A Pilot Study of Low Body Temperatures in Old People Admitted to Hospital

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An earlier study of the Royal College of Physicians (1966) showed a considerable prevalence of hypothermia in patients of all ages admitted to hospital. The report emphasised that there is a very large problem of hypothermia in infants and old people and it is not inconsiderable in those aged between 35 and 65 years. On the other hand, a National Study of Body Temperatures in the Elderly (Fox et al., 1973) revealed relatively few old people living at home with deep body temperatures in the hypothermic range (less than 35.0°C). These two findings are in disagreement unless the explanation is that those with hypothermia are admitted to hospital and the subsequent morbidity and mortality. It was agreed Royal College of Physicians' study and to extend it in a number of ways.

The Working Party on Hypothermia proposed that a pilot study should be undertaken to ascertain whether it would be feasible to plan a definitive study aimed at discovering the relationship between low body temperature in old people admitted to hospital and the subsequent morbidity and mortality. It was agreed that the investigation would be carried out by measuring the mouth and deep body temperatures of patients aged 65 and over admitted to hospital during three winter months from mid-January to mid-April 1975, and by recording information on (a) the social circumstances, (b) pre-existing medical conditions, and (c) the clinical course and outcome of the patients.

METHODS

Organisation and Techniques
The survey was conducted in the University College Hospital Group (U.C.H.) and included University College, National Temperance and St Pancras Hospitals. Some patients from the Royal Free Hospital were also included in the survey. Senior nursing and medical staff were briefed, with special emphasis on those nurses and doctors employed in the Accident and Emergency Department (A and E).
All patients over the age of 65 admitted through the Accident and Emergency Department or on direct admission to the wards had a three minute oral temperature taken using a clinical thermometer (lower limit of recording $25^\circ$C). If the initial oral temperature was $36^\circ$C or less a rectal temperature was recorded with a low reading thermometer in position for three minutes. If the rectal temperature was below $36^\circ$C the patient was designated to the low temperature group (LT) and an appropriate card was filled in.

The next patient over the age of 65 admitted with an oral temperature greater than $36^\circ$C had a rectal temperature taken and the patient was designated to the control group (C) for comparison with the LT group. The purpose of the above method was to secure a wide range of temperatures in elderly patients with varied clinical conditions and the designations LT and C were therefore used for convenience in order to distinguish the two groups and to ensure a non-biased selection.

Data Recording

The patients (in both the LT and C groups) were examined and followed clinically throughout their hospital stay by the medical co-ordinator (A.G.) and the nurse responsible for the survey (G.F.), strict attention being paid to all aspects of their clinical course including special investigations and the compilation of accurate temperature charts. The course and outcome of the illness were graded according to the simple scoring system shown in Table 1. The mental and physical disabilities due to illness were also recorded using the clinical condition score developed by Norton et al. (1962), details of which are summarised in the table.

As soon as possible after the admission of a patient a household survey was carried out by a nurse (A.O'B.) who had extensive experience as a geriatric visitor. She was unaware of the patient's temperature on admission and her assessments of the domestic circumstances and the condition of the patient before admission were therefore unbiased. Information was obtained on the general state of repair of the accommodation, whether it was well built or not and whether it predisposed to cold. Questions were asked as to what heating was utilised in each room in the house and the patient's thermal environment was graded (see Table 1). Details of the ownership of the property, financial state, supplementary benefits, heating allowance and social services available and utilised were obtained from geriatric visitors, social workers, relatives and friends. An assessment was made of the clinical condition score based on the physical and mental state prior to the onset of the illness that necessitated admission. In 5 of the 79 patients it was not possible to gain access to the home to obtain the relevant information.

