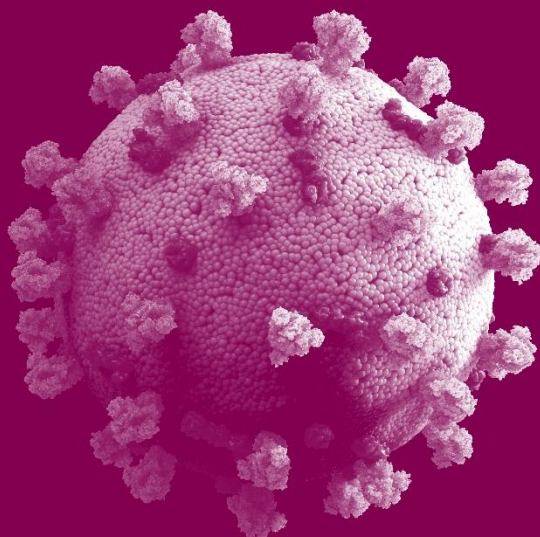


Environmental Impact of the Care Pathway for Seasonal Influenza

Care Pathway Case Study



AstraZeneca 



**Sustainable
Healthcare
Coalition**

Environmental Impact of the Care Pathway for Seasonal Influenza

Title	Care Pathway for Seasonal Influenza
Organisation	AstraZeneca
Company website	www.astrazeneca.com
Contact details	Nigel Budgen (Nigel.Budgen@astrazeneca.com)
Completion date	November 2022
Assurance	Internal assurance
Supporting information	Internal LCA and Care Pathway Assessment Reports
Conformance with Care Pathways: Guidance on Appraising Sustainability ¹	Adheres to the principles of the Guidance
Care pathway description	Care Pathway for Seasonal Influenza
Environmental issues appraised	Global warming potential (IPCC, CO ₂ eq, 100-year)

Globally, it is recognised that health and care systems are undergoing transformative change to adapt to the needs of patients and communities, with increasing pressure to be financially, socially and environmentally sustainable. Appraising the sustainability of care pathways is seen as a crucial step to enabling a more sustainable health system¹.

Conclusions

This study estimates the greenhouse gas (GHG) emissions associated with the management of seasonal influenza, hereon referred to as flu. The results show that the average seasonal flu case in the UK has a global warming impact of 22.1 kg CO₂ eq, based on data for the 2017–18 and 2019–20 flu seasons. This compares with a global warming impact of 1.52 kg CO₂ eq per flu vaccination. Thus, from a carbon perspective, each vaccine needs to prevent 0.069 flu cases to balance the GHG impact, i.e. 14.5 vaccines administered has an equivalent carbon footprint to treatment of one case of influenza, either directly or indirectly. Reducing the impact of seasonal flu results from prevention, resulting in a decreased incidence in disease in the general population, leading to fewer primary and secondary care interventions. These trends directly affect the environmental impact associated with flu management and are important steps towards a more sustainable treatment paradigm for this debilitating disease.

Learnings

This study has demonstrated the value of appraising the sustainability of care pathways. The assessment has identified the environmental hotspots in the care of a patient with flu and how they are affected by treatments. The impact estimated in this study is based on published data relating to care activities that arise per average flu case. Some of the environmental impact values are estimated from literature which introduces a degree of uncertainty with the final absolute footprint value given here. A more in-depth assessment of all the standard procedures that are specifically deployed to control seasonal flu, especially during healthcare interventions, would be needed to provide a definitive measure of the absolute values. The use of further studies to confirm the key findings provided are therefore advocated.

The use of vaccination to restrict disease incidence, especially in the vulnerable, improves health outcomes and the need for health care interventions. These are steps towards a more sustainable approach to control the disease.

