Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard

Adverse events should also be reported to Orion Pharma (UK) Ltd on 01635 520300

Prescribing information is available in this meeting.

Role of disease control on carbon footprint of asthma and COPD care

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Tampere University and
Tampere University Hospital

Finland

EASYH-2241 4/2022

Conflicts of interest

- **Current positions**
  - Professor, Tampere University
  - Consultant, Allergy Centre, Tampere University Hospital

- **Fees from industry**
  - Fees for lectures or advisory board meetings, Costs for attending congresses or meetings: ALK, AstraZeneca, Boehringer-Ingelheim, Chiesi, Circassia, GSK, Mundipharma, Novartis, Orion Pharma, Sanofi, Teva

Much lower carbon footprint of DPI or soft mist inhaler in comparison to pMDI

Inhaler	Type	Carbon footprint per dose (gCO_2e)
DPI (general MCTOC estimate)[1]	DPI	<20
pMDI (general MCTOC estimate)[1]	pMDI	200-300
Buventol Easyhaler[2] (salbutamol)	DPI	3.1
Bufomix Easyhaler[2] (budesonide, formoterol)	DPI	4.0
Formoterol Easyhlaer[2] (formoterol)	DPI	4.3
Budesonide Easyhaler[2] (budesonide)	DPI	3.3
Beclomethasone Easyhaler[2] (beclomethasone)	DPI	3.1
Salflumix Easyhaler[2] (salmeterol, fluticasone propionate)	DPI	9.5
Relvar Ellipta[3] (vilanterol, fluticasone furoate)	DPI	25.5
Seretide Diskus[3] (salmeterol, fluticasone propionate)	DPI	20.9
Seretide Evohaler[3] (salmeterol, fluticasone propionate)	pMDI	229.5
Spiriva Respimat[4] (tiotropium)	SMI	12.9
Berodual Respimat[4] (ipratoripum, fenoterol)	SMI	6.5
Berodual[4] (ipratoripum, fenoterol)	pMDI	82.4
Atrovent[4] (ipratoripum)	pMDI	72.9
Foster Nexthaler[5] (beclomethasone, formoterol)	DPI	7.6
Clenil[5] (beclomethasone)	pMDI	83.1
Foster[5] (beclomethasone, formoterol)	pMDI	94.4
Trimbow[5] (beclomethasone, formoterol, glycopyrronium)	pMDI	119.0

Vartiainen et al, unpublished review of data based on:

1. Benedick. Montreal Protocol on Substances that Deplete the Ozone Layer Medical and Chemical Technical Options Committee. 2018 Assess. Rep. (2018) doi:10.1163/15718069620847781.
2. Carbon Footprint Ltd. Product Footprint Executive Summary for Orion Pharma. (2021).
3. Carbon Trust Ltd. Product Carbon Footprint Certification Summary Report. (2014).
4. Hänsel, M., Bambach, T. & Wachtel, H. Reduced Environmental Impact of the Reusable Respimat® Soft MistTM Inhaler Compared with Pressurised Metered-Dose Inhalers. Adv. Ther. 36, 2487–2492 (2019).
5. Panigone, S. et al. Environmental impact of inhalers for respiratory diseases: decreasing the carbon footprint while preserving patient-tailored treatment. BMJ Open Respir. Res. 7, e000571 (2020)

