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Short Communication

Reforming Care Pathways to Reduce Carbon Footprint

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Abstract

Climate change is a very real, complex and critical issue facing all of us today. In fact, its effects will spillover into future generations. Thus, there is a need to take action now. World Health Organization estimates that about 24% of all deaths globally are related to environmental causes. This is a call for healthcare to take action and decarbonize to reduce carbon emissions towards target net zero. Clinical care pathways are fundamental to medical management. Targeting care pathways reform as one of the starting points in healthcare is a good, fundamental initiative as it forms the intersection between:

i. Better population health

ii. Increased resilience of the healthcare systems

iii. decarbonizing healthcare.

This paper shares the author's views on how to reform care pathways and ensure the engagement of all necessary stakeholders in our mission to achieve a safer, cleaner, and healthier world. The will to change, collaborate on new ideas, and implement innovations are necessary to accelerate the transition to net zero healthcare systems.

Introduction

As healthcare becomes more complex and the spectrum of clinical diseases skyrockets, care pathways were introduced to help streamline management and intervention for more common or specific conditions. Care pathways were designed to assist with decision-making and the delivery of care processes, especially for conditions requiring inter-professional handling and interventions. Care pathways must have clear, defined goals and endpoints. They are evidence-based, facilitate inter-professional communication and coordination, and help with resource management. The introduction of care pathways has certainly increased efficiency, effectiveness of care delivery, cost-effectiveness, quality of care, integration between different specialties, inter-professional collaborative practice performance, and the streamlining of care processes. They can also improve patient safety and satisfaction [1-3]. There is currently a wide spectrum of care pathways in use across institutions. These pathways depend greatly on the practice model, location of the institution, and partnerships or networks fostered in the community. Some examples include acute care pathways, which usually commence in the Emergency Department (e.g., care pathways for hip fractures in the elderly), chronic disease care pathways, and elective care pathways. Having these pathways can reduce both waiting time for care and turnaround time. Staff will be familiar with exactly what to do, and decision-making time is streamlined. These pathways can also enhance staff satisfaction, as they foster understanding between different disciplines and

specialties. Referral times and rejections can be reduced, bed blocks can be overcome, and relationships between specialties can improve. Thus, the benefits and value of using properly planned and executed care pathways usually outweigh the disadvantages [1, 4]. The climate crisis has been described as the greatest public health challenge of the century. There is an urgent call to reduce greenhouse gas emissions and carbon footprints [5, 6]. Healthcare has a large carbon footprint internationally, contributing between 4-5% of global net carbon emissions. Hospitals and many healthcare institutions operate 24 hours a day, 365 days a year. They utilize many devices and systems that require intense energy consumption and generate large amounts of medical waste in the form of solids, liquids, and gases, which are emitted into the environment [5-8]. Healthcare organizations need guidance and support to embark on this green journey, setting appropriate targets and frameworks for their staff to comply with.

Healthcare industries and health-linked industries must strategize on initiatives to manage and reduce their carbon footprint. These initiatives should cover areas such as energy utilization, transportation, use of anesthetic gases, pharmaceuticals and chemicals, as well as medical devices and supplies. This aligns with their responsibility to help save our environment and Mother Earth. Work processes in institutions should be reviewed to promote:

- Staff awareness and training
- Energy efficiency and efficient energy management systems
- Sustainable practices
- Green procurement

There is a dire need to develop standardized and validated tools and methods to assist stakeholders in making informed decisions regarding carbon emissions. Adoption of digital health is also an area to be explored for implementation [9]. These efforts should align with the call by the World Health Organization (WHO) for healthcare to reduce its carbon footprint [10]. Moving forward, one strategic course of action would be to reform and re-energize care pathways to align with the green initiatives of institutions. This would make them more succinct and concise in operations, with less wastage and a reduced carbon footprint [10-12].

