International guideline recommendations and eligibility criteria for home oxygen therapy

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Oxygen is designated by WHO as an essential medicine,[1] which reflects its importance to patients with various acute and chronic diseases. Home oxygen therapy can be provided continuously throughout most of the day, only during ambulation, or only during sleep. Although the potential benefits of oxygen vary across diseases, home oxygen therapy improves dyspnoea and functional capacity in patients who have clinically significant hypoxaemia, and also improves survival in patients with chronic obstructive pulmonary disease.[2,3] The eligibility criteria for home oxygen therapy are based on hypoxaemia thresholds that vary between and often within countries.[4] This variability is also present in the guideline recommendations of respiratory societies and health-care organisations.[5] There is also heterogeneity in the funding and availability of equipment used to deliver oxygen. As a result, access to this essential medicine is inadequate in many parts of the world, resulting in substantial gaps in patient care.

Through a comprehensive online literature search (appendix p 2), we found 30 published guidelines for continuous oxygen therapy (appendix pp 4–5). Our search results showed variability in recommendations for hypoxaemia assessment methods—eg, pulse-oximetric oxygen saturation (SpO_2) versus arterial blood gas (arterial oxygen saturation [SaO_2] or partial pressure of arterial oxygen [PaO_2])—and in secondary criteria, which included some or all of pulmonary hypertension, polycythaemia, oedema, and signs of heart failure. 14 guidelines provided an oxygen saturation threshold (SaO_2 or SpO_2) for continuous oxygen use; the most common threshold was 88% or less, which was recommended in seven guidelines. 29 of 30 guidelines provided PaO_2 thresholds, of which 19 recommended a value of 55 mm Hg or less for continuous oxygen use. The decades-old Nocturnal Oxygen Therapy Trial[3] criteria were similar to the recommendations for continuous oxygen therapy. Recommendations for ambulatory and nocturnal oxygen therapy also varied, with many guidelines not providing recommendations for oxygen therapy in these settings. The use of oxygen therapy during ambulation was addressed in 18 guidelines and the use of nocturnal oxygen in 16 guidelines. Oxygen saturation was the primary method used to determine patient eligibility for both ambulatory and nocturnal oxygen therapy.

A structured online literature search and email surveys of health-care professionals (appendix pp 2–3) indicated that of 193 UN countries included in the search, only 46 countries (population 1·6 billion) provided eligibility criteria for publicly funded continuous home oxygen therapy, 34 (population 1·4 billion) did so for ambulatory oxygen therapy, and 23 (population 1·0 billion) for nocturnal oxygen therapy (figure).[6] Eligibility criteria for two countries with publicly funded oxygen therapy could not be obtained. The remaining 145 countries (population 5·9 billion) had either privately funded oxygen therapy or no funding source was obtainable. An oxygen saturation value of 88% or less was the most common threshold for all three regimens based on total population size for countries with publicly funded oxygen therapy (figure). Among the 28 countries that had national guidelines on oxygen therapy, there was variable overlap in eligibility criteria, with substantial differences in criteria for 36% of the countries. Countries with publicly funded oxygen therapy had a higher median gross domestic product per capita in 2019 than did countries without publicly funded oxygen therapy (US$ 30 451 *vs* 4036; p<0·001).[7,8]

See Online for appendix

There are many potential reasons for the discordance between the guidelines and eligibility criteria, including financial constraints and absence of convincing evidence for threshold criteria. An improved understanding of the reasons for these discrepancies would enable provision of a more targeted and efficient research approach to ensure effective translation of new evidence into patient care.

However, the restricted availability of publicly funded oxygen therapy is of greater public health concern than varying eligibility criteria. We identified public funding sources for oxygen therapy for only 24% of the 193 UN member states—only 21% of the global population—with the majority of people having poor access to oxygen therapy. There are many potential barriers that could explain the difficulties with access. First, initiation of home oxygen therapy begins with the identification of patients

