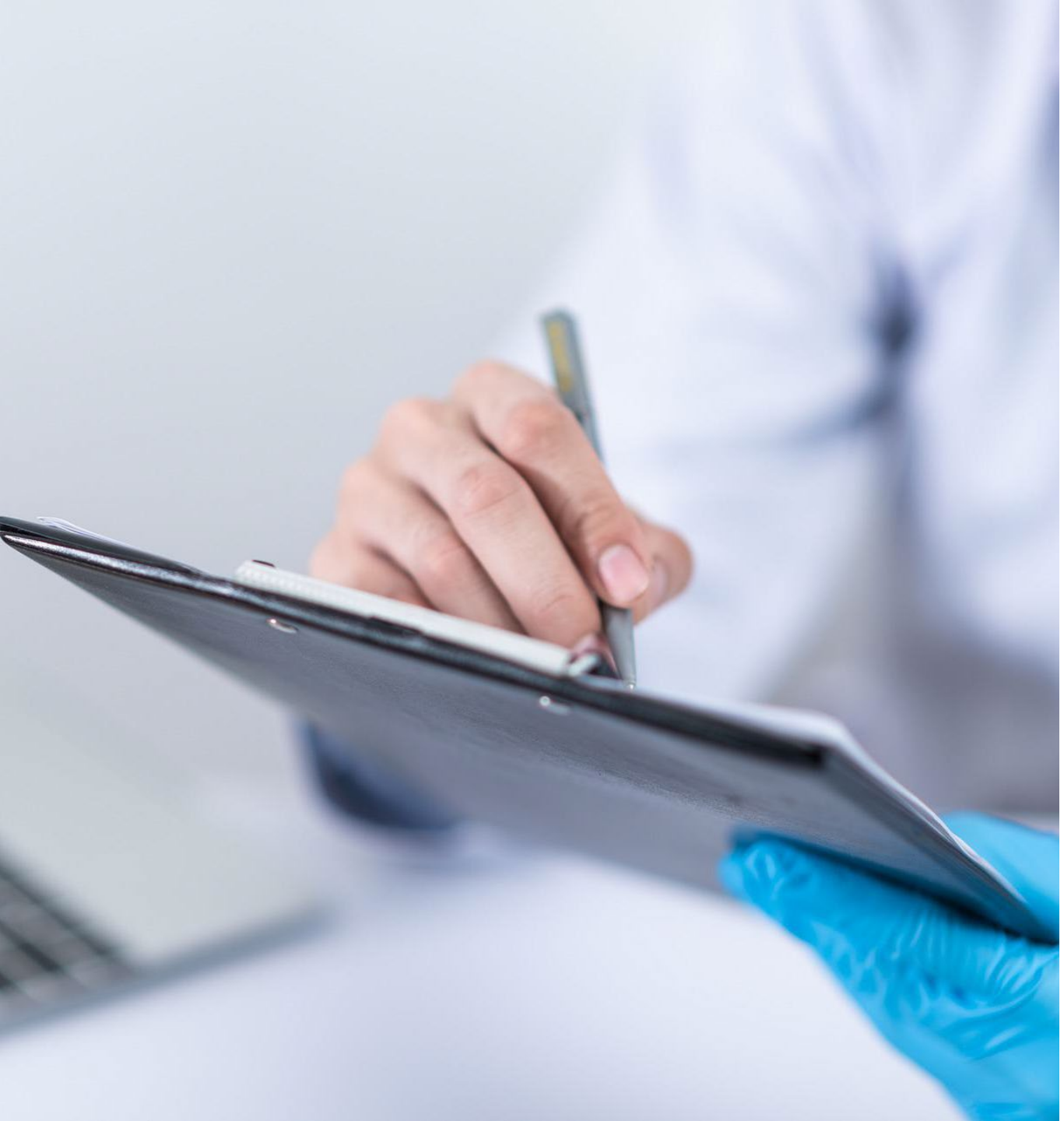


Applying LCA to Healthcare: the Care Pathway Approach

Rodrigo Alvarenga

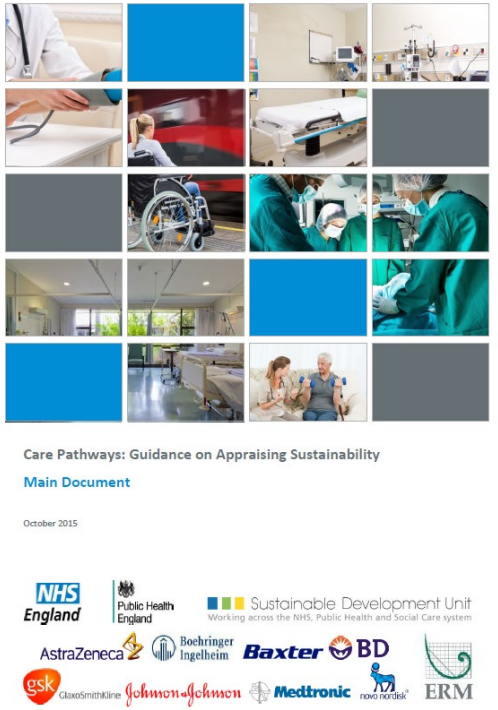
15 September 2022

The business of sustainability

ERM

Care Pathways: Guidance on Appraising Sustainability

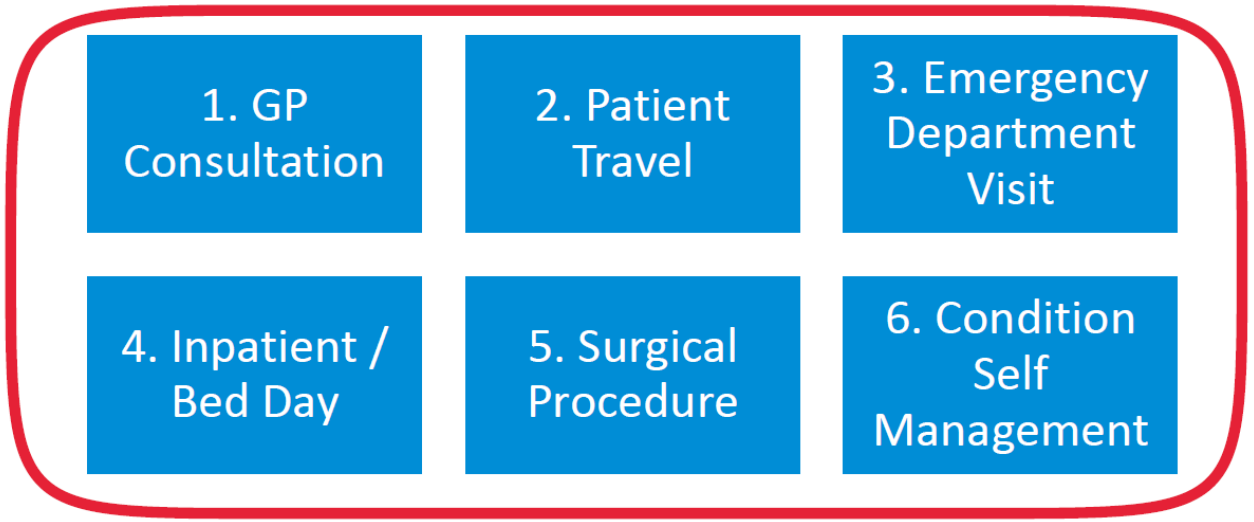
- LCA (of a single product) provides valuable information (eg identification of hotspots). However, comparison with a benchmark (ie *comparative LCA*) can be challenging:
  - With what is this new product to be compared?
  - In addition to its health benefits, how much environmental burden is it incurring/avoiding, when compared to the alternative/baseline?
- Guidance developed in 2015, by the *Sustainable Healthcare Coalition* (SHC)[1], in partnership with England's *National Health Service* (NHS) and *other parties*;
- Provides guidance on how consistently to evaluate the environmental impacts of care pathways (document is available at: https://shcoalition.org/)



[1] previously the *Coalition for Sustainable Pharmaceuticals and Medical Devices* (CSPM)

Care Pathways: Guidance on Appraising Sustainability

- What is a *care pathway*?
  - *A complex intervention for the mutual decision-making and organisation of care processes for a well-defined group of patients during a well-defined period*
- Comprised of a series of care pathway **modules**



Source: Care Pathways: Guidance on Appraising Sustainability. Main Document. October 2015.