Reforming Care Pathways

As care pathways may have been in place for some time, healthcare staff may have become very comfortable and familiar with them. However, to contribute to the broader goals of addressing climate change and enhancing resilience, reviewing care pathways can be an important initiative [2, 4, 13]. Transforming and reforming care pathways may involve the following potential changes:

General Care Pathways: Care pathways often have numerous steps, much like an algorithm. Reviewing these steps to reduce them to the most essential minimum is useful. This can help reduce complexities, shorten the length of stay (if possible), and potentially allow for earlier patient mobilization. The goal is to move patients into a more ambulatory care mode as soon as possible, depending on what the care pathway is addressing. By reducing steps, length of stay, hospitalization period, bed occupancy, and resource utilization, significant reductions in carbon footprint can be achieved. If a reduction of "x" amount is possible for each patient on the pathway, consider the total reduction and savings for "100x or 1000x" patients going through the care pathway each day, month, and year. There is also considerable benefit in ambulating and mobilizing patients earlier, as it helps them return to their families and communities sooner. Being in a familiar environment is particularly beneficial for the elderly. Reforming care pathways can also involve forming community networks of neighbors, volunteers, grassroots organizations, and primary care networks near where the patient lives. Establishing Senior Care Centers and Senior Activities Centers in the community can also be helpful. At SingHealth in Singapore, for example, we offer the "Hospital@Home" program, where we have reformed care pathways for certain conditions to manage patients entirely at home, without hospitalization [14]. Conditions managed through this pathway include mild to moderate cellulitis, mild pneumonia (with low CURB scores), acute joint or monoarticular pain, or a gouty attack. This has reduced admissions for a large group of patients presenting to the ED with these conditions.

Tele-Care and Tele-Consultation: The provision of tele-consultation can be incorporated into care pathways to make consultations more ambulatory. This can further reduce admission rates, use of hospital resources, bed utilization, and thus, the carbon footprint. Some may argue that tele-consultation increases energy use due to electronic devices, computers, and iPads. However, with countries moving towards cleaner energy sources, it is important to balance targeted consultations and avoid over-utilization [9, 14, 15]. Tele-consultation also enables the delivery of care more remotely, reducing travel time and thus further decreasing carbon footprint. This allows patients to access specialist care with reduced travel. Quality of care should not be compromised. Additionally, the use of wearable devices and tele-monitoring for certain cardiovascular conditions is now integrated into remote care delivery. However, limitations still exist, such as the complexities involved (e.g., will patients be able to navigate this environment?) and accessibility issues for specific groups of patients in the community.

Day and Ambulatory Surgery for Minor Procedures: With the introduction of more care pathways for minor surgical procedures, patients may not need to be admitted as inpatients. These procedures can be done under local anesthesia with mild sedation, significantly reducing the use of general anesthesia and gases. Expanding these pathways and reforming older ones for specific conditions can help reduce bed utilization and inpatient admission rates, freeing up beds for those who really need them, especially given the frequent bed shortages countries face today, particularly with the aging population.

Acute Care Pathways: Acute care pathways often start in the ED with well-defined steps. Reviewing and streamlining these processes to shorten them, with a view to earlier mobilization and discharge into the community or step-down care, aligns with reducing the carbon footprint. Examples include hip fracture care pathways, mild heart failure care pathways, asthma pathways, or minor injury care pathways [3, 13].

Specialized Clinic Pathways: Examples include The Falls Clinic pathway, which targets seniors with frequent falls for various reasons. Resources can be organized more efficiently to reduce the need for hospital admission. Currently, some patients may be admitted due to long wait times for medical social worker assistance. Consolidating and coordinating appropriate resources can help achieve intended goals. Another example is a Diabetic Foot Clinic pathway. These pathways, being more ambulatory, empower patients, their families, and the community-based care network.

Regional Health System: Regional health systems segment care delivery into clusters or regional groups, a practice already in use in some countries. Regional care pathways reduce transportation time and travel, making care more accessible to patients. They also facilitate networks with local care providers to support ambulatory, community-based care [16]. This approach aligns with reducing the carbon footprint in healthcare for a country.

Home Hospice Care Pathways: As people live longer with chronic illnesses, including cancers, home hospice care pathways become increasingly important. Many patients may otherwise come to the hospital for complications, pain control, or anxiety about their condition. Home hospice care allows delivery of relevant care in patients' homes, with their families present and involved. Pain medications can be prescribed as oral medications, which have a lower carbon footprint compared to intravenous forms. This approach also encourages advanced care planning, helping patients and their families prepare for and manage potential complications with less anxiety. These care pathways should have clear indications, guidelines, and interventions [17-19].

