

BMJ Open Quality Reducing healthcare waste by eliminating exam table paper in a primary care practice: a sustainable quality improvement initiative

Ilona Hale ,¹ Amanda McKenzie²

To cite: Hale I, McKenzie A. Reducing healthcare waste by eliminating exam table paper in a primary care practice: a sustainable quality improvement initiative. *BMJ Open Quality* 2024;**13**:e002838. doi:10.1136/bmjopen-2024-002838

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/bmjopen-2024-002838>).

Received 27 March 2024
Accepted 8 October 2024



© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Family Practice, The University of British Columbia Faculty of Medicine, Vancouver, British Columbia, Canada

²Environmental Sustainability, Interior Health Authority, Kelowna, British Columbia, Canada

Correspondence to

Dr Ilona Hale;
ilona.hale@healthqualitybc.ca

ABSTRACT

Purpose Climate change is now the greatest threat to human survival. The healthcare system contributes significantly to global pollution and greenhouse gas emissions. Individual practitioners play an important role in helping to reduce these impacts in day-to-day practice. Deimplementation of unnecessary processes and products, such as exam table paper, in medical offices is one simple approach to incorporating principles of planetary health into practice. All quality improvement (QI) projects must start to consider environmental impacts to fully evaluate change ideas.

Methods We designed a single Plan-Do-Study-Act cycle using the Institute for Health Improvement Model for Improvement. We removed the exam table paper from our primary care office and measured changes in staff time, laundry, financial costs, paper use and carbon dioxide (CO₂) emissions.

Results Eliminating exam table paper in our clinic resulted in modest annual cost savings of \$C718 and improved staff efficiency and motivation to introduce other green office practices. In our clinic alone, this change will save 8.2 km of exam table paper, 10 trees and 148 kg of CO₂e (equivalent to driving 1233 km) every year. There were no negative consequences or feedback.

Conclusions This simple QI project demonstrates the feasibility of implementing a small change in a primary care clinic that can improve environmental sustainability with multiple co-benefits. If all family physicians in Canada eliminated exam table paper in their offices, it would result in savings of approximately 95 940 km of paper, 121 680 trees, \$C8 400 600 and 3054 T CO₂e emissions, equivalent to driving around the world 360 times.

Climate change and degradation of our natural environment are increasingly being recognised as serious threats to human health. Despite the health system's mandate to promote and protect health, the healthcare sector is a significant contributor to the problem, accounting for 4.6% of Canada's greenhouse gas (GHG) emissions.¹

Practising physicians have a significant role to play in reducing our system's environmental impact by streamlining care and eliminating waste in our care settings. Using the emerging concept of 'environmentally

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Unnecessary use of healthcare products like exam table paper contributes to the environmental impact of the healthcare system without improving patient health outcomes. Although other institutions have made this change, it has not been documented in the literature.

WHAT THIS STUDY ADDS

⇒ This study details the process and outcomes of removing exam table paper in a primary care practice and demonstrates that it can be feasible and acceptable. It also raises awareness about the importance of considering the environmental impacts of quality improvement initiatives.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study provides a reference to support and inspire providers to undertake this and other environmentally sustainable quality improvement initiatives.

sustainable quality improvement (QI)' allows us to measure the value of an intervention by assessing patient and population outcomes against not only financial costs but also costs to the environment.²⁻⁴ Answering the key question, 'How will I know if a change is an improvement?' requires a QI team to consider all possible impacts, including potential environmental harms and should be considered in any QI project as an outcome or balancing measure.

