



Health Stewardship in Polar Regions: A Gateway to Establish Emergency Medicine in Extreme Environment

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Dear Editor

With their extreme and unique conditions, polar regions present formidable challenges for healthcare systems. Their remoteness, scarcity of resources, and inherent unpredictability underscore the necessity for a well-structured, reliable, and adaptable healthcare framework. The impact of the recent COVID-19 pandemic on these regions served as a stark reminder of the urgent need for systemic enhancement of healthcare systems in polar areas, as numerous scientists, military personnel, and maintenance workers in various stations contracted the virus, necessitating challenges in isolation and evacuation [1]. Organizing medical evacuations in Antarctica is very challenging, especially in winter [2]. A retrospective analysis of the US Army found that traumatic brain/head injuries and other medical/surgical scenarios were among the most common reasons for evacuation [3]. According to a review of the surgical epidemiology of the Antarctic stations, twelve causes of death may have required surgical management [2]. However, limited evidence and heterogeneous methodologies in studies regarding surgical and emergency issues in the polar regions highlighted the need to establish systematic and

comprehensive health policies that directly address medical and surgical emergencies and trauma [2].

Following the World Health Organization's global report in 2000, all healthcare systems must pursue three fundamental objectives: health provision, responsiveness (addressing non-medical expectations such as dignity and autonomy), and a fair financial contribution. Thus, four main mechanisms including financing, resource production, service delivery, and stewardship must be in place [4, 5]. Applying these elements to polar contexts will provide a thorough picture of the present healthcare scenario and enable strategic improvements [6].

Despite being a global concern, stewardship of health systems is particularly difficult in polar regions, particularly Antarctica. The complexity arises due to the myriad of stakeholders involved, each with its own set of care protocols and territorial aspirations, thereby hindering effective collaboration. Health governance and health stewardship must be distinguished, with the former focusing on intra-sectoral policy operations within the health system and the latter including health governance, inter-sectoral leadership, and health policy-making. This distinction is vital since non-health sector performance influences most health-related outcomes, such as

the availability of equipment, access to information technology, and transportation infrastructure.

Moreover, two key sectors significantly contribute to stewardship: intelligence generation for evidence synthesis and regulation involving stakeholders. An integrated, practical, and comprehensive framework is required to evaluate and improve health governance and function.

The third theme of the Integrated Science to Inform the Antarctic and Southern Ocean Conservation (Ant-ICON) initiative, affiliated with the Scientific Committee on Antarctic Research (SCAR) strives to develop a more transparent and practical definition of stewardship under the Antarctica Treaty [7]. This is important because the effects of climate change will have a greater impact on human life in polar regions, necessitating solidarity among member countries of international agreements, such as the Paris Conference or COP21, to achieve coherent and complete stewardship [8].

To ensure robust and effective health system stewardship in the polar regions, we propose a policy approach that includes three components:

A) Health system functioning and service delivery: We advocate for a unified health governance system in polar regions, highlighting the necessity of identifying key stakeholders and policymakers to minimize implementation barriers [9].

B) Health policy-making and implementation: We suggest establishing universal minimum health requirement standards for personnel involved in polar missions, as well as a protocol for providing acute care to tourists and expeditions. Providing remote treatment will need the use of artificial intelligence and advanced technologies, such as

robotic surgery, remote sensing, digital medicine, and telemedicine [10].

C) Human-based research activities: Understanding human responses to various polar settings is essential. The consequences of temperature fluctuations, circadian rhythm disruptions, sleep disorders, stress disorders, and other potential health conditions should be prioritized.

In conclusion, we must strive for an integrated approach to healthcare in polar regions. This includes holistic healthcare system management, improved education, more effective clinical service delivery, research activity promotion, and health evidence synthesis. Ultimately, the desired health system stewardship for Antarctica must be clearly established to ensure the health and well-being of all individuals traveling into these remarkable landscapes.

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