Care Pathways: Guidance on Appraising Sustainability

- The care pathway modules are intended to be additive and can be combined logically to construct a complete care pathway, for example as shown below

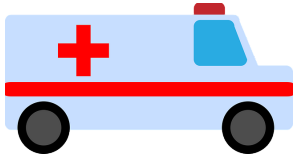
Source: Care Pathways: Guidance on Appraising Sustainability. Main Document. October 2015.

- This approach allows the impact of care pathway scenarios to be quantified (eg including a new drug product to compare with an alternative)
- Indicators: GHG emissions; water use; and waste generated
  - However, new indicators are also possible (and recommended)

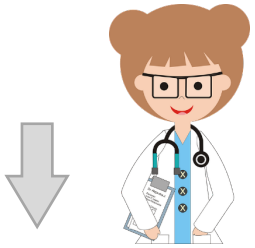
Care Pathways: Guidance on Appraising Sustainability

Illustrative example

Care pathway #1



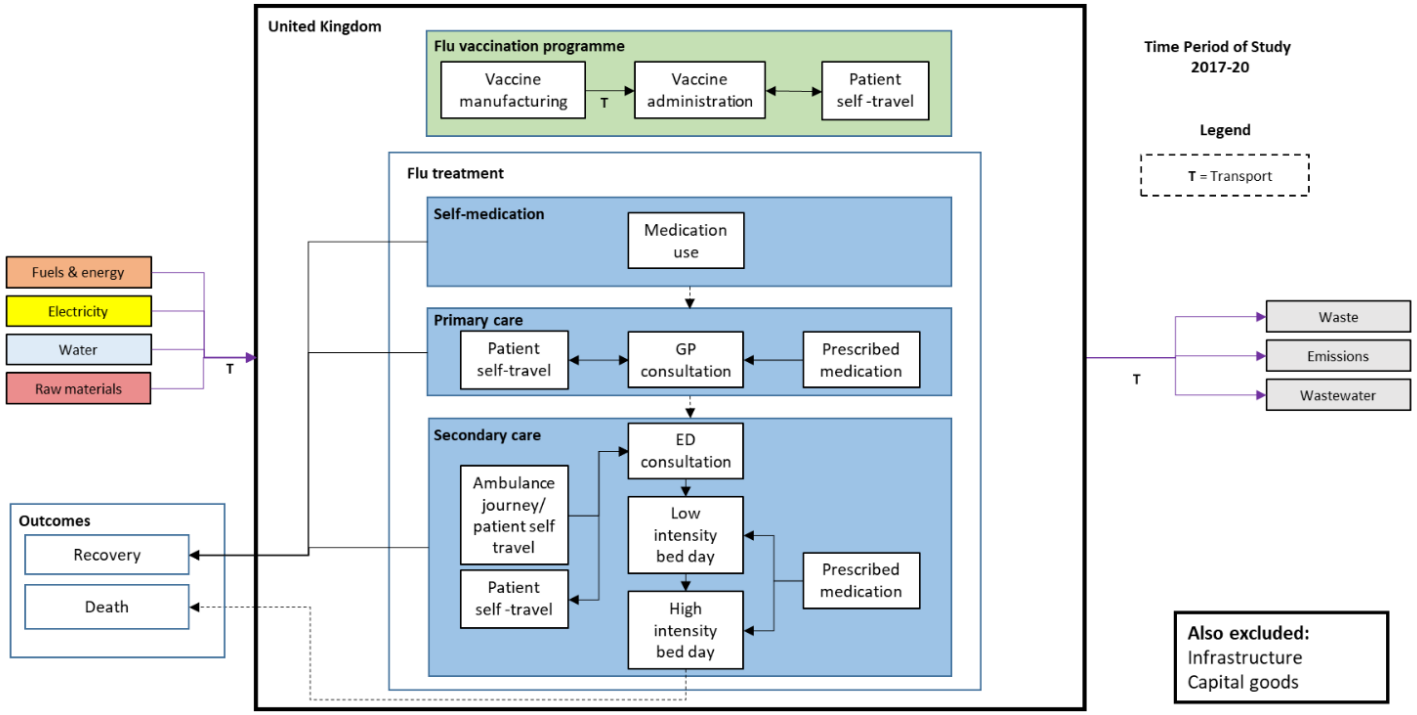