Reform of The Asthma Care Pathway

One of the main feature of the asthma care pathway is the utilization of metered dose inhalers (MDI), which utilizes propellant to deliver specific doses of the medication. This represents a real carbon 'hotspot'. The use of each inhaler has been compared to travelling at 175 miles in a vehicle fuelled by petrol. This is also technique dependent and wastage, which can happen, can upscale the carbon footprint even more. Proper disposal of used inhalers is also important and healthcare institutions should explain to their patients and educate them or even provide disposal means to minimize leakage of damaging gases into the environment. Switching to dry powder form of the medication (dry powder inhaler) may be easier to use and can reduce the carbon footprint to be only equivalent to travelling 4 miles in that car powered by petrol! [20-24] However, when switching to these medication forms, patient capabilities must continue to be a consideration and their choices (usually still), preserved. Thus, in alignment with the move to be more green, reviewing the pathway as in this case, using substitutes which are more environment friendly and avoiding wastage is an excellent and necessary move [21, 24].

Decarbonizing Care Pathways

Healthcare systems are composed of complex systems, micro-systems, and processes, with a significant contribution from human capital. Decarbonization will require a system-wide approach and buy-in from every stakeholder. This is central to achieving the set goals. The stakeholder groups that must be engaged can be broadly categorized into the following:

a. Clinicians and healthcare professionals (nurses, allied health personnel)

b. Administrative staff, managers, clerks

c. Patients and families, as well as public users of the systems

d. Government, policymakers, and regulatory bodies

e. Pharmaceutical and medical technology staff

f. Others, e.g., maintenance and facilities staff

Each group will have its contributions. Reviewing and reforming care pathways will help optimize disease management, improve preventive care, and increase the efficiency of interventions, all leading towards reduced carbon emissions in clinical care pathways. Targeting care pathways is a practical, useful, and fundamental initiative, as it intersects with:

i. Better population health

ii. Increased resilience of healthcare systems

iii. Decarbonizing healthcare

Discussion

Care pathways are very useful if properly planned, executed, with defined timelines, and the necessary standardizations. They help reduce deviations in care delivery among different healthcare professionals. When these pathways specify evidence-based investigations and treatment orders, they help ensure that staff do not over-order and create waste. As the management steps are defined, there will be less tendency to overprescribe or use intravenous medicines too liberally. All these measures can help reduce the carbon footprint. Though they may seem small individually, cumulatively, their impact is significant. Clinical pathways help organizations study practice patterns and can be used to educate and enforce practices that promote 'greener' practice. In reforming care pathways, some useful tips include:

a. Only include the necessary number of steps; any redundancies should be removed.

b. Review medications to use oral ones as much as possible (oral medications have a lower carbon footprint than IV or infusions).

c. For MDIs and gases, consider safer alternatives if available.

d. Mobilize patients and consider earlier discharge from the hospital into the community to reduce the number of follow-up visits requiring travel. When follow-ups can be done in the community or at the primary care level, they should be implemented with an agreed-upon protocol.

e. Strengthen community and primary care networks in the area where patients live to provide additional support.

f. Continue to monitor and track changes in pathway practices, and work with the engineering department to chart progress and trajectory in carbon emission reduction.

g. Reform pathways to include more preventive care and elements that reduce complications, which also holds great promise for reducing carbon emissions. For example, treating a complicated diabetes mellitus patient with end-stage renal complications requiring hemodialysis results in 70 times greater carbon emissions compared to treating a diabetic patient on insulin, and 200 times more than treating a well-controlled diabetic patient on oral hypoglycemic drugs [24].

Conclusion

Healthcare institutions will need to conceptualize and review their operations and processes to gain an in-depth understanding and analysis of their carbon footprint. In reforming care pathways, identifying carbon hotspots is crucial, followed by updating pathways with the latest evidence-based practices to streamline and align with broader green initiatives at the community or country level [25, 26].

References

1. Schrijvers G, van Hoorn A, Huiskes N (2012) The care pathway: concepts and theories: an introduction. Int J Integr Care 12(Spec Ed Integrated Care Pathways): e192.

2. Manning L, Islam MS (2023) A systematic review to identify the challenges to achieving effective patient flow in public hospitals. Int J Health Plann Manage 38(3): 805-828.