Carbon footprint of one year treatment with different inhalers

Drug	DPI or SMI (kg CO_2e)	pMDI (kg CO_2e)
ICS budesonide 200µg x2	2.4 (Budesonide Easyhaler®)	219 (MCTOC†)
ICS beclomethasone 200µg x2	2.2 (Beclomethasone Easyhaler®)	60 (Clenil®)
LABA/ICS Budesonide/formoterol 320/9 x2	2.9 (Easyhaler®)	219 (MCTOC†)
LABA/ICS Beclomethasone/formoterol	2.8 (Foster NEXThaler®)	69 (Foster®)
LABA/ICS salmeterol/fluticasone x2	7.0 (Salflumix Easyhaler®)- 14.6 (Seretide Diskus®)	510 (Seretide Evohaler®)
LAMA 1 canister/month	9.3 (Spiriva Respimat®**)	
ICS/LAMA/LABA 1 canister/month		119 (Trimbow®)
SABA twice a week*	0.3 (Buventol Easyhaler®)	31 (MCTOC†)
SABA 3x200 /year*	1.9 (Buventol Easyhaler®)	90 (MCTOC†)
SABA 200 /month*	7.4 (Buventol Easyhaler®)	360 (MCTOC†)
SAMA 1 canister/month		204 (Atrovent®)

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1. Benedick. Montreal Protocol on Substances that Deplete the Ozone Layer Medical and Chemical Technical Options Committee. 2018 Assess. Rep. (2018) doi:10.1163/15718069620847781.
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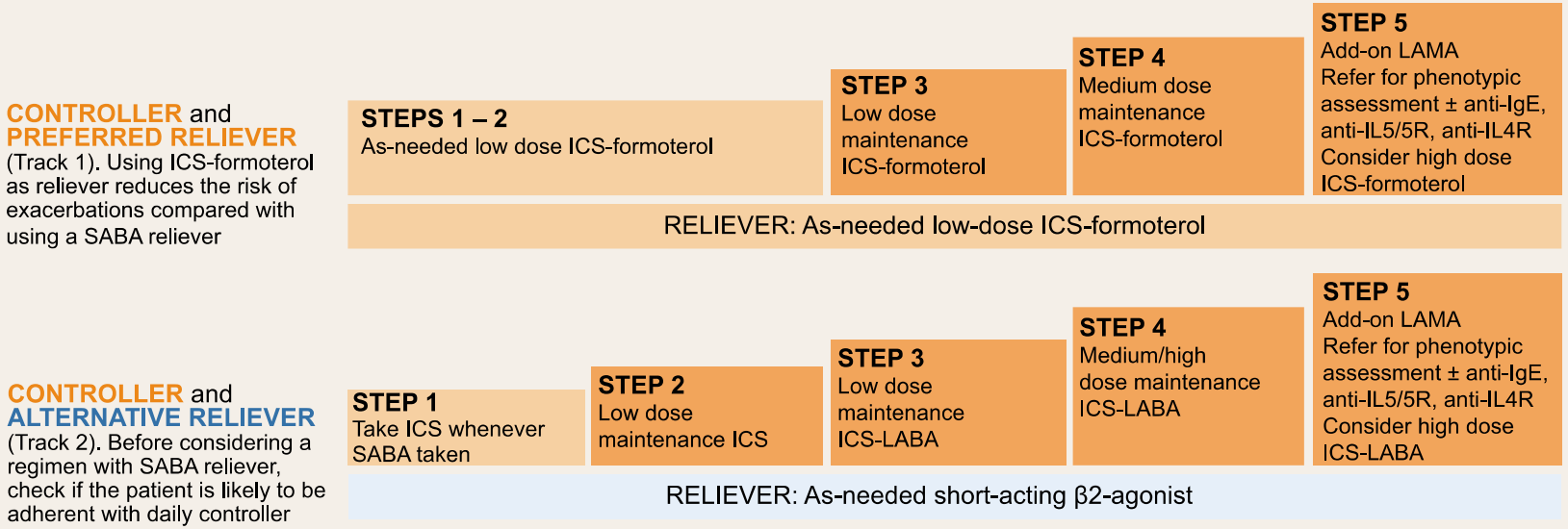
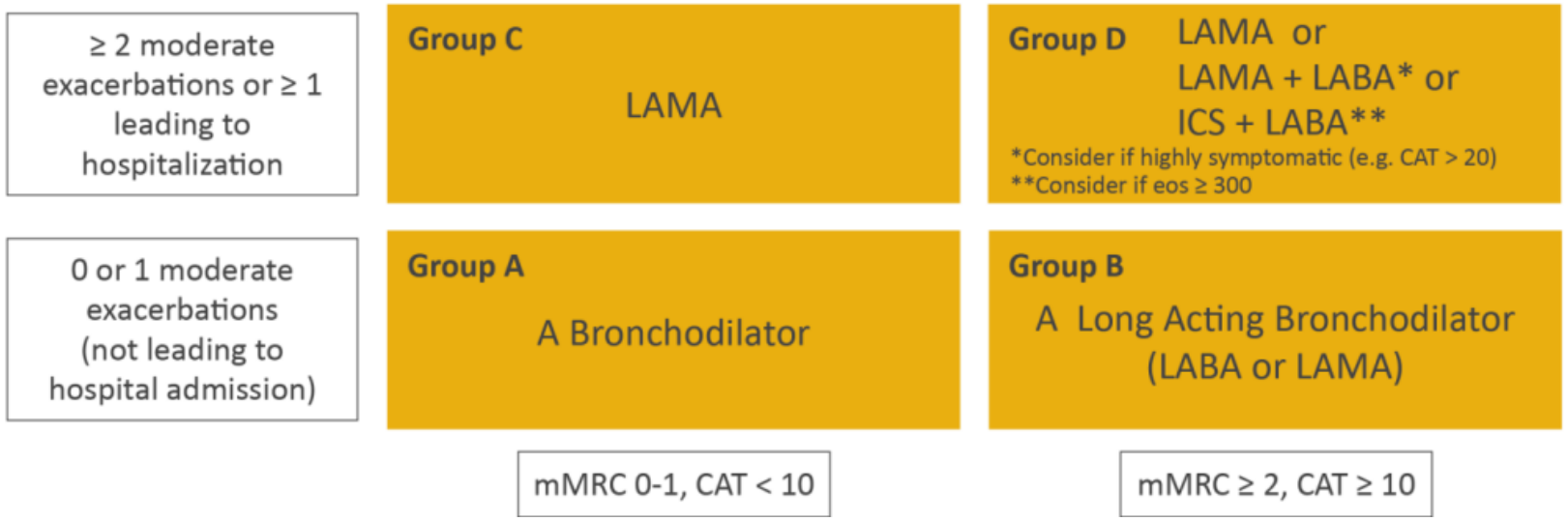
Stepwise treatment of asthma and COPD -maintenance inhalers and relievers