Care pathway #2



Case Study Examples

Flu vaccine case study

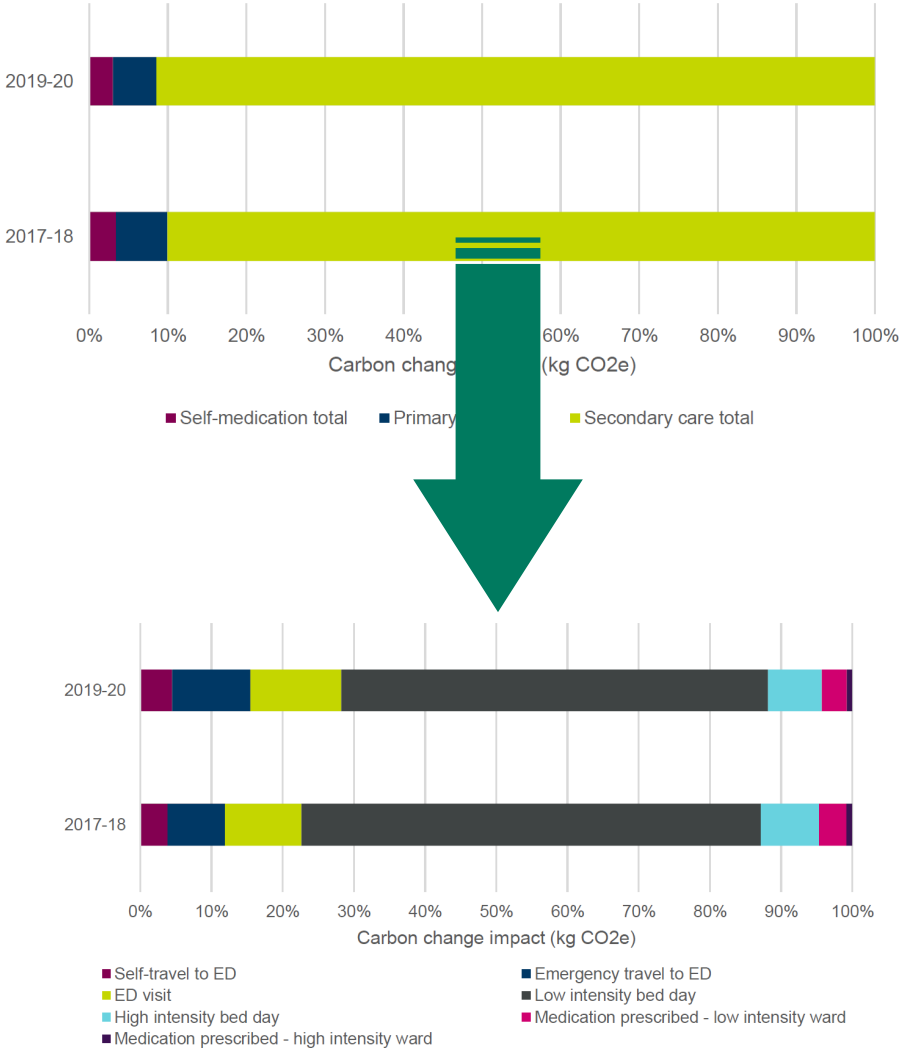
- A vaccine to prevent cases of influenza
- **Comparison:** flu vaccination programme vs flu treatment
  - Statistics describing two flu seasons (2017-2018 and 2019-2020)



Full study and results not in the public domain

Flu vaccine case study

- Using flu cases from publicly available data (eg 1821 cases per 100k people in UK) & secondary data for emission factors
- The climate change impact of a flu case is **22.1 kgCO_2eq** (the average over the two flu seasons)
- The flu vaccine = **1.52 kgCO_2eq** per dose adminstered
  - To break even (from a carbon footprint perspective), each flu vaccine needs to prevent 0.07 flu cases; or 14.5 vaccinations to prevent a single case