Daily meteorological measurements of temperature and rainfall were recorded. Information on local weather was obtained from readings at the London Weather Centre.
Table 1. Scoring systems and coding used in statistical analysis.

| Item                                      | Coding                                      |
|-------------------------------------------|---------------------------------------------|
| Age                                       | In years                                    |
| Living alone                              | Yes 1  No 0                                 |
| Housing                                   | Poor 1  Fair 2  Good 3                      |
| Community services                        | Geriatric Visitor (G.V.)  Yes 1  No 0        |
|                                           | Home Help (H.H.)  Yes 1  No 0               |
|                                           | Meals-on-Wheels (M/W)  Yes 1  No 0          |
|                                           | Social Worker (S.W.)  Yes 1  No 0           |
|                                           | District Nurse (D.N.)  Yes 1  No 0          |
| Tendency to hypothermia (T. to H.)        | 0,1,2,3                                     |
| Deep body temperature (D.B.T.)            | °C                                          |
| Course                                    | 0 = General deterioration                   |
|                                           | 1 = Development of complications            |
|                                           | 2 = Serious illness on admission and for a period thereafter followed by general improvement |
|                                           | 3 = General improvement and no complications|
| Outcome                                   | 0 = Died                                    |
|                                           | 1 = Deterioration or poor improvement       |
|                                           | 2 = Improved                                |
|                                           | 3 = Good                                    |
| Thermal environment (TE)                  | 0 = High risk. The heating available is minimal. The building is in a poor state of repair or the patient never puts heaters on. Long outdoor exposure. |
|                                           | 1 = Moderate risk. The rooms in constant use may be well heated but the patient is still at risk; for example, from a very cold toilet or kitchen. Short outdoor exposure. |
|                                           | 2 = 0 to minimum risk. Every room utilised by the patient is adequately warmed from available heaters, the accommodation is well built, in good repair and does not predispose to cold. |
|                                           | 3 = Central heating.                        |
| Clinical condition score (C.C.S.)         | General Condition  1 – 4                    |
|                                           | Mental State  1 – 4                         |
|                                           | Mobility  1 – 4                              |
|                                           | Activity  1 – 4                              |
|                                           | Incontinence  1 – 4                         |
| C.C.S.2 = Assessment of the patient’s condition within 24 hours of admission | C.C.S.1 = Assessment of the patient’s condition prior to the onset of the illness (or change in domestic circumstances) which necessitated admission |
RESULTS

Patients Studied
There were 39 patients in the LT group and 40 in the C group. Of the 39 patients in the LT group, 33 were admitted to University College and associated hospitals and 17 of these patients had deep body temperatures below $35^\circ C$ (hypothermic or H group). The prevalence of hypothermic admissions was 3.6 per cent in those over the age of 65 (see Table 2).

Relationship between Body Temperature and Mortality
The survey covered 22 patients with rectal temperatures on admission below $35^\circ C$ and of these 10 patients died. The lowest temperature recorded was $26.5^\circ C$. The case distribution and mortality according to the initial body temperature are shown in Table 3. Of the patients, 13 were considered to have primary hypothermia, that is, the principal diagnosis was accidental hypothermia induced.

Table 2. Admissions to UCH and associated hospitals.
(Patients admitted to the Royal Free Hospital are excluded.)

| Total admissions over 65 years | LT group <36$^\circ$C | H group <35$^\circ$C | C group >36$^\circ$C |
|-------------------------------|-----------------------|---------------------|---------------------|
| 467                           | 33 (7.0%)             | 17 (3.6%)           | 36 (7.7%)           |

Table 3. Deaths in each temperature category.

| Initial deep body temperature | No. of cases | Deaths | Temperature category | Mortality |
|-------------------------------|--------------|--------|----------------------|-----------|
| 26.5$^\circ$C                 | P            | 1      | < 30$^\circ$C         | 75%       |
| 28.2$^\circ$C                 | P            | 1      | < 30$^\circ$C         | 75%       |
| 28.5$^\circ$C                 | P            | 1      | < 30$^\circ$C         | 75%       |
| 29.8$^\circ$C                 | P            | 1      | < 30$^\circ$C         | 75%       |
| 30.0 – 30.9$^\circ$C          | P (2)        | 3      | 30.0 – 34.9$^\circ$C  | 39%       |
| 31.0 – 31.9$^\circ$C          | P (2)        | 2      | 30.0 – 34.9$^\circ$C  | 39%       |
| 32.0 – 32.9$^\circ$C          | P            | 1      | 30.0 – 34.9$^\circ$C  | 39%       |
| 33.0 – 33.9$^\circ$C          | P            | 5      | 35.0 – 35.9$^\circ$C  | 29.4%     |
| 34.0 – 34.9$^\circ$C          | P (3)        | 7      | 36$^\circ$C and above | 27.5%     |