3. Mostafa R, El-Atawi K (2024) Strategies to Measure and Improve Emergency Department Performance: A Review. Cureus 16(1): e52879.

4. Ben-Tovim DI, Dougherty MC, O'Connell TJ, McGrath KM (2008) Patient journeys: the process of clinical redesign. Med J Aust 188(S6): S14-S17.

5. Rodriguez-Jimenez L, Romero-martin M, Spruell T, Steley Z, Gómez-Salgado J (2023) The carbon footprint of healthcare settings: A systematic review. J Adv Nurs 79(8): 2830-2844.

6. Pencheon D, Wright J (2020) Making healthcare and health systems net zero. BMJ 368: m970.

7. World Health Organization (2022). Health and the Environment. World Health Organization, Geneva, Switzerland.

8. McAlister S, Morton RL, Barratt A (2022) Incorporating carbon into healthcare: adding carbon emissions to health technology assessments. Lancet Planetary Health 6(12): e993-e999.

9. Khan SAR, Yu Z, Umar M, Jabbour ABLS, Mor RS (2022) Tackling post pandemic challenges with digital technologies: An empirical study. J Enterprise Info Manag 35(1): 36-57.

10. Austin J, Fields L, Ridla AZ, Alexandrou E, Ferguson C (2023) Twelve actions in healthcare to reduce carbon emissions. Eur J Cardiovasc Nurs 00: 1-3.

11. Atwoli L, Baqui AH, benfield T, Bosurgi R, Godlee F (2021) Call for emergency action to limit global temperature increases, restore biodiversity and protect health. Med J Aust 215(5): 210-212.

12. Scally G (2009) Environmental waste in healthcare. BMJ 338: b1129.

13. Linstadt H, Collins A, Slutzman JE, Kimball E, Lemery J, et al. (2020) The climate-smart ED: A primer. Annals Emerg Med 76(2): 155-167.

14. Gan E, Bringing Hospital Care to SGH@Home, Singapore.

15. Tsagkaris C, Hoian AV, Ahmad S, Essar MY, Campbell LW, et al. (2021) Using telemedicine for a lower carbon footprint in healthcare: A two fold tale of healing. The J of Clim Change and health 1: 100006.

16. Saxena N, You AX, Zhu Z, Sun Y, George PP, et al. (2015) Singapore's regional health system: a data driven perspective on frequent admitters and cross utilization of healthcare services in 3 systems. Int J Planning and Manage 32(1): 36-49.

17. Sergeant M, Ly O, Kandasamy S, Anand SS, de souza RJ (2024) Managing green house gases emissions in the terminal years of life in an overwhelmed health system: a paradigm shift for people and our planet. The Lancet Planetary Health 8(5): e327-333.

18. Eti S, Gokelp Y, Yavuz D, Zakaria NB, Erum N (2023) Strategy development for reducing carbon emissions in hospital. Eur Proceedings of Social and Behv Sciences 131(1): 1-1281.

19. Tomson C (2015) Reading the carbon footprint of hospital-based care. Future Hospital Journal 2(1): 57-62.

20. Wilkinson AJK, Braggins R, Steinbach I, Smith J (2019) Costs of switching to low global warning potential inhalers: an economic and carbon footprint analysis of NHS prescription data in England. BMJ Open 9(10): e028763.

21. BTS, BTS/SIGN British Guideline on the Management of Asthma, Scotland.

22. Asthma inhalers and climate change. NICE, SIGN Guidelines Available at: https://www.nice.org.uk>guidance>resources

23. Janson C, HendersonR, Lofdahl M, Hedberg M, Sharma R, et al. (2020) Carbon footprint impact on the choice of inhalers for asthma and COPD. Thorax 75(1): 82-84.

24. Marsh K, ganz M, Nortoft E, Lund N, Graff-Zivin J (2016) Incorporating emissions outcomes into a health economic model. Int J Technol Assess Health 32(6): 400-406.

25. Mortimer F (2010) The sustainable physician. Clin Med (Lond) 10(2): 110-111.

26. Sampath B, Jensen M, Lenoci-Edwards J, Little K, Singh H, et al. (2022) Reducing healthcare carbon footprint and emissions: A primer on measure and actions for healthcare organization to mitigate climate change. AHRQ Publication, USA.