

Screening for hypothermia in Orkney

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SUMMARY. In a screening survey for hypothermia carried out amongst the elderly population of an island in the Orkneys, in which a 96 per cent response rate was obtained, oral temperatures were recorded using standard and low-reading thermometers. Out of 77 patients who entered the survey, only three had an oral temperature of 37°C or higher. Six patients (eight per cent) had a temperature of 35°C or lower, and these, depending on diagnostic criteria, could be considered to be suffering from hypothermia. A low body temperature was unsuspected in all six.

Introduction

The purpose of screening is to seek treatable illness that would otherwise be likely to worsen irretrievably, while remaining undetected. It can do little to help in the relief of disease that quickly reveals itself, or for which there can be little hope of cure or palliation (Stewart, 1973). Hypothermia is well-suited to these criteria.

Hypothermia is found, almost solely amongst those exposed to cold, especially among the very young and the elderly, particularly those living alone in poor housing. Some impairment of temperature homeostasis is usually present (MacMillan *et al.*, 1967), which may be the result of the use of alcohol, or drugs such as the phenothiazines which abolish shivering and induce vasodilatation. Other causes are endocrine disorders (e.g., myxoedema, hypopituitarism), stroke, mental confusion, or retardation, severe infections, circulatory disturbances (e.g., myocardial infarction, pulmonary embolism), and any disorder which is likely to impair mobility (e.g., paraplegia, Parkinsonism, or severe osteoarthritis). I therefore decided to assess the value of a screening survey among the elderly population of an Orkney island for the presence of hypothermia.

Area

The survey took place on the island of Westray, which is about ten miles long, in the extreme North-west of the Orkney group. It is a low-lying island, with an economy based on cattle-farming and fishing (Coull, 1966). The population of 738 are all on my list, and the majority of the inhabitants live in isolated farmhouses, spread throughout the island. Temperatures on the island are cold in winter, and the wind can be strong and persistent.

Method

From the practice age-sex register, patients born in or before 1904 were identified. Screening was undertaken on all the 81 patients in this group on the same day (8.2.75), between the hours of 09.30 hours and 19.00 hours. The air-temperature and the wind-speed were recorded during the previous night, and throughout the period of the survey. All the patients were visited at home. Oral temperatures were taken with a standard centigrade clinical thermometer, being kept in the mouth for three minutes. If the temperature recorded was 35°C or below, the procedure was repeated using a Zeal subnormal clinical thermometer. In view of the number of patients involved, the temperatures were recorded by six workers, all of whom had previously received instruction in the method to be used. Records were also taken of the drugs used, the

social circumstances, and the significant medical conditions of the patients found to have low temperatures.

Results

Eighty-one patients on the practice age-sex register were found to have been born in or before 1904, of whom 37 were men, and 44 were women. Their ages are shown in table 1.

TABLE 1
AGE-SEX DISTRIBUTION OF PATIENTS IN THE SURVEY

Age	70-74	75-79	80-84	85-89	90+	Total
Men	16	8	9	3	1	37
Women	20	8	10	4	2	44
Total	36	16	19	7	3	81

Of these 81 patients, two were temporarily away from the island. A further patient was not at home during the period of the survey and could not be located. All the remaining 78 patients co-operated in the survey (96 per cent response), although an oral temperature could not be obtained from one patient. This was an 80-year-old lady with senile dementia, in whom a rectal temperature of 36.7°C was recorded.

The temperatures recorded are shown in figure 1. Only three patients had an oral temperature of 37°C or higher. Four patients had a temperature of 35°C. One patient's temperature was recorded at 33.3°C, and another at 34.4°C. Using the criteria for hypothermia laid down by the British Medical Association's Committee on Hypothermia in the Elderly (1964), these latter two patients could be considered to be suffering from hypothermia.