P = Primary hypothermia
by cold exposure in the absence of an obvious clinical cause to account for the lowering of deep body temperature; 5 of these patients died. Brief descriptions of the cases of primary hypothermia are given in the Appendix.

Factors concerned in the Production of Low Deep Body Temperature
In the following sections a comparison is made of the findings in the LT and C groups in order to assess the relative importance of the contributing factors.

1. Clinical Conditions. A wide range of clinical conditions was encountered in both groups, which included patients with mild illness and those who were severely ill and dying. These conditions are shown in Table 4.

Table 4. Clinical conditions in the LT and C groups.

| Clinical conditions                  | Number of patients (Deaths) |
|-------------------------------------|-----------------------------|
|                                     | LT group | C group |
| Primary hypothermia                 | 13  (5)  | 0       |
| Cardiovascular disease excluding CNS| 4  (1)   | 7  (3)  |
| Cerebrovascular disease             | 8  (1)   | 8  (0)  |
| Chest infection                     | 5  (3)   | 11 (4)  |
| Fractures                           | 2  (1)   | 3  (0)  |
| Gastrointestinal                    | 0  (0)   | 3  (1)  |
| Falls                               | 4  (2)   | 0  (0)  |
| Renal conditions                    | 0  (0)   | 2  (1)  |
| Miscellaneous                       | 3  (2)   | 6  (2)  |
|                                     | **39  (15)** | **40 (11)** |

Diabetes was found in four patients in the LT group and in five of the C group. Three patients in the LT group and two in the C group were being treated for hypothyroidism. Thirteen of the patients were classified as primary hypothermia and had no obvious pathological cause for their low deep body temperature which was, therefore, ascribed either to cold exposure before admission and/or to a physiological disturbance of thermoregulation.

2. Physiological Impairment of Thermoregulation. Sophisticated tests of thermoregulatory function were not possible in this survey but an indication of the presence of impairment of thermoregulatory capacity was afforded by the failure to maintain a normal deep body temperature during the patient's stay in hospital. All temperature charts were carefully analysed and drops in deep body temperature below 36.0°C were noted. Patients in the LT group were regarded as having stabilised their temperature when it was maintained at 36°C or more for 24 hours. Temperature recordings below 36°C rectally (low temperature episodes indicating a tendency to hypothermia) were noted after the stabilisation period
Table 5. Tendency to low body temperature episodes.

|                  | LT Group | C Group |
|------------------|----------|---------|
| Yes              | 19 (49%) | 6 (15%) |
| No               | 13 (33%) | 32 (80%)|
| Not classified    | 7 (18%)  | 2 (5%)  |

The patients not classified either died soon after admission or never attained a temperature of 36°C.

during the remainder of the stay in hospital. For the C group temperature recordings below 36°C rectally were noted during the whole period of stay in hospital (Table 5).

Patients in the C group showed little tendency to exhibit falls in their deep body temperatures to below 36°C throughout their stay in hospital as compared with those in the LT group who showed a marked tendency ($\chi^2 = 14.37$ and $p<0.01$).

3. Drugs. It was difficult to obtain accurate information on drugs taken immediately prior to admission despite vigorous efforts which included contacting the patient’s general practitioner. Table 6 shows the drugs known to have been taken and which may have affected temperature regulation in both groups. Thus, one-quarter (20 of the 79 patients) were receiving psychotropic drugs prior to admission. The taking of these drugs and of alcohol was rather more common in the LT group than in the C group.