Overconsumption of healthcare resources can result from a failure to de-implement^{5 6} practices that are unsupported by evidence, as is the case for the exam table paper still used in most medical facilities in Canada.^{7 8} Although exam tables can harbour pathogenic microorganisms,⁹ covering the tables does not eliminate the need for cleaning between patients.¹⁰ Changing the paper creates additional work for staff and can undermine optimal infection prevention practices.¹¹ Some institutions, such as the British Columbia Cancer Agency

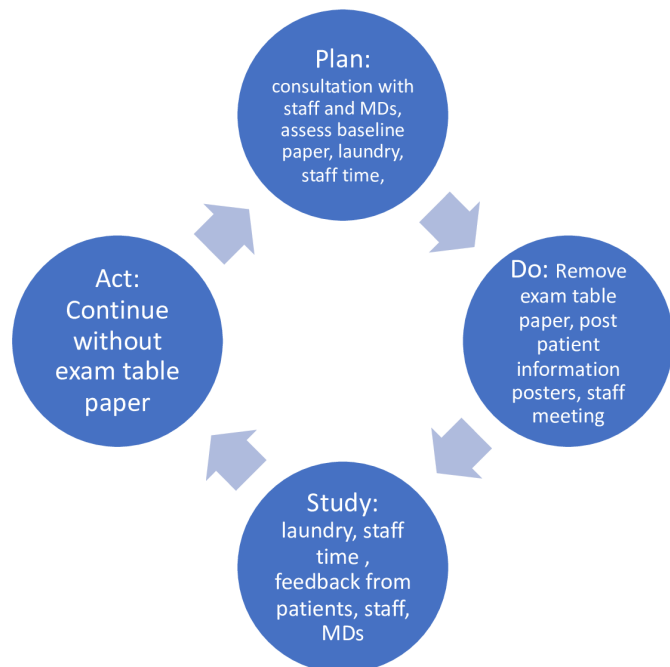


Figure 1 Plan-Do-Study-Act Cycle.

(BCCA) and the Children's Hospital of Eastern Ontario, have already eliminated exam table paper. In a press release, the BCCA noted that the de-implementation of the exam table paper was the culmination of months of hard work and coordination to roll out the programme at one site.¹² By contrast, small, independent 'clinical microsystems' such as private primary care clinics have complete control over change initiatives, free of institutional barriers, a factor known to promote successful implementation of improvement initiatives.^{13 14}

The purpose of this study was to evaluate the process of eliminating exam table paper in our clinic with the specific aims of (1) reducing environmental impact through reduced use of water, toxic chemicals, raw materials and energy to produce, distribute and ultimately dispose of the product¹⁵ and (2) demonstrating the feasibility of this simple sustainable QI project in a small clinic. We hope our study may lead to increased uptake of this and other environmentally sustainable change ideas among primary care practitioners.

METHODS

We conducted a QI project using the standard Institute for Health Improvement Model for Improvement with a single 'Plan/Do/Study/Act' cycle (figure 1) and the SQUIRE 2.0 reporting guidelines.¹⁶

CONTEXT

Our family practice clinic has eight associate physicians (four full time equivalents) and employs 10 staff members, including five medical office assistants (MOAs). There are 12 exam rooms and a minor procedure room. Exam beds are cleaned between each patient. Even before

the intervention, exam table paper was not always used, and patients were provided with additional cloth drapes or gowns as needed depending on the type of visit and physician and patient preference. Each bed also had a pillow with a cloth pillowcase which was changed if soiled or at the end of each day. Paper removed from beds was recycled. Recycling bins are managed by custodial staff employed by the larger health centre. Utilities (electricity used for laundry) are also paid for by the health centre.

IMPROVEMENT TEAM

The QI project team included one family physician (IH) and three medical office assistants (Grete Bush, Colleen Bland and Kathy Clarke), who all contributed to the project development, implementation and evaluation. We were supported by an experienced QI advisor from the local Division of Family Practice. The regional manager for environmental sustainability (AM) provided environmental consultation. The lead author (IH) is the guarantor for the publication.

INTERVENTION Plan

The QI team met on several occasions during December 2021 and January 2022 to discuss the baseline situation, plan the intervention and identify outcomes and balancing measures. We identified potential challenges through consultation with other staff, including concerns about patient comfort, increased laundry and resistance to change. Staff recognised that some patients may be uncomfortable with the idea of lying unclothed on bare exam tables and suggested offering cloth drapes to these patients. They also suggested removing pillows from the exam tables to provide an easier-to-clean surface since the pillows would no longer be covered with exam table paper. Staff recognised that removing the pillows would also save time in changing and washing the pillowcases.