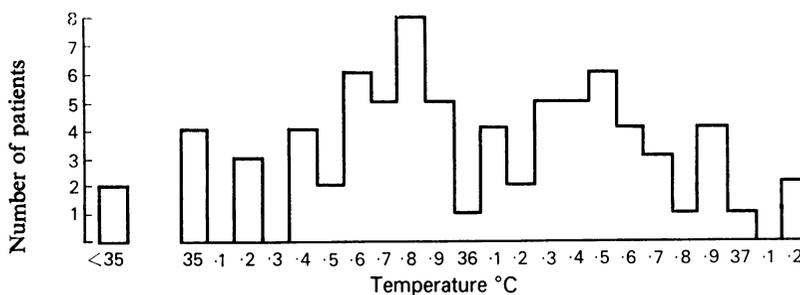


Figure 1

Details of the six patients with very low temperatures are given in tables 2 and 3.

TABLE 2
PERSONAL DETAILS OF SIX PATIENTS WITH LOW TEMPERATURES

Patient	Sex	Year of birth	Family circumstances
1	M	1888	Living alone
2	F	1896	Living alone
3	M	1890	Living alone
4	F	1896	Living with family
5	F	1903	Living with family
6	M	1903	Living with family

TABLE 3
MEDICAL DETAILS OF SIX PATIENTS WITH LOW TEMPERATURES

<i>Patient</i>	<i>Oral temperature</i>	<i>Drug therapy</i>	<i>Significant medical diagnoses</i>	<i>Degree of mobility</i>
1	35.0°C	'Navidrex-K'	Dependent oedema	Good
2	33.3°C	Allopurinol 'Aldactone-A'	Gout; Renal failure Mitral valve disease; Coronary art. disease; Cardiac failure; cataract	Poor
3	35.0°C	Digoxin 'Neonaclex-K'	Cardiac failure	Poor
4	35.0°C	Indomethacin	Osteoarthritis	Good
5	35.0°C	Paracetamol	Osteoarthritis	Poor
6	34.4°C	Nil	Nil	Good

The air-temperatures and the wind-speed for the period immediately before, and during the period of the survey are given in table 4.

TABLE 4
AIR-TEMPERATURES AND WIND-SPEED DURING THE PERIOD
PRIOR TO AND DURING THE SURVEY

<i>Time</i>	<i>Air-temperature (°C)</i>	<i>Wind-speed (Knots)</i>
0000	4.2	13
0100	4.2	12
0200	4.4	10
0300	4.4	13
0400	4.4	13
0500	4.4	14
0600	4.1	15
0700	4.1	13
0800	4.1	16
0900	3.5	15
1000	3.8	16
1100	4.0	16
1200	4.2	16
1300	5.0	14
1400	5.1	16
1500	4.8	16
1600	4.8	16
1700	4.2	15
1800	3.7	14
1900	4.3	3

Discussion

Few studies of the prevalence of hypothermia have been undertaken. Most of those that are available refer to hospital series, whereas the true prevalence in different regions is unknown. Correlation between different series is hindered by a lack of standardisation of method, and by differences in diagnostic criteria.

The definition of hypothermia used in this survey was that of the British Medical Association's Committee on Accidental Hypothermia in the Elderly (1964), which stated: "A state of hypothermia may be said to exist, when the body temperature is below 35°C".

The BMA Committee also advocated the use of oral temperatures in the recognition of hypothermia. Not everyone would agree with this. As the mouth acts as part of the body's 'shell' in its response to cold, and as the temperature of the mouth is lowered by cool inspired air (Barley & Evans, 1970), and cold saliva (Sloan & Keatinge, 1975), this view has been challenged, and the use of rectal temperatures, or the temperature of freshly-voided urine advocated (Fox, 1971; Fox *et al.*, 1973). For the purposes of screening large numbers of patients however, an oral temperature is more suitable in view of its speed and high acceptability by patients.

Hypothermia was only mentioned in 18 Scottish death-certificates during the period 1968-72. This is surprising in view of its high mortality (Royal College of Physicians, 1966), and the large number of cases seen in hospital practice, and suggests that it is under-reported on death certificates. Indeed, Taylor (1964) estimated that between 20,000 and 100,000 people die of hypothermia in Britain each winter. The Royal College of Physicians, using the criterion of a rectal temperature below 35°C, estimated that about 9,000 patients had been admitted to British hospitals (0.68 per cent of all admissions) during three months in 1965, with a diagnosis of hypothermia.