4. Thermal Environment. Altogether, 31 of the 79 patients studied had been living in very cold environments and 14 of the 31 were admitted with rectal
Table 7.
(a) Patients at risk under habitual living conditions, TE 1.

|                  | LT Group (39) | C Group (40) |
|------------------|---------------|--------------|
| Number at risk* (%) | 23 (58%)      | 8 (20%)      |

(b) Patients exposed to cold immediately prior to admission, TE 2.

|                  | LT Group (39) | C Group (40) |
|------------------|---------------|--------------|
| Total exposed to cold (%) | 28 (71%)      | 9 (22%)      |
| Exposed indoors  | 21 (54%)      | 6 (15%)      |
| Exposed outdoors | 7 (17%)       | 3 (7%)       |

* The key for grading patients appears in Table 1. Patients admitted from environments with grades 0 and 1 were regarded as being at risk.

5. Social Factors. In the LT group, 25 patients lived alone compared with 12 in the C group, and 24 in the LT group received social services compared with 16 in the C group. Almost twice as many patients in the LT group compared with the C group were admitted from cold environments (TE categories 0 and 1). It will also be noted that 21 of the 28 patients (75 per cent) in the LT group had a history of cold exposure while indoors.

The homes of 74 of the 79 patients in the series were visited, and information on the thermal environment was obtained. The individual measurements of deep body temperature for the 74 patients have been grouped in four categories (0, 1, 2 and 3) according to the thermal environmental conditions (see Table 1). The scattergram in Fig. 1 shows the relationship between body temperature and the thermal environment under habitual living conditions (TE 1). Although, when the temperatures below 35°C. Table 7 shows the number of patients exposed to a cold environment under habitual living conditions (TE 1), and those who had a history of cold exposure immediately prior to admission (TE 2). It will be seen that considerably more patients in the LT group compared with the C group were admitted from cold environments (TE categories 0 and 1). It will also be noted that 21 of the 28 patients (75 per cent) in the LT group had a history of cold exposure while indoors.

Relating the Body Temperature and the Thermal Environment
The homes of 74 of the 79 patients in the series were visited, and information on the thermal environment was obtained. The individual measurements of deep body temperature for the 74 patients have been grouped in four categories (0, 1, 2 and 3) according to the thermal environmental conditions (see Table 1). The scattergram in Fig. 1 shows the relationship between body temperature and the thermal environment under habitual living conditions (TE 1). Although, when the
temperature on admission was less than 34°C (there was a tendency for patients to come from cold homes) this association was not statistically significant.

The relationship between deep body temperature and the thermal environment immediately prior to admission (TE 2) is shown in the scattergram of Fig. 2; deep body temperatures of less than 34°C are significantly correlated (p<0.01) with cold exposure prior to admission (TE 2, categories 0 and 1).

Relationship between Outcome and Thermal Environment
The outcome of the patient’s illness was categorised according to the simple classification shown in Table 1. The mean deep body temperature, T°C (± S.E.) was calculated for each group. Data were analysed by combining the ‘worst’ categories, 0 and 1, and comparing them with the ‘best’ categories, 2 and 3, for
Table 8.
(a) Outcome vs habitual thermal environment, TE 1.

| Outcome | 0, 1 | 2, 3 |
|---------|------|------|
| TE 1    | *33.45 ± 0.81 (15) | 34.50 ± 0.74 (16) |
|         | 35.94 ± 0.37 (17)  | *36.06 ± 0.33 (26) |
*Difference in means significant (p<.01)

(b) Outcome vs cold exposure prior to admission, TE 2.

| Outcome | 0, 1 | 2, 3 |
|---------|------|------|
| TE 2    | *33.36 ± 0.68 (17) | 34.38 ± 0.63 (20) |
|         | 36.36 ± 0.36 (15)  | *36.45 ± 0.25 (22) |
*Difference in means significant (p<.001)

each of the three variables outcome, habitual thermal environment (TE 1) and thermal environment immediately before admission (TE 2). The results are shown in Table 8. In each case there are significant differences in the deep body temperatures in the comparison between the ‘best’ and ‘worst’ categories. Moreover, the large standard errors in those groups exposed to cold (where TE 1 and TE 2 are equal to 0 or 1) are an indication of the disorder of temperature regulating mechanisms in patients in those groups.

