Environmental Impact and Benefits of Care4Today® Total Knee Replacement Care Pathway

Care Pathway Case Study

care4today®

Johnson & Johnson

Sustainable Healthcare Coalition

Environmental Impact and Benefits of Care4Today® Total Knee Replacement (TKR) Care Pathway

Title	Environmental Impact and Benefits of Care4Today® TKR Care Pathway
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Assurance	Internal assurance
Supporting information	Care4Today® Orthopaedic Solutions – Nottingham University Hospital (NUH). 2017 Care4Today® Orthopaedic Solutions - Delivering Outcomes that Matter. Johnson and Johnson. 2017 Care Pathways: Guidance on Appraising Sustainability'. Coalition for Sustainable Pharmaceuticals and Medical Devices (CSPM). 2015
Conformance with 2012 Greenhouse Gas Protocol Pharmaceutical and Care Pathways: Guidance on Appraising Sustainability ("the Guidance")	Adheres to the principles of the Guidance
Care pathway description	Care4Today® Total Knee Replacement Care Pathway Assessment
Environmental issues appraised	Global warming potential (IPCC, CO_2 eq, 100-year) Water consumption (m^3) Waste generation (kg)

Conclusions

Using research by Nottingham University Hospital (NUH), this assessment demonstrates that there are substantial improvements for the environment when Care4Today®, a digital care pathway program, is used with Total Knee Replacement (TKR) procedures. Care4Today® integrates health and multi-media features with clinical Enhanced Recovery After Surgery protocols and technology. In this study, the data showed that Care4Today® improved outcomes and delivered substantial reductions in LoS (length of stay), thus leading to substantial reductions in cost at both the patient and environmental levels. GHG savings are estimated to be 50 kg CO2e per patient.

Learnings

This study demonstrates the value of assessing care pathways with an environmental impact lens. It reinforces value-based healthcare[1], in that improved health outcomes following knee replacement surgery using Care4Today® correlate with a reduced cost in environmental terms. The outcomes that benefit patients over dollar (or pound) spent should not only be measured in personal and clinical terms centered on patients, but also in environmental terms to benefit the health of populations.

The impact reduction shown is based on primary data for patient care from clinical studies and secondary data for GHG emission, water consumption and waste generation associated with care activities. Although of reasonable quality, there is a degree of uncertainty associated with the assessment due to the use of secondary data. Gathering more specific data for some of the standard TKR procedures, as well as the manufacture and supply of the different TKR surgical kits and implants would provide a more accurate reflection of absolute reductions.

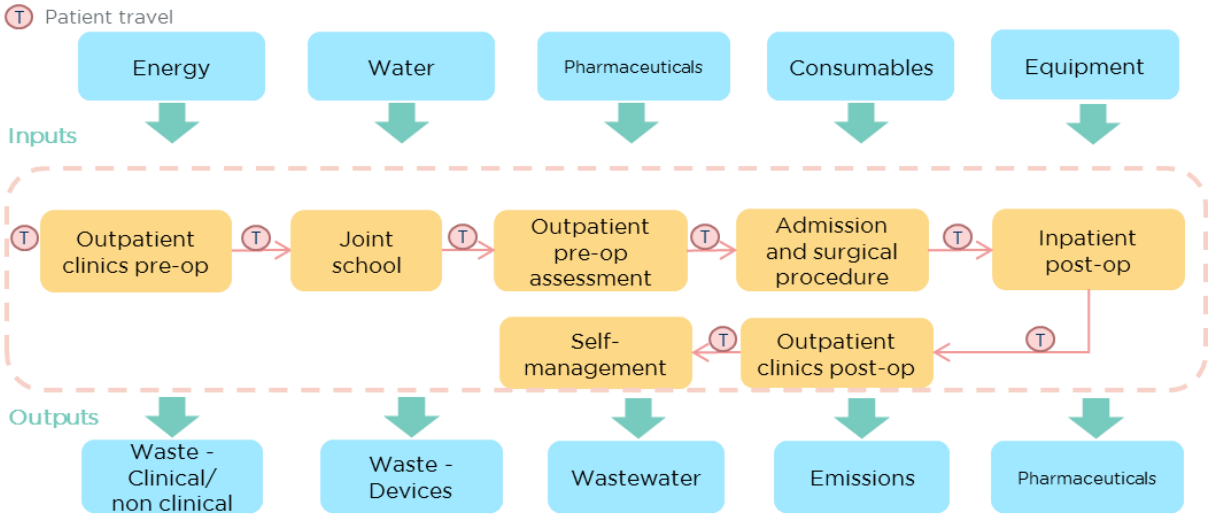
Scope

This case study considers the environmental impacts of pre-Care4Today®and post-Care4Today®pathway for TKR. The unit of analysis for this appraisal is:

