Environmental Impact and Sustainability Associated with the Practice of Dermatology

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Background

The practice of medicine, particularly dermatology, significantly contributes to environmental issues, including climate change, with healthcare accounting for 10% of greenhouse gas emissions in the U.S. and 25% of global healthcare-related emissions. As populations and medical demands rise, so does resource consumption, intensifying ecological consequences, including the exacerbation of over half of known human pathogenic diseases. Dermatology, which relies heavily on in-person visits, topical treatments, and medical supplies, adds to this environmental burden. This review explores how dermatological practices contribute to environmental harm and examines the role of pharmaceuticals and personal care products in ecological damage, aiming to promote sustainable practices in the field while maintaining high standards of care.

Methods

A PubMed search was conducted using the terms (“environmental impact” OR “sustainability”) AND “dermatology.” Results were screened to include English-only articles between 2018 - 2024, and excluded duplicates. Further exploration of dermatology’s environmental effects was enhanced through citation tracking and additional PubMed searches.

Results

Category	Waste Production (kg CO2e/year)	Sustainable Alternative
Procedural visits & Patient travel [7,19]	385,440,000	Teledermatology
Waste Management [19]	136,031**	Proper segregation, recycling, autoclave
Academic printed literature [20,22]	29,885 - 34,240***	Electronic format
Dermatology conference* [23,41]	408,000	Virtual setting

Table 1. Annual waste production and prevention across various dermatologic outlets, extrapolated and standardized to kg CO2e/year.
*Estimated waste produced from a theoretical, in-person dermatology conference
**Waste production was calculated using data from 25 Mohs treatment centers. This data was used to determine the waste produced per surgeon, which was then extrapolated to estimate the waste production for the 12,040 non-self-employed dermatologists in the United States
***Includes all printed JAAD copies between 2021-2022, and waste production was extrapolated from one dermatology clinic with printed JAAD journals over one year

Category	Waste Prevention (kg CO2e/year)	Sustainable Alternative
Procedural visits & Patient travel [32]	77,088,000 - 115,632,000†	Teledermatology
Waste Management [38]	17,684*	Proper segregation, recycling, autoclave
Academic printed literature [20,22]	29,876 - 34,231	Electronic format
Dermatology conference [7,19,40]	20,400	Virtual setting

Table 2. Annual waste prevention across various source categories, extrapolated and standardized to kg CO2e/year.
†Reflects current data on waste prevention due to existing solution of teledermatology visits in the United States
*Waste reduction was calculated using the percentage of clinical waste that can be prevented using sustainable practices data

Environmental Disruption	Sequelae	Dermatologic Consequences
Depletion of the Ozone Layer	Increased UV Radiation Exposure	Increased Skin Cancers of All Types
Higher Concentration of Greenhouse Gases	Rising Global Temperatures	Increased Range of Vector-Borne Diseases
Pollution	Increased Atmospheric Particulate Matter and Allergens	Exacerbation of Atopic Dermatitis, Inflammatory Dermatoses
Environmental Runoff of Pharmaceuticals Including Topicals	Pollution of Water Sources	Unknown Consequences

Table 3. Dermatologic consequences of environmental change grouped categorically.

Discussion

The medical field, including dermatology, contributes significantly to environmental changes, which in turn affect both patients and dermatological practices. Virtual formats, such as teledermatology, have proven effective in reducing carbon emissions by minimizing travel for appointments, offering an environmentally responsible solution. Additionally, the management of pharmaceutical waste, particularly from topical medications like sunscreens, has been shown to harm ecosystems. Simple interventions, like reducing medical waste incineration and optimizing recycling, can mitigate environmental impacts. Climate change exacerbates dermatologic conditions, highlighting the need for sustainable healthcare practices and policies, such as waste management and telemedicine, to combat these challenges. Future efforts should focus on innovative waste management, telemedicine's long-term impact, and education on sustainability.

References & Disclosures

1. Vanaria, RJ; Bhupalam, V; Marrero-Perez, A; Chaudry A; Awad, N; Nestor, MS. Environmental Impact and Sustainability Associated with the Practice of Dermatology. Submitted: Journal of Clinical and Aesthetic Dermatology (Aug 2024).

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