

Cluster Subcutaneous Allergen Immunotherapy as a Sustainable Practice Towards Net Zero Healthcare

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To the Editor,

As the health care sector accounts for approximately 5% of global greenhouse-gases (GHG) emissions, several health systems are calling for adoption of transparent and standardized metrics for GHG accounting, paving the way towards net zero healthcare [1]. Although allergen immunotherapy (AIT) has been proposed as a prototype of individualized medicine in terms of clinical response and safety for allergic disease, commuting to medical facilities and lengthy build-up schedules have been described as limiting factors to treatment compliance among subjects on subcutaneous immunotherapy (SCIT) [2]. Cluster AIT schedules are variations of conventional AIT regimes, in which the timeframe from induction to maintenance phase is much shorter compared to conventional AIT [3]. Hence, we assessed the contribution of a SCIT cluster scheduled intervention in the reduction of the carbon footprint in subjects starting SCIT.

In this single-center retrospective analysis, sociodemographic data, clinical profile, the SCIT dosing schedule and the number of required physical visits, and road travelled distance to our Institution during the build-up phase of SCIT was collected from patients' electronic medical records (EMRs) from November 2021 to January 2022. Following routine clinical practise, only subjects with a confirmed Allergist SCIT-prescription, following a positive skin prick test and/or a specific IgE (sIgE) to a corresponding panel of standardized aeroallergen were included [4]. The investigation was approved by the local Ethical Committee (institutional code CHUC 2022-13, on 2022, February 24th).

A total of 710 doses of SCIT were administered in 145 patients during the 12-week study period (Table 1S). All subjects successfully completed a SCIT cluster protocol, including the administration of 2 injections at a 30-minute interval in weekly visits to reach the maintenance dose in 1 to 4 weeks. A total of 97 out of 145 subjects (66.8%) completed a cluster SCIT schedule with allergoids (adsorbed to aluminum hydroxide or L-tyrosine and Glutaraldehyde-modified extracts), while 48 patients (33.2%) followed a SCIT cluster regime with solely adsorbed to aluminum hydroxide extracts. Regarding the composition of the prescribed SCIT, the combination of House Dust Mites (HDM) was most frequently prescribed in 64 out of 145 patients (44.13%), followed by HDM and *Blomia tropicalis* in 50 subjects (34.48%). The mean number of required physical visits per patient following a cluster schedule was significantly (<0.001) reduced compared to a conventional SCIT regime. The overall road travelled distance was 16,613 km for all 145 subjects completing a cluster SCIT schedule, in contrast to a total of 31,808 km following a conventional SCIT regime. In addition, the estimated annual carbon footprint for the cluster schedule was 8,960 kg Co₂e with a potential reduction of 8,204 kg Co₂e related to a conventional SCIT regime (Figure 1) [5]. Ten adverse events (AE) related to the cluster SCIT schedule were reported in 6 out of 145 patients (4.13%), increasing the mean (SD) number of outpatients extra-visits to the Allergen Immunotherapy Unit (AIU) by 1.5 ± 1.2 times to reach the cluster SCIT maintenance dose. Nine out these 10 AEs were described as mild non-immediate local reactions after subcutaneous injection. The remaining AE was considered a Grade-II late moderate reaction, successfully treated at home with the regular patient's medication after a telephone consultation to the AIU [6].

To our knowledge, this is the first study to investigate the contribution of a cluster SCIT schedule in the reduction of the carbon footprint related to scope 1 emissions as a part of our shared responsibility to decarbonize (Figure 2). Health care professionals are called to participate and implement sustainable medical practice principles to routinely clinical practice. Cluster allergen SCIT may contribute to reduce direct emissions from healthcare facilities to achieve carbon neutrality.

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Figure 1: A) Contribution of cluster and conventional allergen immunotherapy schedules to partial (CO₂, CH₄, and NO₂) and total (CO₂e) carbon footprint emissions from 2021 November to 2022 January. B) Annual CO₂e of cluster and conventional allergen immunotherapy schedules. Asterisks indicate statistical significance (**** $p < 0.001$).

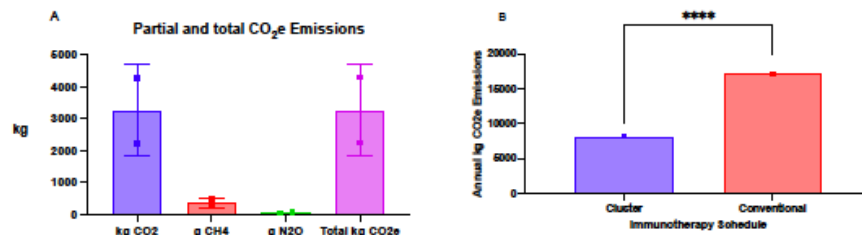
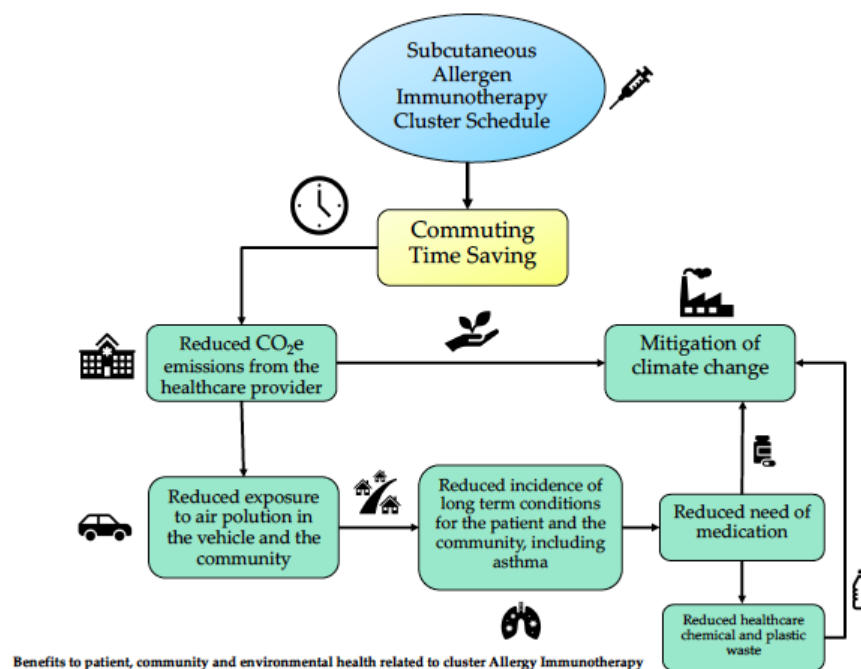


Figure 2: Potential benefits to patient, community and environmental health related to cluster scheduled subcutaneous immunotherapy



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Table 1S NET ZERO Allergy 2023.docx available at <https://authorea.com/users/587064/articles/626437-cluster-subcutaneous-allergen-immunotherapy-as-a-sustainable-practice-towards-net-zero-healthcare>