"100 adult patients undergoing primary TKR surgery in a UK National Health Service hospital"

The pathway begins following patient referral for consultation with an orthopaedic surgeon (in the orthopaedic outpatient clinic). The patient is placed on the waiting list for TKR, and subsequently invited to attend joint school. This is followed by a pre-operative assessment, two to six weeks prior to admission and surgery, with post-operative care as an inpatient until they are ready for discharge. Following discharge, patients are supported by an outreach team, with outpatient follow up consultations at 6-8 weeks and 6 months. The Care4Today®system involves modified joint school; accelerated physiotherapy; patient website; Allied Healthcare Professional (AHCP) website; multi-media patient education pack; and online video streaming (self management). The clinical outcomes for each TKR solution scenario is based on research undertaken by the NUH[2].

GHG emissions, water consumption and waste product have been considered in this appraisal by using the approach and impact factors set out in the "Care Pathways: Guidance on Appraising Sustainability" guidance document[3]. The diagram below sets out a summary of the process stages included in study.



Data

The clinical outcomes of TKR using different knee kits and Care Pathways are derived from UK clinical data at a university teaching hospital[1]. Emission factors were taken from the SHC care pathway guidance[2]. As the surgical procedure module was identified as one of the higher impact modules in the materiality assessment, some detailed activity data has been gathered on consumables, equipment, and the reusable TKR kit, including the sterilisation process. Data sources for consumables included scientific literature detailing resource utilization e.g. operating times and other data, for the TKR procedure[3], personal communications from Johnson & Johnson consulting clinicians and other representatives[4]. GHG intensity data on the reusable kit, sterilisation process and knee implant were obtained from a carbon footprint report from 2011 on TKR commissioned by DePuy, which is considered representative.

[1] Porter, M. Value Based Healthcare Delivery (2014).