www.ginasthma.org
www.goldcopd.org

On GINA step 2, the type of the inhaler, not the treatment strategy, makes the difference

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

As-Needed Budesonide–Formoterol versus Maintenance Budesonide in Mild Asthma

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- As-needed Budesonide-Formoterol: 0.52 inhalation per day

- Budesonide 200µg twice daily: 1.3 inhalations per day
- As-needed SABA: 0.49 inhalation per day

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Annual carbon footprint (kg CO_2e)

DPI	pMDI
0,8	57
1,6	142
0,6	54

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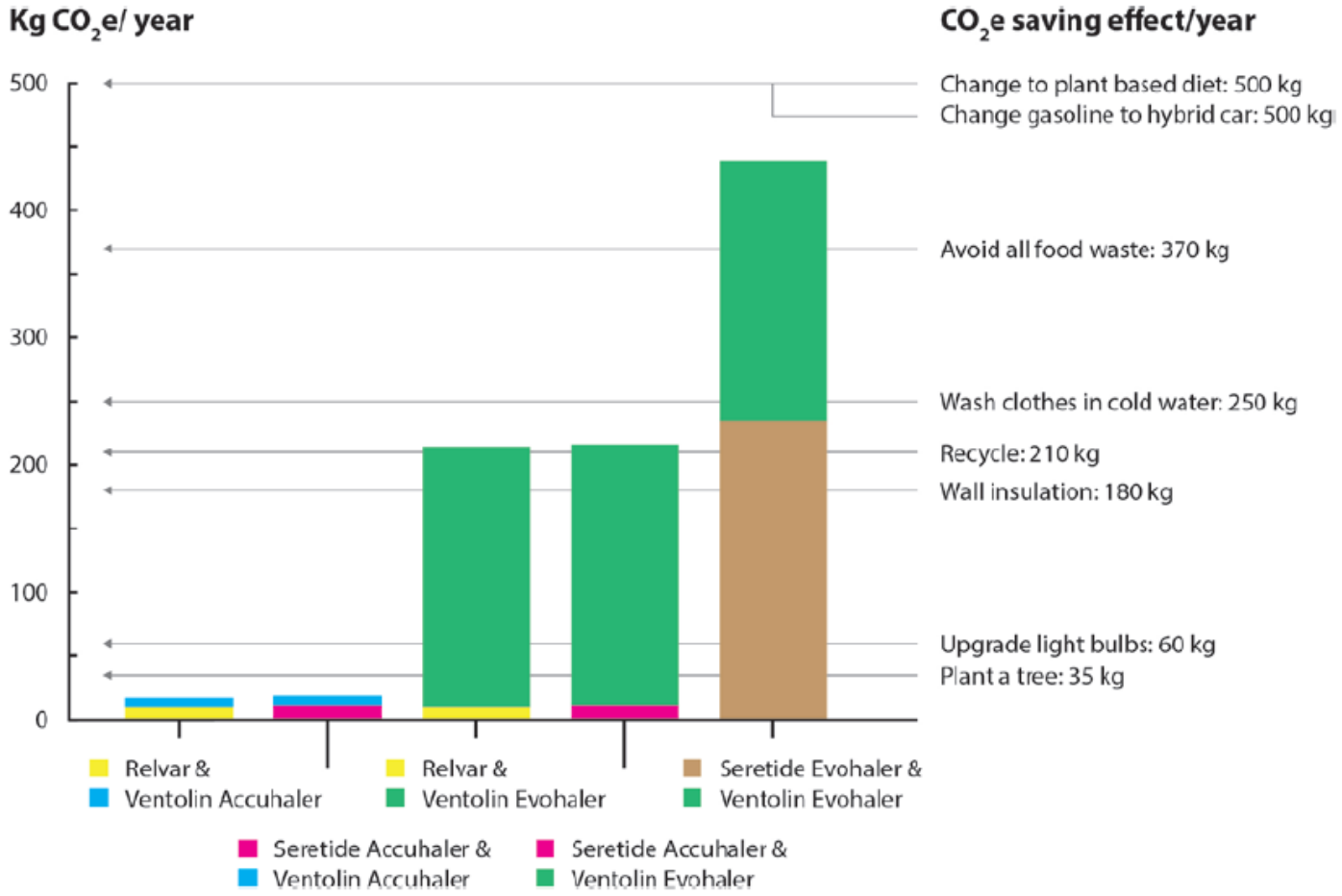
Putting it all into perspective – the difference between using pMDI and DPI on individual level



