Intensive Care, Climate Change, and Global Warming

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Introduction

Human activities have resulted in the emission of growing amounts of carbon dioxide and other greenhouse gases in the last five decades, leading to global climate change via increasing atmospheric warmth. The world has warmed by 0.85 degrees Celsius. The last decade has been the warmest since 1850, and natural disasters (such as earthquakes, destructive storms, forest fires, prolonged heat waves, droughts, and floods) have increased dramatically in frequency and intensity. Between 1998 and 2017, 1.3 million people were killed by climate-related and geophysical disasters, with another 4.4 billion injured, homeless, displaced, or in need of emergency assistance. Climate change scenarios include changes in the spread of infectious diseases as a result of warming [1], as well as changes in outbreaks. After floods or as a result of water heating, extreme weather events might occur. Furthermore, warmer climates give better circumstances for the vector that transmits infections to survive and complete its life cycle. Natural catastrophes and extreme occurrences result in traumatic deaths and injuries, mental illnesses, and infections, while global warming increases the incidence of heat-related ailments (cardiovascular strain, pulmonary diseases, exsiccosis, mental disorder).

The occurrence of rising average air temperatures near the Earth's surface over the past one to two centuries is known as global warming [2]. Climate scientists have been collecting precise measurements of numerous weather phenomena (such as temperatures, precipitation, and storms) and related impacts on climate (such as ocean currents and the chemical makeup of the atmosphere) since the mid-twentieth century. These findings show that Earth's temperature has changed throughout practically every possible timescale since the beginning of geologic time, and that human activities have had a rising influence on the pace and magnitude of current-day climate change since at least the beginning of the Industrial Revolution. Many climate experts think that a rise in global average temperature of more than 2 degrees Celsius (3.6 degrees Fahrenheit) in such a short time will cause major societal, economic, and ecological harm. Increased loss of numerous plant and animal species, shifts in agricultural patterns, and increasing sea levels are all examples of such devastation [3]. By 2015, all but a few national governments had started the process of implementing carbon reduction plans as part of the Paris Agreement, a treaty aimed at limiting global warming to 1.5 degrees Celsius (2.7 degrees Fahrenheit) above preindustrial levels in order to avoid the worst of the predicted consequences. The most essential is carbon dioxide, which has a role in both the greenhouse effect and the human economy. Carbon dioxide concentrations in the atmosphere were estimated to be around 280 parts per million during the start of the industrial period in the mid-18th century (ppm). They have climbed to 416 ppm by the end of 2021, and if fossil fuels are consumed at current rates, they would reach 550 ppm by the mid-twentieth century, effectively doubling carbon dioxide concentrations in 300 years [4].

Global warming is linked to the broader phenomenon of climate change, which refers to changes in the entirety of climate variables. Climate change affects precipitation patterns, winds, ocean currents, and other aspects of the Earth's climate, in addition to air temperature. Climate change is typically thought of as a result of a variety of natural processes acting on different timescales. Climate change has involved a "anthropogenic," or purely human-caused, element since the dawn of human civilization, and this anthropogenic factor has become more substantial in the industrial period of the previous two centuries [5]. The term "global warming" is used

to refer to any warming of near-surface air that can be linked to anthropogenic causes over the last two centuries. On various timescales and at various spatial scales, human activity has altered global surface temperatures through affecting the radioactive balance controlling the Earth. The most significant and well-known anthropogenic influence is the increase in greenhouse gas concentrations in the atmosphere. Humans also have an impact on climate by altering aerosol and ozone concentrations and changing the land cover of the Earth's surface [6]. By increasing the net downward long-wave radiation reaching the surface, greenhouse gases warm the Earth's surface. Each gas has a particular relationship between atmospheric carbon dioxide levels and the accompanying positive radioactive forcing of the surface. The chemical characteristics of each greenhouse gas and the amount of long wave radiation that each can absorb have a convoluted relationship. The radiative behavior of each major greenhouse gas is discussed after that. Magnetic resonance imaging of the right foot and ankle showed a lesion with heterogeneous signal located superficially to the extensor tendons of the fingers, close to the subcutaneous cellular tissue of the dorsal surface, measuring 2.6 cm x 2.1 cm x 1.5 cm, determining dorsal skin bulging,

