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Review Paper

Minimum indoor temperature threshold recommendations for English homes in winter – A systematic review

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ABSTRACT

Objectives: To identify and assess the available evidence on the impacts of cold indoor temperature thresholds on human health and make evidence-based recommendations for English homes.

Study design: Systematic literature review.

Methods: A systematic search of peer-reviewed published literature from the UK and countries with similar climates, and grading of the evidence using the National Institute of Health (NIH) framework was followed by a discussion with experts and formulation of recommendations.

Results: Twenty papers were included. Studies were included if they were conducted outside England but were from countries considered to have similar climates. Studies included two small randomised controlled trials, two cohort studies and one case control study; other studies were cross-sectional, largely laboratory-based studies. Health effects in the general population start to occur at around 18 °C. Effects in older people are more profound than in younger adults. Older people are less able to perceive low temperatures.

Discussion: Although evidence was limited, a strong argument for setting thresholds remains. The effects observed on the general population and the effects on those more vulnerable makes a case for a recommended minimum temperature for all. Health messages should be clear and simple, allowing informed choices to be made. A threshold of 18 °C was considered the evidence based and practical minimum temperature at which a home should be kept during winter in England.

Conclusion: There is limited evidence available on minimum temperature thresholds for homes. However a recommendation of at least 18 °C for the whole population with nuancing of messages for those more vulnerable to the effects of cold can be made from the results of the retrieved studies.

Recommendation: Heating homes to at least 18 °C (65 °F) in winter poses minimal risk to the health of a sedentary person, wearing suitable clothing.

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Introduction

There are around 25,000 more deaths each winter (December to March) in England when compared to the rest of the year.[1] The high prevalence of cold, damp, poorly energy efficient homes, combined with other complex factors such as fuel poverty and health inequalities are considered to be one of the main reasons why England continues to have higher excess deaths and illness in winter, compared to our European neighbours.[2,3]

The people who are most vulnerable to the impacts from exposure to cold are people 65 years and over, children and those with chronic illnesses (particularly cardiovascular and respiratory disease), factors that are widely distributed within the population. These are also the people who spend the majority of time at home and in the specific case of older people, may not always perceive cold temperatures because of physiological changes that occur with ageing.[4]

There is strong evidence which shows cold homes impact on health,[5] which increases the importance of having indoor temperature threshold recommendations for homes to protect and improve health and well-being. As such, there are a number of existing policies and frameworks in England which seek to address cold homes, and/or excess winter illness and death. These include (but are not limited to) the housing health and safety rating system (HHSRS) an evidence and risk-based evaluation tool;[6] recent guidance published by the National Institute for Health and Care Excellence[7] and the Cold Weather Plan for England.[8]

Previous versions of the Cold Weather Plan for England[8] recommended minimum indoor temperatures of 18 °C for bedrooms and 21 °C for living rooms. In 2014, Public Health England (PHE) was asked by a number of external sources whether these recommendations should be reconsidered. The plan had historically based recommendations on the widely referenced consensus document from the World Health Organisation,[9] now some 30 years old. Given the age of the original evidence source and in response to external requests, a decision was taken to review the evidence to establish if there was new evidence to inform indoor temperature recommendations in the plan. In doing so, it was acknowledged that any recommendations, as well as being evidence based, must be pragmatic in nature. It was also crucial to consider the broader impact of those recommendations, including the effect on potential carbon emissions and expenditure on fuel, specifically for those already experiencing the most severe fuel poverty.

This paper is a summary of the full review which is accessible on the PHE website.[10]

The aim of this review was to:

1. Systematically review the evidence on indoor temperature thresholds and the impact on human health.
2. Develop a set of recommendations for the Cold Weather Plan for England on indoor temperature thresholds.

Methods

The literature search

The literature search (carried out in February 2014) aimed to identify peer reviewed, primary research papers. The following five medical databases were searched: PubMed, OVID, Medline, EMBASE, and Cumulative Index to Nursing & Allied Health Literature (CINAHL).

Table 1 details the search terms and Boolean operators used.

Inclusion and exclusion criteria (Table 2) were discussed with experts to increase likelihood of capturing all relevant published work.

Fig. 1 illustrates the literature search process.

Consultation with experts

The preliminary results of the literature review were presented to 40 experts at the National Cold Weather Plan seminar 2014.[11] These experts comprised leading academics in the fields of epidemiology, engineering, housing and health as well as senior colleagues from the NHS, voluntary and community sector and a number of government representatives from the Department of Energy and Climate Change, the Department of Health, and the Department of Communities and Local Government. Delegates were asked to discuss the proposed recommendations in details and provide feedback. These expert opinions were taken into consideration when forming the final recommendations in the Cold Weather Plan 2014–2015. A summary and delegate list from this event is available.[11]

Weighing the evidence

The National Institute for Health (NIH) grading system was used to assess the studies. The Scottish Intercollegiate Guidelines Network (SIGN) and The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) were also considered but deemed not the most appropriate tools for this particular review, due to the large number of cross sectional studies.

The NIH checklists enabled the reviewers to objectively account for the methodological quality of individual studies. These were considered alongside the weight of evidence and consistency of findings to support evidence-based recommendations. Two reviewers worked separately to assess study design, complete a checklist, rate the study and assign a grade. Grades were compared and where there was an inconsistency, the reviewers agreed on a final grade together. Two additional reviewers then assessed the papers and assigned grades and agreed on the final marks for all studies.

Data were collected and recorded on spread-sheets (Appendix A). Data were extracted, compared and contrasted for study design, population and the setting for that study, the conditions to which participants were exposed, a number of recorded primary and secondary outcomes (body mass index, body temperature, blood pressure and so on).

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