Interpretation of the Results

A correlation matrix was constructed in order to investigate the relationship between all the variables measured (see Table 1). The matrix is shown in Fig. 3.

There was found to be a significant correlation between a low deep body temperature and cold exposure immediately before admission (TE 2); deep body temperature was also significantly correlated with living alone, but the association with tendency to hypothermia just failed to reach significance at the 5 per cent level. The patient’s habitual thermal environment (TE 1) was significantly correlated with cold exposure immediately before admission (TE 2) and each was significantly associated with living alone, poor housing and the provision of certain community services.

The clinical condition score on admission (CCS 2) was significantly correlated with the course of the illness, age, and deep body temperature. The clinical
|                  | Outcome | Age | Living alone | Housing | G.V. | H.H. | M/W | S.W. | D.N. | TE 1 | TE 2 | CCS 1 | CCS 2 | Course | T to H | D.B.T. |
|------------------|---------|-----|--------------|---------|------|------|-----|------|------|------|------|-------|-------|--------|--------|--------|
| Outcome          |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| Age              |         | x   |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| Living alone     |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| Housing          |         |     |              |         | xxx  | xxx  |     |      |      |      |      |       |       |        |        |        |
| G.V.             |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| H.H.             |         | x   |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| M/W              |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| S.W.             |         |     |              |         |      |      |     |      |      |      |      | xxx   |       |        |        |        |
| D.N.             |         | x   |              |         |      |      |     |      |      |      |      | xxx   | xxx   |        |        |        |
| TE 1             |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| TE 2             |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| CCS 1            |         | x   |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| CCS 2            |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| Course           |         | xxx |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| T to H           |         | x   |              |         |      |      |     |      |      |      |      |       |       |        |        |        |
| D.B.T.           |         |     |              |         |      |      |     |      |      |      |      |       |       |        |        |        |

x = p<0.05;  xx = p<0.01;  xxx = p<0.001
condition score (CCS 1), obtained from details of the physical and mental disabilities which existed before the illness necessitating admission, was correlated with age and the provision of community services, including social worker, district nurse, meals-on-wheels, geriatric visitor and home help.

Since one of the aims of the study was to relate the patient's deep body temperature and preceding environmental cold exposure to subsequent morbidity and mortality, the factors affecting outcome were further explored by multiple regression analysis. A fit between outcome and all the variables measured was made by the method of least squares in order to determine which variable contributed to outcome significantly. The factors contributing to outcome, in order of decreasing significance, are: the course of the illness, the age of the patient, tendency to hypothermia, and the provision of the services of a geriatric visitor before admission. There was no significant relationship between outcome and the thermal conditions in the home (TE 1 and TE 2).

**DISCUSSION**

In this survey it was found that 3.6 per cent of elderly patients admitted to hospital had hypothermia (deep body temperature below 35.0°C). The findings suggest that the prevalence of hypothermia among the elderly admitted to hospital is even greater than was suggested by the previous Royal College of Physicians' study carried out ten years ago in which 1.2 per cent of elderly admissions were reported as having hypothermia. This higher figure for identified hypothermia occurred in spite of the fact that the winter of 1975 was milder; in 1965 the minimum temperature recorded by the Meteorological Office was −16°C during the three winter months, whereas in 1975 the temperature never fell below 0°C. The explanation of this difference is open to conjecture. It may be partly due to the differences between the populations from which the patients were drawn in the two studies. It is also possible that in 1965 there was an underestimate of the incidence of hypothermia on admission in the old. But in 1975 there was very careful briefing and supervision of all staff involved including medical and nursing staff of the Accident and Emergency Department and in all wards admitting adult patients. A very high degree of co-operation was obtained from all the staff. It should also be remembered that the 1965 study was conducted before main hospitals became District General Hospitals. The present survey and other studies have revealed an association between hypothermia on admission and adverse social circumstances. If, in 1965, some of the hospitals participating in the survey were not fulfilling a truly district function then those patients most at risk may have been admitted to other hospitals, including geriatric departments not within the main hospital. By contrast, in the present study, University College Hospital has a commitment to provide medical care for patients of all ages within a defined district and it is unlikely that many patients were admitted elsewhere.
The National Study of Body Temperatures in the Elderly (Fox et al., 1973) showed that, although 10 per cent of old people at home are on the borderline of hypothermia, with deep body temperatures between 35.0 and 35.49°C during the winter months, relatively few people in their homes had frank hypothermia. On the basis of the present study the most likely explanation of this discrepancy is that old people with frank hypothermia are usually admitted to hospital.