Between 2030 and 2050, the World Health Organization (WHO) estimates that extreme heat, natural disasters, and changing infection patterns will cause an additional 250,000 deaths per year, mostly in people at risk (people living in coastal regions or megacities, children, the elderly, people with multiple and/or severe comorbidities, and—last but not least—people living in regions with weak healthcare infrastructures). The impact of global warming on diseases requiring intensive care has been extrapolated from some existing data regarding a change in the spread of infectious diseases, a (further) alteration of the respiratory system's function—especially in patients with chronic lung diseases—an expected increase in kidney diseases, an expansion of cognitive disorders due to heat waves, particularly in the elderly, and some negative cardiovascular effects [7]. According to statistical models used to assess the global burden of infectious illnesses owing to climate change, there might be a 10% rise in diarrheal infections in 2030, particularly among young children, and a 3–5% increase in the population at risk for malaria. In Germany, the first case of meningitis caused by mosquito-borne West Nile virus infection was recently reported in a man who had never travelled outside of the country. As a result, in the future, European intensivists, who should already be aware of uncommon vector-borne diseases due to global tourism, will need to be further sensitized to currently uncommon or tropical mosquito-borne diseases like malaria and dengue, as well as other vector-borne viral, fungal, or bacterial transmissions like coccidioidomycosis or avian influenza [8]. Apart from diabetes, hypertension, and Glomerulus-nephropathy, dehydration and volume loss could be secondary outcomes of climate-related high heat exposure, leading to chronic kidney disease or abrupt renal failure. A recent study discovered an epidemic of unidentified etiology chronic kidney disease ('Mesoamerican Nephropathy') in Central America, which has been linked to repeated dehydration owing to heat stress. Several researches have looked into the potential consequences of climate change on cardiac health, and these effects are predicted to worsen in the future decades. A surge in mortality, emergency department visits, and (intensive care) hospitalization as a result of cardiopulmonary disorders brought on by heat stress, extreme weather, or air pollution appears to be more likely than worst-case horror scenarios [9].

What, though, is the relationship between climate change and intensive care medicine? In the face of all these difficulties to the healthcare system, do we have adequate awareness (and answers)? Climate change is a fact that is relevant for patient care, according to the majority of responders in a recent study on climate change and health among members of the American Thoracic Society. They confirm that physicians and medical organisations should take an active role in informing patients, the general public, and policymakers on the impacts of climate change on human health. Do we yet take such an active role? Are we ready to deal with the rising occurrence of serious illnesses about which we must, in some circumstances, learn first? [10] To our knowledge, there is presently no specific activity in intensive care medicine to face current and future challenges in the context of global warming and climate change, although it is expected that intensive care medicine will need more specialised capacities, better knowledge on the

part of the intensivists, and better preparation for worst-case scenarios (heat stroke waves or infectious outbreaks) to manage the consequences of climate change adequately.

It has been demonstrated that acute and intensive care services differ significantly across economic regions, in both high-income and low-income nations, and it is arguable whether the current intensive care structure is equipped to meet the demands of climate change [11]. Changes in knowledge and structure are required to be prepared, and ICU bed capacities are far from the sole barrier. In the near future, intensive care staff will require specific knowledge of 'uncommon' diseases and heat stroke management (especially in the elderly), and the ICU will need to be organised to effectively care for larger numbers of critically ill patients arriving quickly in the event of a natural disaster. The number of ICU beds should be monitored, especially in megacities and coastal regions, to ensure that they are sufficient in the event of a natural disaster. For effective infection control management, a functionally acceptable capability for isolating patients with serious infections is required. In the event of disastrous floods, storms, or heat waves, expert help from psychiatrists or psychologists must be accessible. Preparing intensive care medicine for the effects of climate change does not entail ignoring a basic medical principle: prevention is better than treatment. As a result, it is imperative that we support efforts to mitigate or, preferably, eliminate global warming [12].

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