Implementation

One week prior to implementation, we held an in-service meeting to orient the entire staff to the project. On the night before the intervention start date (1 February 2022), we completely removed the rolls of exam table paper from the exam rooms. We developed and posted a patient information poster in each room to inform patients about the intervention. Pillows were removed from the beds and stored in the rooms to be available, as required, for patients with special needs. We devised a method for staff members to share any feedback with the lead physician through our internal messaging system.

Study measures

The primary outcome measures were the changes in staff time, paper use, financial costs and environmental impact (change in GHG emissions (CO₂ equivalents)). The baseline annual amount of paper was calculated by reviewing purchasing records from the previous years

Table 1 Estimated annual changes in paper use, staff time and costs preintervention and postintervention

	Preintervention			Postintervention			Change
	Item	Time	Cost	Item	Time	Cost	
Exam table paper	216 rolls	0	\$C564	0 rolls	0	0	Savings: \$C564
Staff time (changing pillow cases)	5 days per week	25 hours	\$C550	1 day per week	5 hours	\$110 (-\$440)	Savings: \$C154
Staff time (laundry)	62.5 loads	115 hours	\$C2530	70 loads	128 hours	\$2816 (+\$286)	
							Total Savings: \$C718 (+7 hours)

(2018–2021). Because it was anticipated that eliminating paper may cause an increase in the use of cloth drapes, we also identified loads of laundry as a balancing measure, evaluated at baseline and at 1 and 3 months after the start of the intervention. At baseline (January 2022), we calculated the time required for MOAs to do one load of laundry, change table paper and change pillowcases as important process measures. These were measured on several occasions by two different staff members and the average times were calculated. A qualified environmental professional (AM) conducted the analysis of the environmental impacts of the intervention standardised methods (see online supplemental appendix 1).

RESULTS

The results are summarised in [tables 1 and 2](#). Although there was a small increase in the volume of laundry, which remained stable at 1 and 3 months postintervention, the extra time required for this was offset by the time saved by no longer changing the pillowcases every day, resulting in an overall reduction in MOA time. The annual cost savings related to no longer purchasing exam table paper was \$C564. The time previously required for changing exam table paper was negligible (seconds per room) and protocols for sanitising beds did not change before and after the intervention so these were not included in the impact calculations. There was very little feedback from patients but the few comments received were positive.

An unexpected outcome was the enthusiastic uptake by the core staff team members. As a result of their

heightened awareness of the time taken to do laundry, staff independently started to reduce the amount of draping and other cloths being unnecessarily used for different procedures. They also felt empowered to introduce a number of other environmental initiatives, such as switching from disposable ‘blue wrap’ to reusable cloth sterilisation wrap, eliminating the use of disposable absorbent pads, using more environmentally friendly cleaning products (alcohol or hydrogen peroxide based), switching from liquid detergent to dry laundry sheets, reducing the water temperature for laundry, encouraging more efficient use of sharps containers and identifying ways to support more physicians using metal vaginal speculae. One staff member has presented our clinic’s environmental initiatives to a regional group of MOAs.

DISCUSSION

This QI study evaluating the elimination of exam table paper in one primary care clinic demonstrated modest cost savings, increased efficiency and decreased environmental impacts with no negative consequences. Because it was a small system-level intervention (complete elimination of the unnecessary paper), it did not rely on individual behaviour change (remembering or deciding whether or not to use the paper), which enhanced the sustainability and effectiveness of the intervention. The cost and environmental savings likely represent an underestimate of the savings that could be expected in other clinics since our clinic was already using exam table paper only selectively and the baseline estimates of paper used occurred partly during the COVID-19 pandemic when in-person visits were reduced.