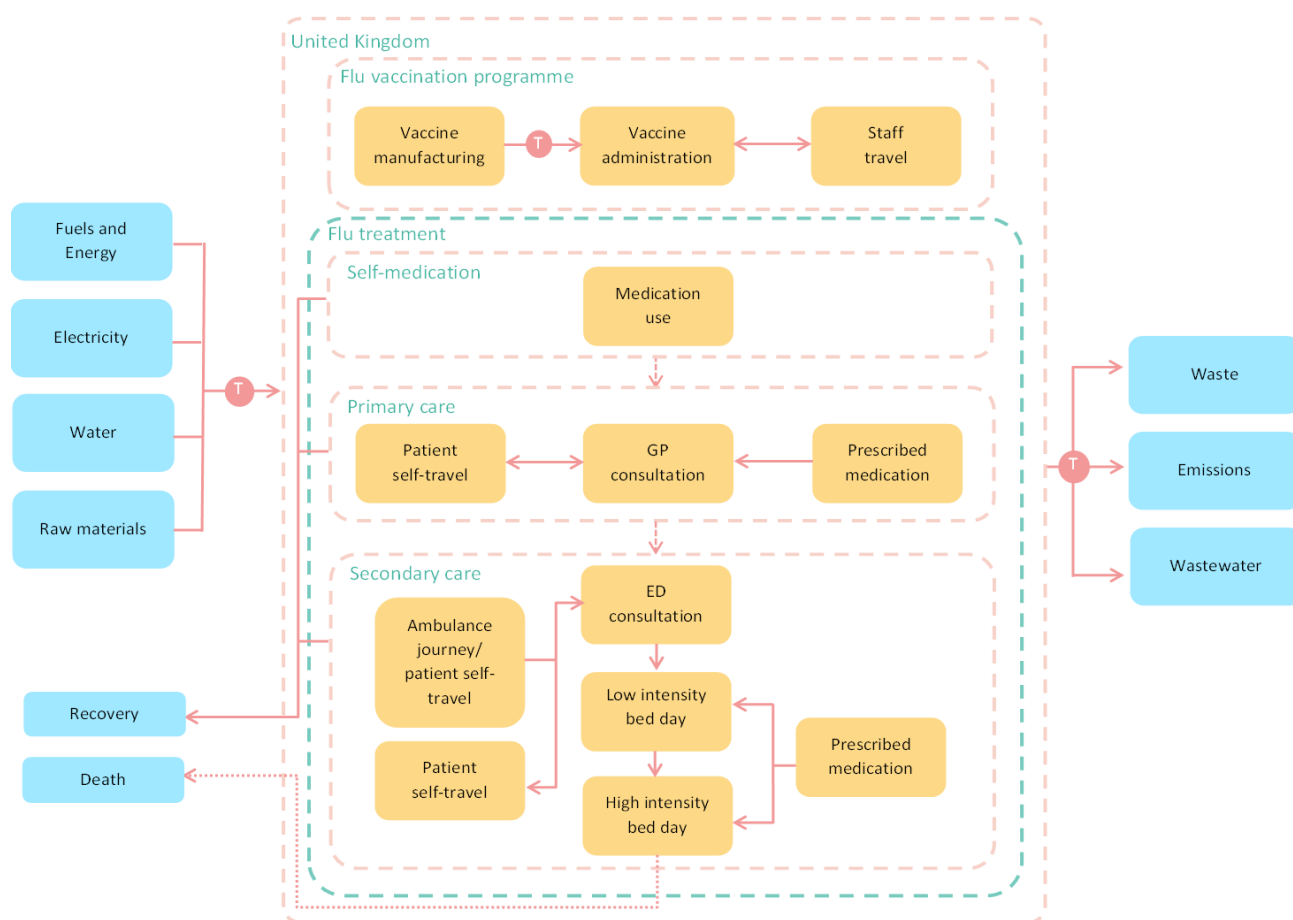
¹ <https://shcoalition.org/sustainable-care-pathways-guidance/>

Scope

This appraisal addresses the environmental impact of a vaccination programme per patient and contrasts this with the impact of a seasonal flu case in the UK. The unit of analysis for this appraisal is: “the care of a patient with flu of any age in the UK”

Flu vaccinations are used to prevent the catching and spreading of flu, and to reduce the cases and severity of flu in the population, which in turn reduce the burden on healthcare services. A care pathway assessment was conducted to determine the impacts of a flu case.

GHG emissions have been considered in this appraisal by using the approach and impact factors set out in the “Care Pathways: Guidance on Appraising Sustainability” guidance document⁴. The diagram below sets out the flu vaccine care pathway and flu case care pathway activities included. Adverse reactions to the flu vaccine were insignificant and not included.



Data

The treatment of a flu case has been determined using secondary data in the literature, supplemented by estimates and assumptions. The incidence of flu per 100,000 people in the UK were determined for the 2017–18 and 2019–20 flu seasons. Primary and secondary care interventions in a flu season were estimated from literature.^{2,3,4,5,6,7,8,9} A table summarising the data is shown on page 4.

² <https://www.rcgp.org.uk/clinical-and-research/our-programmes/research-and-surveillance-centre/public-health-data.aspx>

³ <https://digital.nhs.uk/data-and-information/publications/statistical/practice-level-prescribing-data/>

⁴ <https://www.england.nhs.uk/statistics/statistical-work-areas/ae-waiting-times-and-activity/>

⁵ <https://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/>

⁶ <https://www.gov.uk/government/statistics/annual-flu-reports>

⁷ <https://www.gov.uk/government/collections/syndromic-surveillance-systems-and-analyses>

⁸ <https://www.nice.org.uk/guidance/ng139/documents/draft-guideline>

⁹ <https://www.statista.com/statistics/1074497/mean-length-of-inpatient-stay-in-us-hospitals-due-to-influenza>