There was a similarity in the types of illness according to the clinical diagnosis for patients in the low temperature group and those in the control group. There was, however, significant association between the deep body temperature and the clinical condition score on admission (CCS 2); more severe illness might be responsible for lowering of deep body temperature, although it is possible that the converse is true, with hypothermia leading to a deterioration in the clinical condition. Low deep body temperature was significantly correlated (at 0.1 per cent level) with cold exposure immediately preceding admission (TE 2) and with living alone. Three-quarters of the patients in the low temperature group who suffered cold exposure immediately before admission were exposed to cold indoors. The importance of adverse domestic conditions is emphasised by the significant correlations between TE 2 and the habitual thermal environment (TE 1), poor housing, living alone, and the need for provision of certain services. These findings have important implications in the prophylaxis of hypothermia and reveal the need for attention to environmental circumstances in the home.

Multiple regression analysis demonstrates that an adverse outcome is significantly correlated with the course of the illness, increasing age, and the tendency to hypothermia which was used as a crude clinical assessment of impairment of thermoregulatory function. The association between outcome and the provision of the services of a geriatric visitor is obviously not causal, but is a reflection of the needs for this service in order to maintain in their own homes those suffering more severely from the handicaps of old age. This relationship was confirmed by the correlation between the retrospective assessment of the clinical condition before the onset of the illness necessitating admission (CCS1) and the provision of a variety of community services including geriatric visitor, home help, meals-on-wheels, social worker, district nurse, and the receipt of supplementary benefits.

It should be emphasised that this was a pilot study and, owing to the small numbers involved, caution must be exercised in drawing firm conclusions. It has, however, shown the feasibility of a more thorough investigation of social, environmental and clinical factors concerned in the lowering of deep body temperature in the elderly and, in spite of small numbers, significant correlations have been demonstrated. The evaluation of multiple factors requires a large-scale study involving many hundreds of patients, and such a study would be particularly useful in the assessment of the significance of variables contributing to the outcome of illness which, in the aged, is usually the result of a variety of pathological and environmental conditions. There are, however, important
limitations to hospital-based studies. It is likely that the decision to admit elderly patients to hospital depends as much upon the lack of facilities available for management of the patient at home as on the nature and severity of the illness. Those patients admitted must therefore represent a selected group; that is, the same environmental factors responsible for the lowering of body temperature may determine the need for admission, and these factors may not be operative in those admitted with normal deep body temperatures. Moreover, in this type of study it is difficult to obtain wholly accurate details of the condition of the patient before the onset of the illness that necessitated admission. Prospective studies in general practice would probably be the best means of obtaining these details and providing much needed information on the relationship between low deep body temperature and subsequent morbidity and mortality.

Acknowledgements
We wish to express our thanks to the medical and nursing staff of the University College Hospital Group and the Royal Free Hospital who co-operated so willingly in the study and to members of the community health and social services who collaborated in the household survey. We are deeply indebted to members of the Working Party on Hypothermia: Doctors M. F. Green (Secretary), A. Adelstein, R. H. Fox, G. Kazantzis, T. W. Meade, G. L. Mills and Surg. Captain D. Walters, and the observers from the Department of Health and Social Security: Doctors J. Brothwood, G. Matthew, and Marguerite Smith. Dr A. Fenton Lewis gave considerable assistance in the statistical analysis. The investigation was carried out on behalf of the Royal College of Physicians with financial support from the Department of Health and Social Security.

