

# **Environmental impact report: Medicines optimisation**

**Implementing the NICE guideline on  
medicines optimisation (NG5)**

Proof of concept v1.7

# Implementing the NICE guideline on medicines optimisation (NG5) could save :



202 tonnes of  
greenhouse gas emissions



0.3 million m<sup>3</sup> of  
fresh water



24 tonnes of  
waste

per 100,000 population

## Summary

1. This report considers the environmental implications of implementing the recommendations made in [medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes](#) (NICE guideline 5).
2. This guideline covers safe and effective use of medicines in health and social care for people taking 1 or more medicines. It aims to ensure that medicines provide the greatest possible benefit to people by encouraging processes such as medicines reconciliation, medication review, and the use of patient decision aids. This may lead to a reduction in avoidable medicines-related admissions to hospitals. This is the focus of the environmental impact report and calculator.

## Introduction

3. This guideline offers best practice advice on the safe and effective use of medicines in health and social care for people taking 1 or more medicines.
4. This report discusses the environmental impact of implementing our guideline on [medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes](#) in England. It aims to help organisations plan for the environmental implications of implementing this NICE guideline.
5. We encourage organisations to evaluate their own practices against the recommendations in the NICE guideline and assess resource use and savings locally. Organisations can input estimates into the local environmental impact calculator to reflect local practice and estimate the impact of implementing the guideline.

## Background

6. Medicines-related patient safety incidents are common. Between October 2014 and September 2015, 183,895 medicines-related incidents were reported in England to the [national reporting and learning system](#). However, this is likely to underestimate the true number of incidents as not all are identified and reported.
7. Medicines-related patient safety incidents include medication errors (such as prescribing errors, dispensing errors, administration errors and monitoring errors) and preventable adverse events. Non-preventable adverse events, such as well-recognised adverse drug reactions, were not included within the scope of the guideline.
8. Based on the estimates in the [fourth report from the Patient Safety Observatory](#) (2007), avoidable medicines-related admissions to hospitals may equate to nearly 2 million bed days in England or 4,200 per hospital<sup>1</sup>, with a median length of stay of 8 days for a medicines-related admission. Applying these assumptions to more

---

<sup>1</sup> In total there were 474 English providers submitting information to HES in 2012-13. 2 million/474=4,200.

recent activity levels, this equates to 3 million bed days. Organisations should review the applicability of these findings at a local level.

## Assumptions made

9. The environmental impact calculator makes the following assumptions:

- It is assumed that the most significant impact of this guideline will be on reducing the number of non-elective admissions for adverse drug reactions.

**Table 1 Environmental impact of avoidable medicines-related admissions<sup>2</sup>**

<a href="#">Proportion of non-elective admissions related to adverse drug reactions</a>	6.50%
<a href="#">Proportion of adverse drug reactions that were potentially avoidable</a>	72.00%
Proportion of non-elective admissions related to potentially avoidable adverse drug reactions (6.5% x 72%)	4.68%
Number of non-elective admissions in a year, related to adverse drug reactions <sup>3</sup>	5,764,765
<a href="#">Median number of bed days per adverse drug reaction-related admission</a>	8
Total number of bed days for potentially avoidable adverse drug reaction-related admissions (4.68% x 5,764,765 x 8)	2,997,678

<sup>2</sup> Non-preventable adverse drug reactions are outside the scope of the guideline. However, potentially preventable adverse events, such as potentially avoidable adverse drug reactions, are included in the scope of the guideline.

<sup>3</sup> The Health and Social Care Information Centre (2016-17) Hospital Episode Statistics for England. Emergency admissions. Inpatient statistics.

<a href="#">Environmental impact of each bed day</a>	63.7kg of CO <sub>2</sub> e, 0.6m <sup>3</sup> of direct fresh water used, 98.6 m <sup>3</sup> of indirect fresh water use and 8.15kg of waste produced.
<a href="#">Further environmental impact of each admission (in terms of patient journeys to and from hospital)</a>	36kg of CO <sub>2</sub> e, 0.03m <sup>3</sup> of direct fresh water used, 91.20m <sup>3</sup> of indirect fresh water used and 0.53kg of waste.