At the time of publication, 2 years post implementation, the clinic continues to operate without exam table paper and the volume of laundry has remained stable.

This initiative provides an example of the potential for evaluating the environmental impacts of QI projects. Given the current threat of climate change and other environmental harms, it is imperative that we start to consider not just the financial costs but also the environmental costs of every QI initiative, even those not specifically designed to

Table 2 Annual projected environmental savings

Paper saved	8.2 km paper
Trees saved	10.4 trees
Emissions (kg CO ₂ e)	
Laundry	+113
Paper	-261
Total	148 kg CO ₂ e saved (equivalent to driving 1233 km)

address environmental concerns. In many cases, as in our study, changes that increase efficiency will save money and have less impact on the environment; demonstrating this by presenting environmental outcome measures can strengthen the argument for adopting a change.

The increased motivation among staff to streamline other aspects of care delivery was a notable co-benefit. Increasing team engagement and empowerment improves morale and job satisfaction and taking action to combat climate change can be a powerful antidote to eco-anxiety.¹⁷

This study contributes to the limited literature on sustainable quality improvement initiatives in primary care and has been highlighted in a national resource on Planetary Health for Primary Care¹⁸ which also contains many other ideas and practical suggestions. Because of the large number of family physicians across Canada, even small changes could have a significant impact if broadly implemented. Extrapolating the data from this study, nationwide elimination of exam table paper in family physician offices would result in savings of 95 940 km of exam table paper, 121 680 trees, \$C8 400 600 and 3054 T of CO₂e which is the equivalent of driving 14 426 100 km (360 times around the world).

This example also demonstrates the ease with which independent practitioners in private practice can make changes compared with colleagues working in large hospitals or health authorities.

Although the biggest part of our system's environmental footprint is actually upstream from our facilities—in the supply chain that provides medications and all the other products we use to diagnose and treat patients¹⁹—the visible waste—the 'garbage we see' such as exam table paper continues to be the focus of many of our interventions and is still important, particularly if it raises awareness about the issue of environmental sustainability and stimulates practices to think about the bigger issues of the 'invisible waste' in our system related to overuse.²⁰

LIMITATIONS

The staff's increased attention to laundry during the intervention made it difficult to determine how much of the change in laundry was attributable to the specific interventions studied. Some of the findings may not apply to other clinics depending on a number of factors, such as whether or not clinics are responsible for their own power, waste management and laundry. In addition, the clinic studied is quite small and larger facilities may face different challenges. The methodology for calculating environmental impacts in QI projects is in its infancy. Calculations in this study were done using the best existing tools and references. We were not able to quantify the other environmental effects of reduced paper beyond reduced GHGs, such as a decrease in effluent from pulp and paper manufacturing. Another limitation is that there were no patients on the intervention team.

CONCLUSIONS

Family physician offices are ideally positioned to develop and implement small, environmentally sustainable QI projects. We hope that by sharing our experience, other clinics will be inspired and empowered to also make this one small change in their practice.

Acknowledgements The authors would like to acknowledge and thank Grete Bush, Colleen Bland and Kathy Clarke, the medical office assistants, whose support of this work was invaluable.

Collaborators not applicable.

Contributors The QI project team included one family physician (IH) and three medical office assistants (Grete Bush, Colleen Bland and Kathy Clarke) who all contributed to the project development, implementation and evaluation. We were supported by an experienced QI advisor from the local Division of Family Practice. The regional manager for environmental sustainability (AM) provided environmental consultation. The lead author (IH) is the guarantor for the publication.