Fox *et al.* (1973), in a large-scale survey covering the whole of the British Isles, found a deep-body temperature below 35°C in ten per cent of patients over the age of 65, whilst Eddy *et al.*, (1970), measuring the oral temperature of people over the age of 69 in London, found temperatures below 35°C in 17 per cent. A further survey undertaken in London during the winter of 1967, found oral temperatures of 35°C or below in 11 per cent of patients over 60 years of age (Society of Medical Officers of Health, 1968). In the present survey in Orkney, only six out of 77 patients (eight per cent) had an oral temperature of 35°C or less, on one particular day in February, of whom only two (three per cent), fulfilled the given criteria for hypothermia.

In a previous survey (Fox *et al.*, 1973), an association was found between the prevalence of hypothermia and the standard of housing. This survey was undertaken in an area where the general standard of housing and heating is poor. A high proportion of the houses on the island of Westray are old, small, and isolated, and consist of but a single storey. Many are roofed only with corrugated asbestos sheeting or sandstone flagstones, often leaving the rafters exposed internally. In many of the houses the floors are cold, consisting of flagstones lain directly onto the soil. Fifty-three per cent of the houses have no bath or shower, whilst in 40 per cent of the houses there is no hot water or toilet (Census for Scotland, 1971).

The houses are often very cold. There is no mains electricity on the island. Electricity is provided by small domestic generators, which do not allow the use of electric fires, or the pumps needed to drive central heating systems. Most heating is either through coal-fires, or cooking ranges of the 'Rayburn'-type in the main room of the house only. These burn solid fuel and tend to run low at night. Otherwise, what heating is available is through the use of paraffin heaters.

Exposure to cold is a necessary condition for the development of hypothermia. Fox's study covered a period of several months, and hence no detailed data concerning the air-temperature or wind are available. My survey was conducted on one day over a 9½-hour period, and relevant weather details for this period, and for the preceding night are shown. Unfortunately, my survey took no account of the normal circadian rhythm of body-temperature. The weather on the day of the survey was relatively mild and windless for Orkney. Presumably the prevalence of hypothermia might have been higher on a day with worse weather.

A recent anthropometric survey of the island of Westray (Marshall, 1975), showed that the population of this island tends to be somewhat shorter and fatter than the English 'standard' populations. Williams (1968) found that the presence of hypothermia

was commoner amongst thinner patients. This may be one explanation for the relatively low prevalence found in this Orkney survey.

On clinical grounds, the presence of a low body temperature was unsuspected in all six patients in whom it was found. Three of the six were men, three were women. Three were living with other members of their families, whilst three were living alone. Three of the six had a relatively severe impairment in their mobility. Only one of these, a 78-year-old lady (patient 2) was acutely ill at the time. She suffered from multiple pathology, and was recovering from an episode of left ventricular failure. None of the six was taking phenothiazines or barbiturates or other drugs known to induce hypothermia.

Conclusion

In this survey which screened 96 per cent of all the 81 patients in an island practice aged 70 or over, an oral temperature of 35°C or less was found in eight per cent of patients. In view of this finding, the theoretically easy ways of preventing hypothermia, and yet its high mortality, it is suggested that further surveys of this kind be undertaken to assess the value of screening as an approach to this problem.

Acknowledgements

I should like to thank all the elderly patients in the practice who so readily took part in the survey, and also, the staff of the Meteorological Office, Kirkwall for providing me with weather details. I should especially like to record my gratitude to the practice nurse, Mrs Jessie Creelman, and to Mrs Isabella Harcus, Mrs Annie Scott, Mrs Margaret Scott and Mrs Isabella Tocher for their assistance in recording data, without whose help the survey could not have been accomplished.

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THE GENERAL PRACTITIONERS' CONTRIBUTION TO 'LONG-STAY' HOSPITALS IN SCOTLAND

A survey by the Scottish Hospital Advisory Service showed that there were about 900 general practitioners attached to hospitals of all kinds in Scotland. The biggest group of 140 general practitioners worked in geriatric units.

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