Full study and results not in the public domain

CKD case study

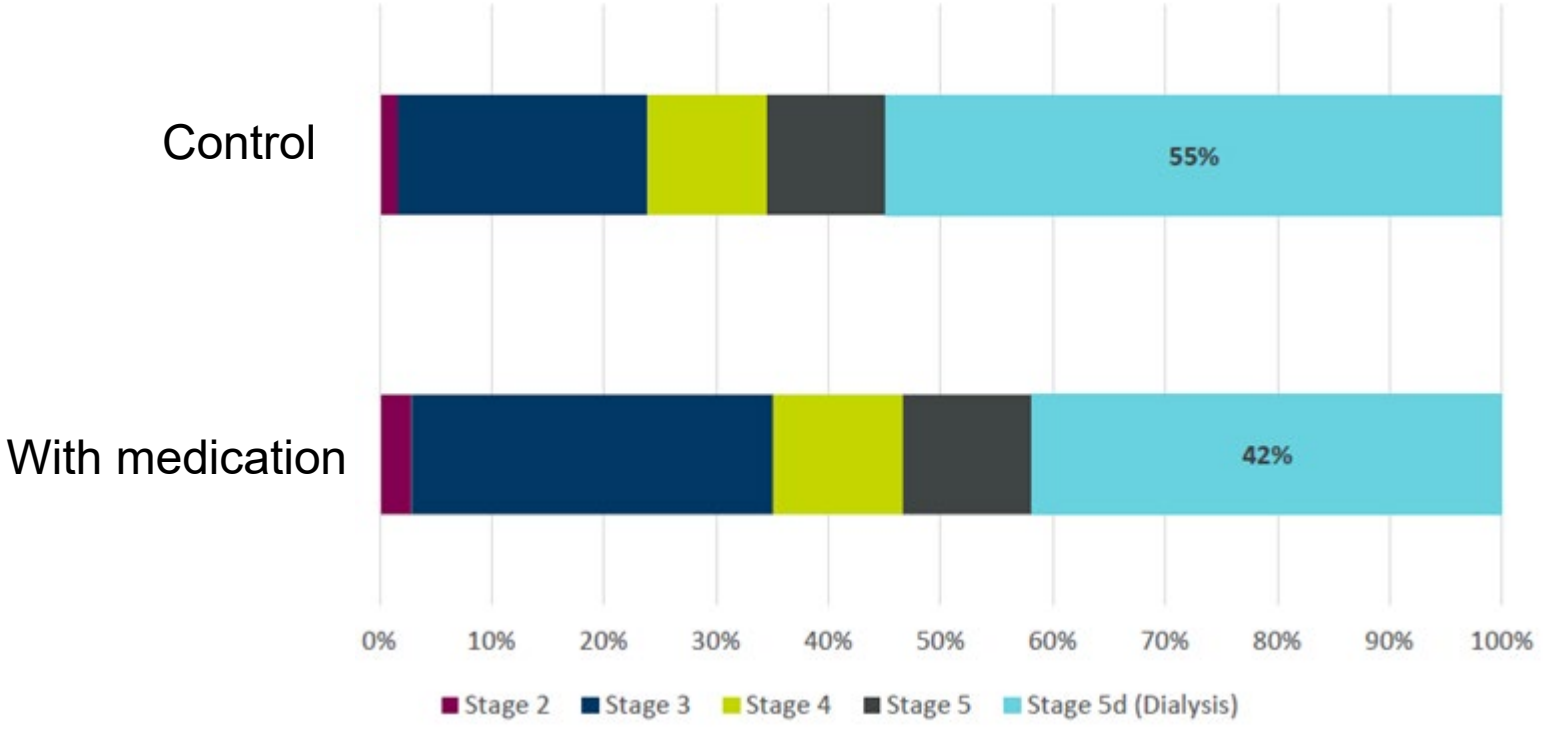
- Chronic kidney disease (CKD) is a disease that causes progressive extensive damange to patients' kidneys over prolonged period of time
- The progression of CKD in patients is measured by different stages
  - Stage 1 (eGFR >90 ml/min/1.73m^3)
  - Stage 2 (eGFR 90 - 60 ml/min/1.73m^3)
  - Stage 3 (eGFR 60 - 30 ml/min/1.73m^3)
  - Stage 4 (eGFR 30 - 15 ml/min/1.73m^3)
  - Stage 5 (eGFR <15 ml/min/1.73m^3)
  - Stage 5d (eGFR <15 ml/min/1.73m^3, with dialysis treatment required)
- Certain pharmaceuticals can be prescribed with the objective of maintaining eGFR* and delaying the progression of patients' CKD.