10. As well as resulting in avoidable emergency admissions to hospital, medicines-related patient safety incidents and preventable adverse events can also lead to an increased length of stay if they occur after a patient has already been admitted as an inpatient. We have not been able to estimate the additional bed days that occur due to these events and incidents taking place within hospital, but note that medicines optimisation practices in the hospital setting would have an additional environmental benefit. Space has been provided in the calculator for local organisations to apply assumptions and estimates about the additional bed days generated by adverse medicines reactions occurring after patients have been admitted to hospital.

## Environmental impact

11. As noted in paragraph 9, there could be beneficial environmental impacts for NHS organisations associated with avoidable medicines-related adverse events in the community that result in hospital admissions. Health products used in the supply chain also contribute to the overall environmental impact. The accompanying calculator estimates the total impact for the population of England and allows NHS organisations to calculate the impact for their local populations.

12. The calculator estimates that, avoiding 75% of the 374,710 hospital admissions for adverse medicines events that are considered to be avoidable (or approximately 3 million hospital bed days and over 700,000 patient journeys) would result in the following environmental benefits:

- Avoid 110,910 tonnes of greenhouse gas emissions
- Avoid the use of 179 million m<sup>3</sup> (or 179,133 million litres) of fresh water (includes direct water use and indirect water use, for example water used in the supply chain or the generation of electricity).
- Preventing the creation of 13,300 tonnes of waste

13. It should be noted that the savings created by reduced hospital activity do not consider the environmental impacts of daily life outside of that boundary. In addition, the savings achieved may limit the impact of future growth in demand for health services. This will result in a reduction in both cost and environmental impact compared to a do nothing scenario.

14. Changes in local practice relating to medicines optimisation could result in other environmental benefits. These include:

- Reducing hospital stays by avoiding adverse drug reactions that occur during or after admission to hospital (as opposed to in the community)
- Reducing the prescribing, demand and therefore manufacturing of unrequired medication.

15. In respect to the first of these two additional benefits, a systematic review estimates treating or managing adverse drug reactions that occur during an inpatient stays may decrease the length of stay in hospital by 3 days<sup>4</sup>.

16. Where a medicines review results in a reduction or discontinuation in one or more of the prescribed medicines, there is a reduction in demand for and, potentially,

---

<sup>4</sup> Wiffen, P, Gill, M et al.(2002) Adverse drug reactions in hospital patients: a systematic review of the prospective and retrospective studies. Bandolier Extra

the production of medicines. In their 2010 joint report, the York Health Economics consortium and the School of Pharmacy at University of London estimate that £250 to £300 million of medicines are not used and therefore wasted in primary and community care in the NHS each year. The report goes on to suggest that 30 to 50% of this volume could be 'cost-effectively avoided'.

17. It is estimated that every pound spent on pharmaceuticals generates greenhouse gas emissions of 0.1558kg CO<sub>2</sub>e per £<sup>5</sup>. Avoiding £150m of unused medicines equates to total avoidable emissions of 23.4 thousand tonnes CO<sub>2</sub>e from the manufacturing and supply of pharmaceuticals.

## Benefits and savings

18. Overall, this guidance has the potential to have a positive environmental impact through avoiding in-hospital activity and journeys to and from hospital. A reduction in avoidable medicines-related admissions of:

- 110,910 tonnes of greenhouse gas emissions
- 179 million m<sup>3</sup> (or 179,133 million litres) of fresh water (direct and indirect)
- 13,300 tonnes of waste

19. These figures are equivalent to:

- 0.5% of the total annual carbon footprint of the health and social care system in England<sup>6</sup>
- Direct and indirect fresh water savings equivalent to 5 times the direct annual water use of all NHS trusts<sup>7</sup>
- 4.4% of the total NHS annual waste<sup>8</sup>

---

<sup>5</sup> Stockholm Environmental Institute work undertaken in 2014/15 for the SDU carbon footprint of the health and social care sector)

<sup>6</sup> Total carbon footprint 22.8 million tonnes -SDU health check 2016 (<http://www.sduhealth.org.uk/policy-strategy/reporting/nhs-carbon-footprint.aspx>)

<sup>7</sup> Total NHS water use 35.5million m<sup>3</sup>; ERIC data returns 2015/16 (<http://hefs.hscic.gov.uk/DataFiles.asp>)

<sup>8</sup> Total NHS waste weight 301 Kilotonnes; ERIC data returns 2013/14 (<http://hefs.hscic.gov.uk/DataFiles.asp>)