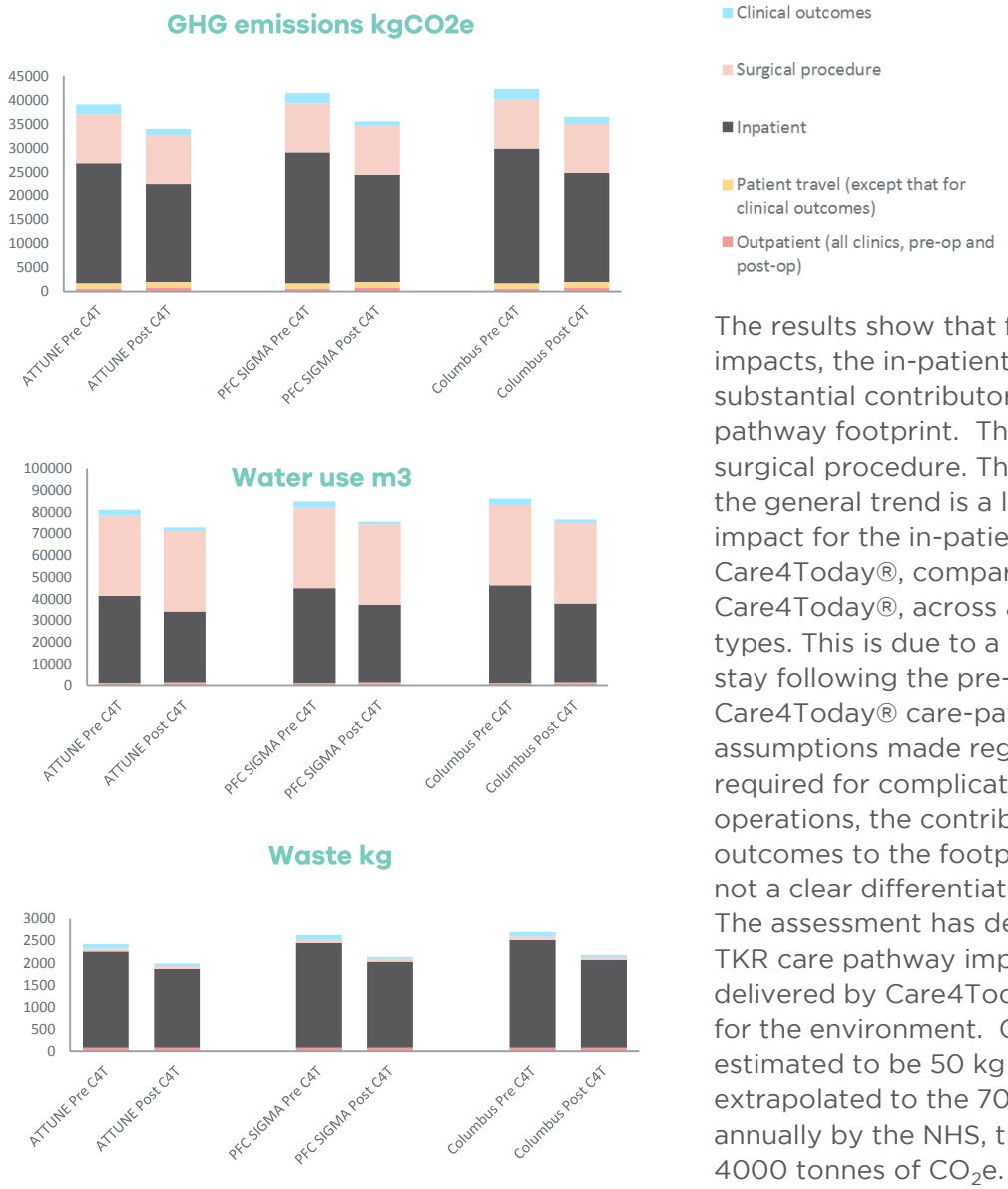
[2] Care4Today®Orthopaedic Solutions – Nottingham University Hospital (NUH). 2017

[3] Time-driven activity based costing of total knee replacement surgery at a London teaching hospital. Alvin Chen, Sanjeeve Sabharwa, Kashif Akhtar, Navnit Makaram, Chinmay M. Gupte. The Knee 22 (2015) 640–645

[4] Care Pathways: Guidance on Appraising Sustainability'. Coalition for Sustainable Pharmaceuticals and Medical Devices (CSPM). 2015

Results

The impacts of each care pathway activity were determined to provide an estimate of the GHG emissions, water consumption and waste generation for 100 patients undergoing TKR. The assessment calculates the environmental footprint of TKR care pathway pre- and post-Care4Today®.



The results show that for all environmental impacts, the in-patient care is the most substantial contributor to the TKR care pathway footprint. This is followed by surgical procedure. The results show that the general trend is a lower environmental impact for the in-patient module post-Care4Today®, compared to pre-Care4Today®, across all knee implant types. This is due to a reduced length of stay following the pre-operative Care4Today® care-pathway. Based on the assumptions made regarding the care required for complications and re-operations, the contribution of clinical outcomes to the footprint is minimal and not a clear differentiator to the footprint. The assessment has demonstrated that the TKR care pathway improvements delivered by Care4Today®, are substantial for the environment. GHG savings are estimated to be 50 kg CO_2e per patient. If extrapolated to the 70000 TKR undertaken annually by the NHS, this would equate to 4000 tonnes of CO_2e.

Acknowledgements

This document has been developed collaboratively through the Sustainable Healthcare Coalition (previously CSPM), 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.

1 Care4Today®Orthopaedic Solutions – Nottingham University Hospital (NUH). 2017
2 Care Pathways: Guidance on Appraising Sustainability'. Coalition for Sustainable Pharmaceuticals and Medical Devices (CSPM). 2015
3 Time-driven activity based costing of total knee replacement surgery at a London teaching hospital. Alvin Chen, Sanjeeve Sabharwa, Kashif Akhtar, Navnit Makaram, Chinmay M. Gupte. The Knee 22 (2015) 640–645