* eGFR: estimated glomerular filtration rate

Full study and results not in the public domain

CKD case study

- Using data from a clinical trial, the difference in patient progression in stages over a period of 2.4 years, with and without medication, was used to quantify two care pathways



Average impact per patient day, percentage contribution by CKD stage

Full study and results not in the public domain

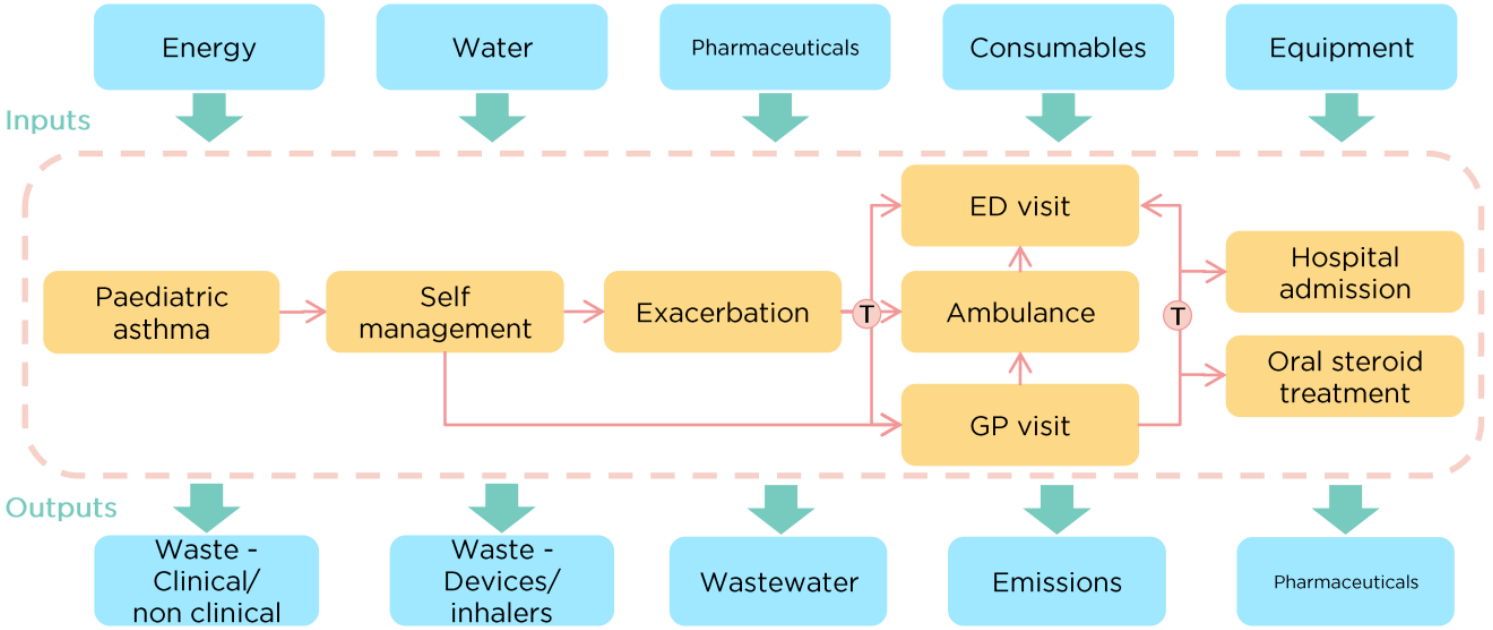
CKD case study

- The average impact per patient.day is 0.392 $kgCO_2eq$
- This can be reduced to 0.355 $kgCO_2eq$ when the medication is pescribed (ie an impact that is 9% lower)
  - This is a net benefit that accounts for the environmental impact of the medication
- The impact of dialysis is much higher than that of the other stages' modules.
- As a result, avoiding or delaying patients progressing to Stage 5d accrues more benefit in terms of avoided climate change impacts than the burdens associated with medication manufacture

Full study and results not in the public domain

Adherence in Poorly Controlled Paediatric Asthma

- Environmental impacts of *poor control* and *improved control* of paediatric asthma by use of intelligent digitally connected dry powder inhalers (DPI) [Smartinhalers™]
- Functional unit = the annual management of a child with asthma (aged 6 to 16 years old) in the UK