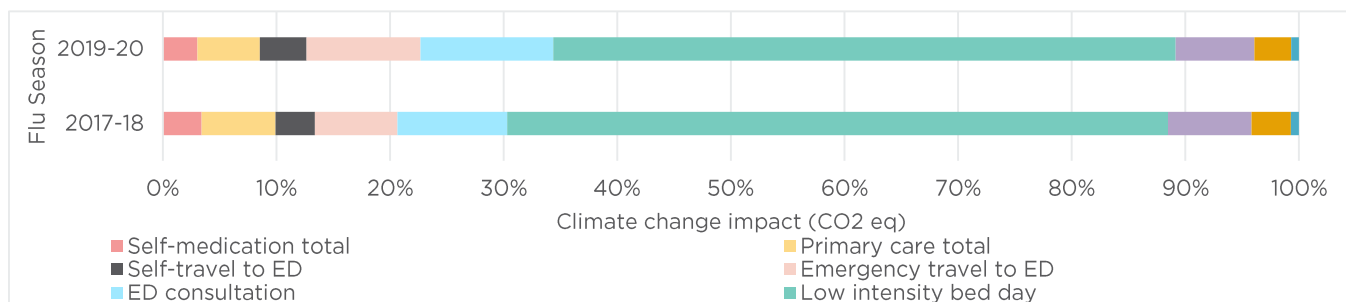
Results

The results show that the average flu case for the 2017–18 and 2019–20 flu seasons has a global warming impact of 22.1 kg CO₂ eq. Despite the 2017–18 flu season being a worse flu season (i.e. by having almost double the frequency of cases than the 2019–20), an average flu case for both years is estimated to have a similar global warming impact (20.8–23.5 kg CO₂ eq). The 2017–18 flu season had double the frequency of cases per 100,000 than the 2019–20 season, which results in almost double the total global warming impact for the UK (25,200 vs 14,400 tonnes CO₂ eq). The breakdown of the results is shown in the graph below.

Category	Sub-category	Amount per case (2017–18 flu season)	Amount per case (2019–20 flu season)	Unit
Self-medication	Paracetamol	10.4	10.4	tablets
	Ibuprofen	1.49	1.49	tablets
	Aspirin	0.88	0.88	tablets
Primary care	Self-travel to GP	0.60	0.57	one-way journeys
	GP consultation	0.30	0.29	consultations
	Analgesics	3.03	2.90	tablets
	Mucolytics	0.08	0.08	dose (5 ml of syrup)
	Amoxicillins	3.42	3.28	tablets
	SABAs	0.11	0.10	inhaler/nebuliser dose
	Self-travel to ED	0.25	0.33	one-way journeys
Secondary care	Emergency travel to ED	0.04	0.07	one-way journeys
	ED consultation	0.15	0.20	consultations
	Low intensity ward visits	0.32	0.34	days
	High intensity ward visits	0.02	0.02	days
	Antibiotic doses prescribed to low intensity wards	0.80	0.85	doses
	Antibiotic doses prescribed to high intensity wards	0.05	0.05	doses
	Self-travel to ED	0.25	0.33	one-way journeys

The vaccination programme in the UK is used to prevent infection caused by flu and reduce transmission. 3,169,150 children between the ages of 2 and 11 were vaccinated against flu in the 2019–20 season in England and Scotland¹⁰. In an LCA completed by AstraZeneca in 2021, the flu vaccine was shown to have a global warming impact of 1.52 kg CO₂ eq per dose administered. The 2019–20 flu vaccination programme in England and Scotland therefore had an estimated global warming impact of 4,817 tonnes CO₂ eq. Using the results above for the average impact of a flu case (22.1 kg CO₂ eq), to break even from a carbon perspective, each flu vaccine needs to prevent 0.069 flu cases (from an average of both flu seasons), i.e. 14.5 vaccines administered has an equivalent carbon footprint to treatment of one case of flu.

Each flu season varies in severity and incidence as new strains emerge. Vaccination effectiveness also varies from season to season. Therefore, the GHG impact from seasonal flu and the associated vaccination program will also vary. This assessment provides an assessment for the 2017–18 and 2019–20 flu seasons, described as seasons of low rates for influenza-like illness.



Acknowledgements

This document has been developed collaboratively through the Sustainable Healthcare Coalition, which comprises a range of organisations within the healthcare sector including pharmaceutical and medical device companies, trade bodies, procurement, government organisations and other stakeholders. The Sustainable Healthcare Coalition operates with the aim of facilitating the journey towards good health and wellbeing on a finite planet, through open-minded collaboration across public and private healthcare.

Disclaimer: This case study has been prepared by ERM on behalf of the Sustainable Healthcare Coalition, of which AstraZeneca is a member. AstraZeneca has provided the data and input into the studies referenced in this report and does not guarantee the reported outcomes.

¹⁰ Total amount in Wales and Northern Ireland are not reported. Reference: "Surveillance of influenza and other respiratory viruses in the UK Winter 2019 to 2020" <https://www.gov.uk/government/statistics/annual-flu-reports>