SUSTAINABLE PATHOLOGY

With climate change and sustainability becoming a significant focal point for any sector, it's hard to ignore healthcare's need for transformation, argues Specialist Biomedical Scientist **Carmen Holmberg**.

What does the term "climate change" mean to biomedical scientists and their work? The general consensus from those whom I've asked is that they are fully aware of the impact of global warming, but they hadn't really considered the impact of pollution from the health service. When asked how laboratories can effectively reduce their carbon footprint, there were a variety of answers, but all agreed on one point – we could do better.

With issues such as climate change, which feel so far removed from our day-to-day lives, and with no physical gauge to see the rising levels of carbon dioxide in the air, it's no surprise that carbon emissions are not at the forefront of laboratory policies and are often side-lined.

As biomedical scientists who diagnose and monitor patients' health, an understanding of how climate change affects health is needed to address the contradictions, as the NHS is the most significant public sector contributor to climate change.

This raises questions about the sustainability of the health sector for the long term and the need to transform the current system, so future generations can benefit from the resources too.

Carbon footprint of NHS England

In 2015, the NHS England in alone was responsible for 22.8 million tonnes of CO_2 emissions, which is greater than the annual emissions from all aircrafts departing Heathrow Airport. This accounts for 25% of public sector emissions in the UK, with the NHS paying over £50m a year on carbon permits. With increasing environmental awareness from the public and with UK policies including Climate Change Act 2008 and signing the Paris agreement, the healthcare sector is facing increasing pressure to reduce its carbon footprint and environmental impact. It is expected that these carbon permits and environmental policies are likely to increase over time, so change will be inevitable for a more cost-effective and less carbon-intensive system.

Pathology environmental impacts

Pathology laboratories are known to contribute towards a substantial portion of carbon emissions due to their high energy demand; most using up to six times more energy per unit surface than a normal office building. The most energy-demanding processes include generating large amounts of hazardous and solid waste, consuming vast amounts of water, ventilation and generating chemical pollution adding to climate change.

Planetary boundaries

Besides climate change, there are eight other planetary processes known as "planetary boundaries", a concept

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identified by a group of environmental scientists led by Johan Rockström and Will Steffen, who were looking to evaluate the earth's system dynamics and characterising the conditions for earth to remain stable and for humans to thrive. The scientists state that they cannot account for what it would be like if these boundaries are pushed too far, possibly leading to the point of no return.

The planetary boundaries are: stratospheric ozone depletion, loss of biosphere integrity, chemical pollution and the release of novel entities, climate change, ocean acidification, freshwater consumption and the global hydrological cycle, land system change, nitrogen and phosphorus flows to the biosphere and oceans, and atmospheric aerosol loading. Four boundaries (climate change, land-system change, biodiversity loss and biogeochemical change) have already exceeded the safe boundary limits and are now in the zone of uncertainty for generating abrupt or irreversible environmental changes. There is a need to revert these four back to safe operating levels and to prevent the other boundaries from breaching safe levels.

Despite the realities of today, it has been shown that these planetary boundaries can transition back to safe operating levels for human survival. In the 1970s the stratospheric ozone hole above the Antarctic was operating in a danger zone of its boundary, as it was growing at an unprecedented speed. However, by 2015, the stratospheric ozone depletion boundary was back within safe operating levels, as policymakers listened and businesses had solutions. Therefore, a transition was seen with the ozone hole shrinking, but it is not due to completely close until 2060.

As the scientists have highlighted in their work, these planetary boundaries do not offer a "roadmap for sustainable development", but they do help to advise on society's decisions about sustainability and to prevent further damage to the environment.

Sustainable healthcare

Why should healthcare lead the way on this sustainability journey? As health professionals, we are in the ideal position to lead and set an example for this change, along with our moral responsibility to ensure patients are not harmed by pollutants that the health service causes. In time, it is likely that sustainability will be seen as a necessary element of quality policies too.

Across the UK, many examples from the campaign for greener health, the centre for sustainable healthcare and the NHS sustainability development unit, have started the process of "sustainable healthcare". Many trusts have jumped onto this initiative already, collaborating with their estates' teams (as traditionally, it was an estate-led project) and which have seen reduction of CO_2 emissions with financial sustainability as an added bonus. For example, Barts Health trust has saved £9.2m so far, with saving 48,511 tonnes of CO_2. Queen Margaret Hospital trust reduced waste before haemodiafiltration, which cost £0 to implement, saving £18,594 per year and CO_2 saving of 5200kg per year. These exemplary cases show that additional financing is not needed to start the process, as most would assume.

Foremost, education is needed. The University of Manchester has recently included "Living with climate change" as part of the syllabus in its undergraduate biomedical science degree course, highlighting the importance of this issue to future biomedical scientists. Forging that bridge between biomedical science and climate change is important, as often these current news topics seem remote to our daily lives. We as health professionals need to able to protect as well care for the health of the population. BMS

ENVIRONMENTAL IMPACTS ON HEALTH

It is well documented that climate change (often termed as climate breakdown) is having detrimental effect on health in many ways. Examples include:

- Extreme heat from global warming leading to heatstroke and dehydration
- Air pollution from burning fossil fuels and wildfires; exacerbating asthma and other respiratory disorder
- Increasing the geographical range of insects who spread vector-borne diseases
- Extreme weather events that can cause instant fatalities to spreading waterborne diseases.

Essentially, for healthy people to live; there is a need for a stable climate.

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