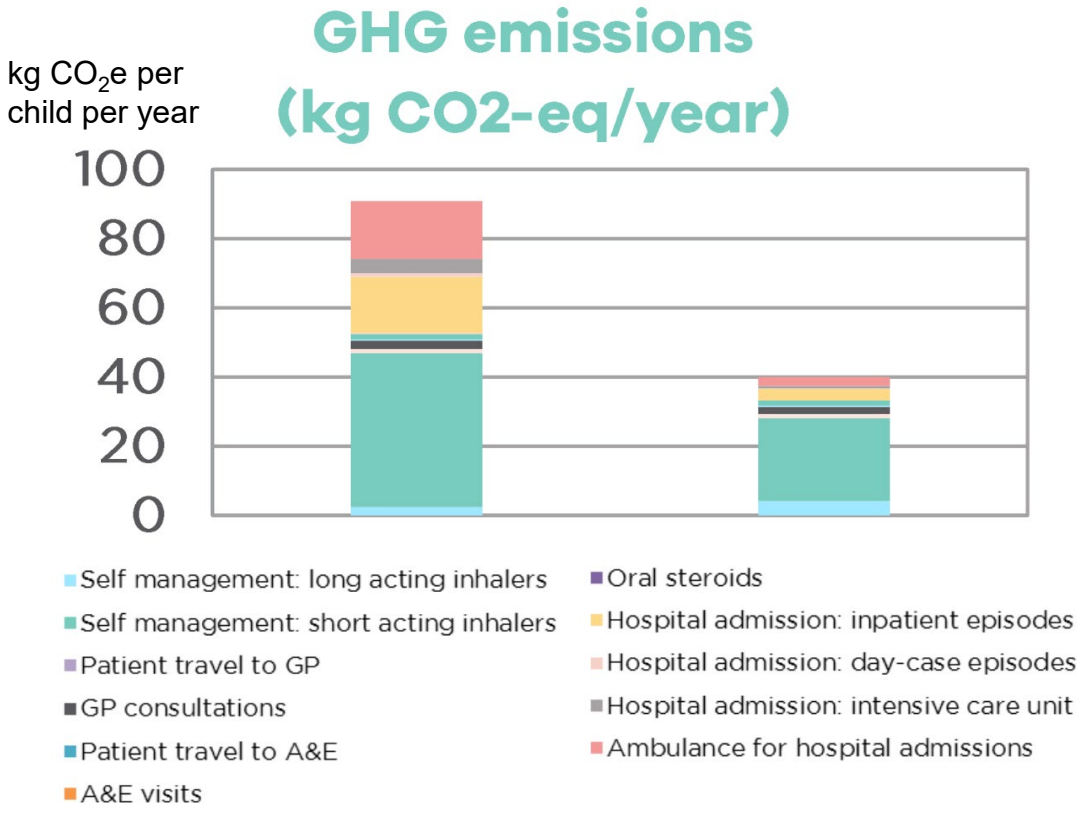


Publicly available data: https://shcoalition.org/environmental-impacts-of-poor-control-and-improved-control-of-paediatric-asthma-by-use-of-intelligent-digitally-connected-dry-powdered-inhalers-dpi/

Adherence in Poorly Controlled Paediatric Asthma

- The objective is to deploy digital technology to increase adherence and to reduce exacerbations (which result in hospital admissions, associated travel, etc)
- Improved adherence with the Smartinhaler™ reduces the number of hospital admissions (and associated travel) and the need for reliever inhalers
- The study showed that around **50%** of the GHG emissions associated with a patient with poorly controlled asthma can be **reduced** by improving adherence with DPI Smartinhaler™

This study also quantified water consumption and waste generation – impacts that are not included in this presentation



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Take-Home Messages

- The care pathway approach is able to provide consistent guidance on how robustly to analyse the environmental benefits that can be secured through adoption of a new care pathway (eg a new drug)
- Healthcare is a major source of greenhouse gas emissions contributing to climate change
- The care pathway approach provides a mechanism by which the environment impact of healthcare can be reduced whilst improving patient's health/outcomes - the case studies presented here are practical examples of this
- Approach already used in the sector ➔ guidance adapted to be implemented into LCA studies (by stakeholders in the healthcare sector)
- The approach may be extrapolated to other sectors (potentially with some need for adaptation)
  - eg hospitality sector, tourism (improving 'staycations')

Let's not reinvent the wheel!

Thank you

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