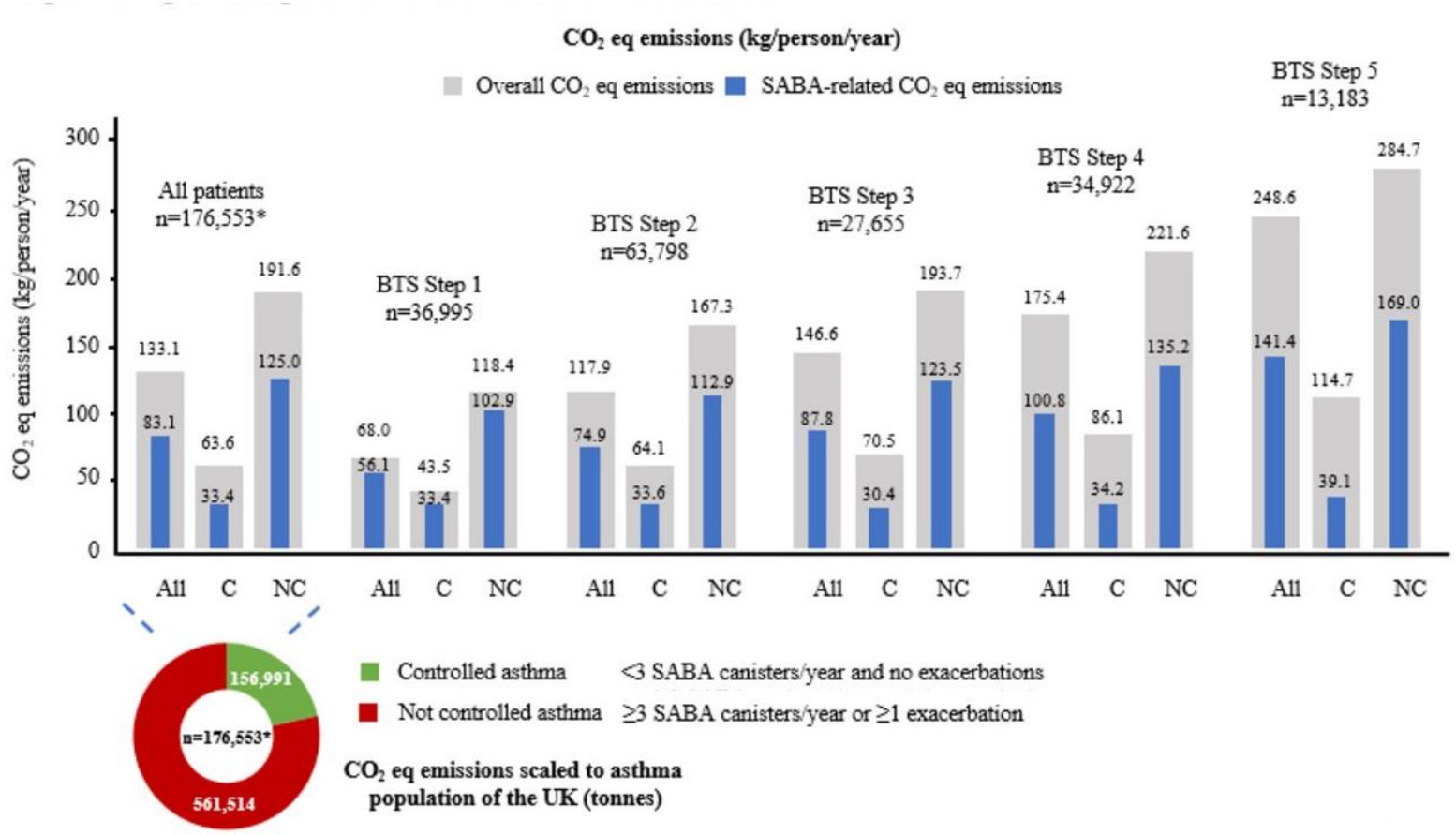
Janson C et al., *Thorax* 2020;75:82–84.

Carbon footprint of a day at hospital / intensive care

- 45 kg CO_2e per day at acute care unit
- 88 – 178 kg CO_2e per day at intensive care (for septic shock)

McGain et al, *Crit Care Resusc*. 2018;20(4):304-312.
Prasad et al, *The International Journal of Life Cycle Assessment*. 2022;27:38–49.

Relation between asthma control and carbon footprint at different treatment steps



Wilkinson et al., *Eur Resp J* 2021 58: OA76;
DOI: 10.1183/13993003.congress-2021.OA76

Summary

- Huge difference in the carbon footprint between DPI (or SMI) and pMDI
  - Note that also as-needed SABA makes a big difference if taken from pMDI
- Worse asthma control associated to higher carbon footprint at every treatment step
- Main aim is the well-being of the patient
  - Exacerbations and hospitalizations are worse case scenarios for both the patient and the environment