponged, and fanned. The temperature returned to normal in three and a half hours. Following this alarming reaction experiments were made (also by W. A. F.) to evolve a thermocouple to record the rectal temperature. This was never perfected owing to vibration.
**Temperature Records**

Seventeen treatments were given to 12 patients. The temperature charts of twelve of these fever sessions are still available for study and eight show essentially similar pyrexial responses. The maximal and minimal quarter-hourly temperatures for the first two and a half hours in these 8 cases were:

<table>
<thead>
<tr>
<th>Quarter-hour</th>
<th>Max.</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼</td>
<td>99·8</td>
<td>97·8</td>
</tr>
<tr>
<td>½</td>
<td>100·8</td>
<td>99·0</td>
</tr>
<tr>
<td>¾</td>
<td>101·8</td>
<td>99·4</td>
</tr>
<tr>
<td>1</td>
<td>102·8</td>
<td>99·8</td>
</tr>
<tr>
<td>1¼</td>
<td>103·6</td>
<td>100·4</td>
</tr>
<tr>
<td>1½</td>
<td>104·2</td>
<td>101·0</td>
</tr>
<tr>
<td>1¾</td>
<td>104·8</td>
<td>101·4</td>
</tr>
<tr>
<td>2</td>
<td>105</td>
<td>102·2</td>
</tr>
<tr>
<td>2¼</td>
<td>104·2</td>
<td>102·6</td>
</tr>
<tr>
<td>2½</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

The fever took two and a half hours to four and a quarter hours to reach normal after the current had been switched off. Therapy was terminated either for electrical reasons or on account of intolerance by the patient. The chart of the patient in whom fever was most prolonged is appended (fig. 3). Of the four other charts, in one the temperature took eight hours and in the other two days to settle completely. Another two charts concern two sessions given to the same patient, a large man with whom proper insulation from cooling agents was difficult. On the first occasion the fever reached only 102·2° F. after three hours between the blankets and, after the patient had been removed from the blankets and the temperature had settled again, it rose spontaneously an hour later to 103·8° F. On the second occasion it reached 103° F. in two and a half hours but, although the blankets were left on for five and a half hours from the onset of treatment, the temperature dropped slowly to 100·8° F. and the treatment was abandoned. These two indifferent responses were obviously due to excessive heat loss. The remaining abnormal chart concerned a man who already had a temperature of 101·8° F. when put between blankets. It reached 103·2° F. in an hour and this was maintained for two hours. He still had a temperature of 103·2° F. on the next day.

**Pulse Records**

The average maximal pulse-rate was 126 beats per minute, the lowest reading being 104 and the highest, albeit for a short period, 160. In three instances it exceeded 130 but in none was the treatment modified on account of the pulse-rate.

**Therapeutic Results**

Of the 12 cases treated 7 had relapsing gonorrhoea which was sulphonamide-resistant, one had gonorrhoeal epididymitis, one gonorrhoeal rheumatism, one non-specific urethritis, one non-specific epididymitis and one a syphilitic iritis.

The rheumatic case was markedly relieved of his pains and the two epididymitis cases showed less pain immediately after treatment. Apart from this the results were disappointing for in only one case (the patient with gonorrhoeal rheumatism) was the stay in hospital curtailed. The cases of sulphonamide-resistant gonorrhoea did not appear to benefit as well as if fever had been given by intravenous T.A.B. vaccine. It was considered likely that
the results would have been better if sulphonamides had been combined with fever but, owing to possible dangers arising from the conditions then prevailing, this was not tried.

CONCLUSIONS AND SUMMARY

The technique of hyperthermy by means of electric blanket has been described. 12 patients were treated with seventeen fever sessions and the records of twelve of which have been studied.

In view of the disappointing clinical results, and one alarming case of hyperpyrexia, the "hyperthermega" treatment was abandoned. There is little doubt, however, that artificial fever may be easily produced by the method described although its dangers in the manner used were considered to be too great for general use.

Such a method is not likely to play any part in the present-day treatment of venereal disease but the results are recorded partly as a historical curiosity and partly lest this type of treatment may have some application in other fields of Medicine.

REFERENCES