Appendix
Summary of all patients with initial temperatures below 35°C in whom exposure to cold was considered to be the primary cause of low body temperature.

1. G. H. M. — Male aged 95
   Initial $T^\circ = 29.8^\circ C$
   Lived in a house in poor state of repair and inadequately heated. Steadily ailing in health for about two weeks before admission and refused help. Very ill for three days before admission in cold environment, admitted stuporous and very cold. Pulse 64/minute. Pneumonic changes R lung and congestive cardiac failure. E. C. G. — ischaemic heart disease; irregular rhythm; atrial fibrillation. Deep body temperature reached 36°C only after four days. Died ten days after admission.

2. D. B. — Female aged 65
   Initial $T^\circ = 30^\circ C$
   A vagrant found on Euston Station and admitted in very neglected state, louse infested, cold and rigid. Puffy hands, feet and face, flushed cheeks. J waves on E.C.G. and ventricular ectopic beats. Pulse 56/minute. Hypoalbuminaemia on
admission. Improved on ward diet. Deep body temperature 36° C after 18 hours. Good recovery.

3. G. B. — Male aged 77  
Initial T° — 28.2° C
Admitted after being found on cold bedroom floor unconscious for about two days. Intense peripheral cyanosis but responded to verbal commands. Marked rigidity of limbs. Pulse 58/minute. Developed attack of L-sided chest pain five days after admission; no evidence of myocardial infarct or pulmonary embolus. Good recovery. Temperature reached 36° C after three hours, but dropped once to 35.8° C three days after admission. Suffered no ill effects from a cooling test two-and-half weeks after admission; the rectal temperature fell from 37° to 36° C in three-and-half hours and shivering occurred early in the cooling period.

4. H. W. — Female aged 82  
Initial T° — 26.5° C
Unwell two days before admission in a comatose state. Pulse 36/minute. Died three hours after admission. Well known to Social Workers. Lived in very poor conditions — rooms cold and dirty. She and her husband refused all services offered. Coroner’s verdict: death from neglect and hypothermia.

5. M. D. — Female aged 94  
Initial T° — 34.8° C
Admitted from an Old People’s Home after a fall out of bed, and then exposed from an open window. Confused and cold on admission. Pulse 72/minute, regular. Developed irregular pulse with ectopic beats next day. Discharged to the Home after 24 hours.

6. A. B. — Male aged 79  
Initial T° — 28.5° C
Lived in poor conditions. Seen by son the night before admission. Found by son unconscious and unclothed the following morning by an open window and no heating in the flat. Unconscious and cyanosis on admission. Irregular pulse 56/minute and T-wave changes in E.C.G. with ? nodal rhythm; J-waves present. Neglected condition with flexural rash in axillae and groins and oedematous scrotum with dermatitis.

7. S. S. — Female aged 93  
Initial T° — 32.4° C
Lived in a well-constructed flat with adequate available heating. Falls and giddy spells recently. Found collapsed in the kitchen/living room in a draught as the doctor had opened the window the night before as he thought he smelt gas. Nephew called doctor as she was ‘chesty’. The electric fire was switched off and the room was very cold. Pulse 60/minute on admission; atrial fibrillation on E.C.G. and widespread flattening of T-waves. Generalised increase of muscle tone and central and peripheral cyanosis. Very wasted. Flushed cheeks. Swollen feet.
Numerous ecchymoses on skin of arms. X-ray of chest: bronchopneumonic changes.

8. D. C. – Male aged 65
   Initial T° – 33.6° C
   Lives in a lodging house, well known to Geriatric Visitor. Found in street collapsed following excessive intake of alcohol. Pulse 68/minute on admission. Confused with slurred speech. Flushed face. Neglected condition. Discharged after 24 hours. Visited at home the next day and found to have recovered. Oral T° then 34.8° C.