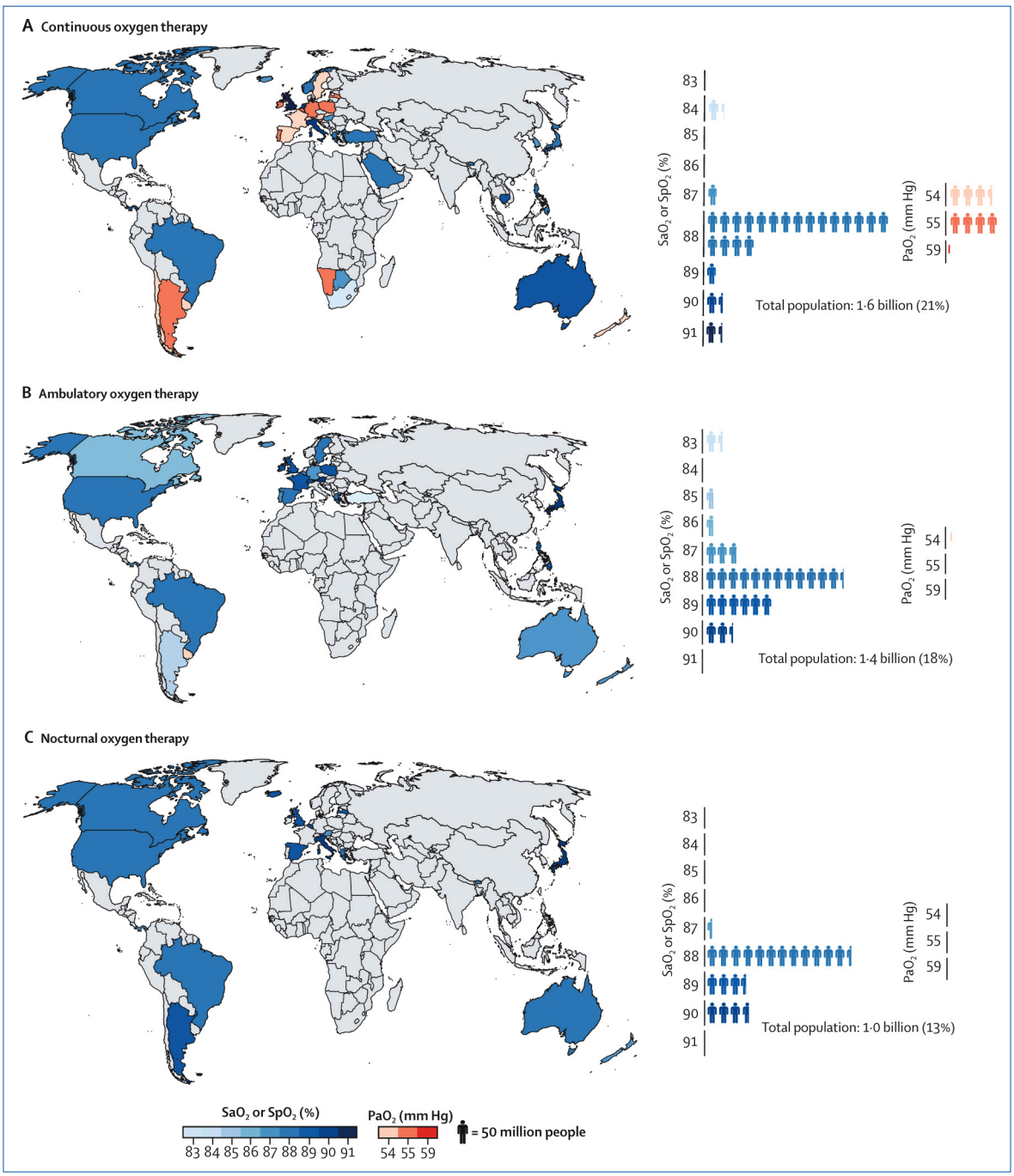

Figure: **Hypoxaemia threshold for continuous, ambulatory, and nocturnal oxygen therapy for countries with reported public funding for treatment**
Hypoxaemia thresholds according to available criteria for publicly funded use of continuous (A), ambulatory (B), and nocturnal (C) oxygen therapy by country (left panels) and population (total population and as a percentage of the world population; right panels). Thresholds were identified from a structured online search and email surveys of health-care professionals (appendix pp 2–5) and are based on the value at which an individual would qualify for oxygen supplementation. For countries that had multiple sets of criteria for oxygen therapy thresholds that differed across regions, weighted averages of oxygen saturation (SaO_2 and SpO_2) and PaO_2 based on regional population size were calculated. The total population with public funding for oxygen therapy and the percentage of the global population with this funding was based on UN data from 2019.[6] PaO_2=partial pressure of arterial oxygen. SaO_2=arterial oxygen saturation. SpO_2=pulse-oximetric oxygen saturation.

who are at high risk of hypoxaemia and subsequent testing to confirm the presence of clinically significant hypoxaemia; however, there are currently no validated criteria that predict onset of hypoxaemia, and many countries have insufficient equipment and resources to support widespread testing.[9] Second, patient preferences and societal norms might influence willingness to commence oxygen therapy, including perceptions that patients might become dependent or that treatment initiation might signal short-term mortality.[10] Third, health-care professionals might be unfamiliar with oxygen therapy guidelines or be uncertain about appropriate timing of testing or when to prescribe oxygen therapy.[11] These issues were further exaggerated in the context of the COVID-19 pandemic, with many patients needing long-term oxygen therapy after initial recovery[12] and the increased need for oxygen exceeding the available supply in some countries during early COVID-19 waves.[13]

Collectively, these barriers highlight the vital need for a concerted effort by multiple stakeholders to improve access to oxygen therapy globally. We hope that our Comment will call attention to the international public health concerns related to home oxygen therapy with the identification of priority areas for which efforts are most urgently needed.

We declare no competing interests.

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