Funding The lead physician was supported in kind and with some sessional funding by the Doctors of BC Family Practice Services' Committee Practice Support Program. This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The project was identified as a minimal-risk study using A Project Ethics Community Consensus Initiative (ARECCI) ethics screening tool.²¹ According to the Interior Health Research Ethics Board, a minimal risk study is not required to obtain any further ethical approval.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Iona Hale <http://orcid.org/0000-0002-8542-1028>

REFERENCES

- Eckelman MJ, Sherman JD, MacNeill AJ. Life cycle environmental emissions and health damages from the Canadian healthcare system: An economic-environmental-epidemiological analysis. *PLoS Med* 2018;15:e1002623.
- Mortimer F, Isherwood J, Pearce M, *et al*. Sustainability in quality improvement: measuring impact. *Future Healthc J* 2018;5:94–7.
- Mortimer F, Isherwood J, Wilkinson A, *et al*. Sustainability in quality improvement: redefining value. *Future Healthc J* 2018;5:88–93.
- Physicians RCo. Leading for quality: the foundation for healthcare over the next decade London. 2010.
- Parker G, Kastner M, Born K, *et al*. Understanding low-value care and associated de-implementation processes: a qualitative study

- of Choosing Wisely Interventions across Canadian hospitals. *BMC Health Serv Res* 2022;22:92.
- 6 van Bodegom-Vos L, Davidoff F, Marang-van de Mheen PJ. Implementation and de-implementation: two sides of the same coin? *BMJ Qual Saf* 2017;26:495–501.
 - 7 Committee PIDA. Best practices for environmental cleaning for prevention and control of infections in all health care settings. Public Health Ontario; 2012.
 - 8 Authority PHS. *British Columbia best practices for environmental cleaning for prevention and control of infections in all healthcare settings and programs*. Victoria: Columbia PICNoB, 2016.
 - 9 Bifero AE, Prakash J, Bergin J. The role of chiropractic adjusting tables as reservoirs for microbial diseases. *Am J Infect Control* 2006;34:155–7.
 - 10 (PICNET) PICNoBC. *BC best practices for environmental cleaning for prevention and control of infections in all healthcare settings*. Provincial Health Services Authority, 2016.
 - 11 Waters E. End of the roll for examination table paper. *Can Fam Physician* 2020;66:748–9.
 - 12 Agency BCC. Planetary health unit eliminating exam table paper. 2023. Available: <http://www.bccancer.bc.ca/about/news-stories/stories/bc-cancer-planetary-health-unit-eliminating-exam-table-paper-bc-cancer>
 - 13 Williams I, Dickinson H, Robinson S, et al. Clinical microsystems and the NHS: a sustainable method for improvement? *J Health Organ Manag* 2009;23:119–32.
 - 14 Dixon-Woods M, McNicol S, Martin G. Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature. *BMJ Qual Saf* 2012;21:876–84.
 - 15 Tomberlin KE, Venditti R, Yao Y. Life cycle carbon footprint analysis of pulp and paper grades in the United States using production-line-based data and integration. *BioRes* 2020;15:3899–914.
 - 16 Ogrinc G, Davies L, Goodman D, et al. SQUIRE 2.0-Standards for Quality Improvement Reporting Excellence-Revised Publication Guidelines from a Detailed Consensus Process. *J Am Coll Surg* 2016;222:317–23.
 - 17 Gunasiri H, Wang Y, Watkins E-M, et al. Hope, Coping and Eco-Anxiety: Young People's Mental Health in a Climate-Impacted Australia. *Int J Environ Res Public Health* 2022;19:5528.
 - 18 Hale ILL, Norris J. Planetary health for primary care. 2023. Available: <https://cascadescanada.ca/resources/sustainable-primary-care-toolkit/>
 - 19 Tennison I, Roschnik S, Ashby B, et al. Health care's response to climate change: a carbon footprint assessment of the NHS in England. *Lancet Planet Health* 2021;5:e84–92.
 - 20 Hale I, Bell RW. Family doctors well suited to being climate leaders. *Can Fam Physician* 2023;69:230–2.
 - 21 Hagen B, O'Beirne M, Desai S, et al. Innovations in the Ethical Review of Health-Related Quality Improvement and Research: The Alberta Research Ethics Community Consensus Initiative (ARECCI). *Healthc Policy* 2007;2:e164–77.