'Impact of weather on human health – current and future issues'

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Overview

In addition to its public health role, the Met Office health team tries to understand relationships between weather and health in order to develop tools and communication processes which assist 'at risk' groups to remain well during weather that increases the risk of illness. Over the longer term it has a key role in leading on climate change science and communicating results. The climate is set to warm over the coming century and this is likely to affect health. Understanding probable climate scenarios based on good science will help us prepare more effectively for this.

Summary

In introducing the topic, Wayne Elliot informed us that the Met Office has been at the forefront of weather research for 154 years, with approximately 1700 people, mostly scientists, currently working there. The Hadley Centre has been a leading authority on climate science since it opened in 1990 and the health team, which Wayne heads up, consists of 12 people, including a number of clinicians. The Centre models and anticipates changing weather, relates this to health trends and symptoms, and provides research and assistance to others based on these analyses. The programme started about ten years ago and is seen as a world leader in its field.

The lecture covered two main areas: the first relates to weather, wellness and illness; the second to climate and how it is changing.

Weather, wellness and illness

The Met Office approach to weather and health includes three elements:

- Understanding the relationships between weather and health
- Understanding 'at risk' groups of the population
- Developing the tools for effective communication to elicit behaviour change

Wayne began by suggesting that the field of weather and health was not new, having been described by Hippocrates in 400BC, but in the interim some basics have been forgotten. He showed a map of the UK which highlighted that, by and large in the summer months, if the wind is from the South and East, then the UK experiences hot weather and poor air quality. When the wind is from the East and North, the UK experiences cold weather. Both of these situations are

associated with *increased risk* of a population health impact. But, when the wind is from the West, the risk to the population of weather related health impacts is low, suggesting that UK culture and people are adapted to the prevailing weather system from the West.

Wayne then described the Public Health work which the Met Office health team is engaged in.

National Heatwave Services – this involves information and comment through news and weather bulletins in press, television and radio etc warning of high temperatures. This is linked to heatwave planning through which professional groups, such as the NHS, know what kinds of actions to prepare for during episodes of high temperature. Scotland is one of the few countries in Europe without a heatwave plan even though it surpasses temperatures at which health begins to be affected.

National Cold Weather Plan – similar service to National Heatwave Services except it relates to *extreme cold weather*.

National Ultra Violet Light Service – this runs mostly in the background as a scientific service, in relation to illnesses like cancer.

In addition to these public health services, Wayne mentioned two bespoke services that the team offers. The first of these, '*Brighter Outlook'*, relates to mental health, especially seasonal affective disorder (SAD). When the Met Office predicts a period of low dense thick cloud in an area (which will restrict light and thus is likely to affect mood), it informs subscribers to the service that this going to happen. Combinations of literature, cognitive behavioural therapy, medication, light boxes, diet and physical activity are combined by sufferers with the knowledge that such a period of weather is forecasted, to help them to self manage their condition during this time.

Wayne spoke in more detail about another service related to people with respiratory disorders – '*Healthy Outlook*'. He began this exposition with a short description of the effects of cold and the scale of excess deaths during periods of cold weather. He presented data which showed that the four countries with the highest excess cold weather premature mortality were Portugal, Ireland, Spain and the UK, all of which are on the Atlantic seaboard. The Met Office, with others, is currently engaged in research to discern the complex range of factors accounting for this. One example is that cold weather is a risk factor for those already suffering from a disease called Chronic Obstructive Pulmonary Disorder (COPD).

COPD is the most common cause of admission to hospital from existing conditions. It is responsible for approximately 30,000 deaths a year in the UK and an annual cost to the NHS of about £800million. Wayne demonstrated this point by showing one example of emergency admissions to a South East London hospital after a cold spell in January 2004. Emergency COPD admissions peaked about 10-12 days later. This peak in COPD admission due to cold weather was 15% above the average rate for admissions to hospital at that time of year.

To help with health effects of cold weather on COPD sufferers as well as the burden this creates for the NHS, the Met Office forecasts periods of elevated risk for people with COPD. The

forecast includes cold weather temperature, speed of onset, length, depth, humidity and the level of circulatory repository infections in the population. This enables patients, who are registered for the service (via their local PCT) to be notified in advance of the cold weather period and to apply clinically accepted interventions to keep themselves well.

The service also concentrates on who *might be* at risk (rather than those known as being at high risk), since most of the emergency COPD admissions in these circumstances come from previously unknown cases. When cold weather comes, the Met Office sends notification to GPs. It then uses an automated caller to phone patients and asks them if they are well and have enough medication. The answers to these questions are relayed to the GP, who can then tell which patients are at high risk of an episode and which are not. An element of the service which patients have stated they really like is the feeling that someone is looking out for them. What makes the service work is the combination of the prediction of elevated risk of COPD events, together with the delivery of an appropriate message to appropriate people and the communication of the status of their COPD patient list back to the GP. The service has about 35,000 subscribers in the UK. The early reporting of symptoms by specific people at risk, together with follow up medical action, reduces the number of emergency admissions for COPD during episodes of cold weather.

Following a short question and answer session on weather and health, the session moved on to climate and how it is changing.

Climate and how it is changing

Climate change is a long standing natural feature of the planet, however there is evidence to suggest that this natural cycle of change is being affected by human activity. Natural features which 'force' the climate to change include the earth's wobble on its axis, the intensity of the sun's activity and the earth's volcanic activity. These features interact with the earth's atmosphere to create fluctuations in temperature.

However, if human activities are included in these calculations it can be seen that there is a human effect which is causing the temperature to rise faster than otherwise might be the case.

Over the last 100 years the increase in global mean temperature has been approximately 0.7 degrees Celsius. The various International Panel on Climate Change (IPCC) scenarios estimate a rise in Global mean temperature of between 1.5 – 6 degrees Celsius by the year 2100, depending on the mitigation measures taken by humans. Current observations suggest that CO2 concentrations in the atmosphere are higher than those associated with a 6 degree Celsius increase in global mean temperature, so the outlook is not as good as it might be. In any case, most commentators suggest that we are already likely to see increases in excess of 2 degrees Celsius.

While there is much discussion of the mean global temperature, this is not the most important point. More significant from a health point of view, is the frequency and severity of extreme

weather events that such an increase implies. The larger the increase in temperature, the more frequent and severe hot weather events will be. The first of these in recent times was the hot summer of 2003 which was unexpected and killed between 35-50,000 people in Europe. If temperature increases as currently observed, then such summer weather is likely to happen every two years and by 2080 this type of weather will be cool in comparison to the norm. In such circumstances infrastructure will need to adapt quickly if it is to protect the population adequately from exposure to this type of weather.

Wayne suggested that a key role for the Met Office, in addition to scientific research, was that of good communication of the implications of scientific findings on climate. He showed us that the Met Office was shifting from a single estimate model of change to a model which showed the probability of various climate outcomes according to the projections of several hundred models over time and space.

In conclusion, Wayne suggested that climate is most likely to continue warming and that adaptation to such change is now necessary. The past is no longer a good guide to the future. Part of the preparation needs to be an understanding of how to make our people and systems resilient in the face of these probabilities so that we are better able to protect ourselves from the health effects which heat, cold and flooding will bring in the coming century. This will benefit from co-operation at all levels of governance, from international agreements to more informed individual engagement, ever more reliable scientific prediction and an ability to communicate its meanings.