9. I. M. – Male aged 86
   Initial T° – 34.6° C
   Lives in Old People’s Home which is centrally heated. Has a tendency to wander and has been missing on many other occasions. Found on King’s Cross Station, dressed but without an overcoat, after being missing for 24 hours. Admitted confused and cold. Pulse 72/minute; E.C.G. – large peaked T-waves in anterior chest leads. Chest infection present on X-ray.

10. M. P. – Female aged 69
    Initial T° – 34.4° C
    Lives in centrally heated block of flats. Admitted to a very cold side ward. Acid-fast bacilli isolated from sputum. Known to have diabetes mellitus. Pulse 80/minute, regular. Flushed cheeks. X-ray of chest: R upper lobe cavity and extensive consolidation in the R mid and upper zones.

11. T. H. – Male aged 75
    Initial T° – 31° C
    Unable to obtain much information on background. Admitted stuporose and mute. Pallor of whole body and face. Central and peripheral cyanosis. Dehydrated. Unusual flapping tremor of R arm. Limbs very rigid. Pulse 80/minute, regular. Bruise R calf. Died within three hours of admission.

12. I. R. – Male aged 79
    Initial T° – 30.4° C
    Lives with son and family in well constructed centrally heated house. Confused at times and wandered away from home; found near Hampstead Heath collapsed after a cold and rainy night. Pulse 80/minute, irregular. Atrial fibrillation on E.C.G., J-waves present. E.E.G. – no evidence of recent supratentorial focal lesion; mild diffuse abnormality compatible with cerebrovascular disease. Cervical spondylosis with disc space narrowing. Blood sugar 50 mg per cent on admission. Postural hypotension.

13. A. F. – Female aged 79
    Initial T° – 31.4° C
    Adequate available heating although flat badly constructed and cold. Patient does not use available heating and well known to Geriatric Visitors. Takes excess alcohol and depressed at times. Six previous admissions for hypothermia and
nursed at home twice with mild hypothermia. Apparently ill for two weeks before admission but not having medication. Confused but conscious. Slurred speech. Pulse 56/minute. E.C.G.—ventricular extopic beats and non-specific T-wave changes. Flushed cheeks. Postural hypotension. Bruises L forearm. Blackouts in February 1975 investigated at St Leonard’s Hospital where the thyroid function tests were found to be normal. EMG in 1970 suggested hypothyroidism as slow conduction velocity in lateral popliteal nerve and at that time delayed relaxation of ankle jerks. This admission patient still has slow return of ankle jerks. Has been treated for diabetes in the past but no evidence of diabetes on this occasion.

References
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THE DEVIOUS PRESIDENTIAL MIND
Walter Charleton was a bright boy and a staunch Royalist. Obtaining a Doctorate of Medicine at Oxford at the age of 22, he was immediately appointed physician to Charles II during his exile and so was at the centre of things when the monarchy was restored. With such patronage it was not surprising that he was a founder-member of the Royal Society and later became President of the College of Physicians. As a physician he stood accused of taking ‘too much time in reading and composition and too little at the bedside of patients’. His many compositions were way outside medicine. He contributed to Dryden’s edition of Plutarch’s Lives and was much admired by the poet. In The Mysterie of Vinters (1669) he discoursed on the sicknesses of wine as if they had been illnesses of his patients. He even had a long list of remedies for the ‘chronic distempers of wine’. He must have been an obsessional man of words as he published a list, in Latin, Greek and English, of the names of all known animals and managed to get in a reference to Charles II’s menagerie at St James’s Park. The College Library possesses the first edition (1688) of this work. In his time he was best known for his views on the building of Stonehenge, which he attributed to the Danes. This work, published in 1663, was entitled Chorea Gigantum, or the most famous Antiquity of Great Britain, standing at Salisbury Plain, restored to the Danes.