NHS
Great Western Hospitals
NHS Foundation Trust

Sustainable healthcare and IPC: can they co-exist?

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Infection Prevention Society

Sponsored by

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Hosted by: Heather Stoltzfus
Johns Hopkins University School of Medicine

ips Infection Prevention Society

What is sustainability?

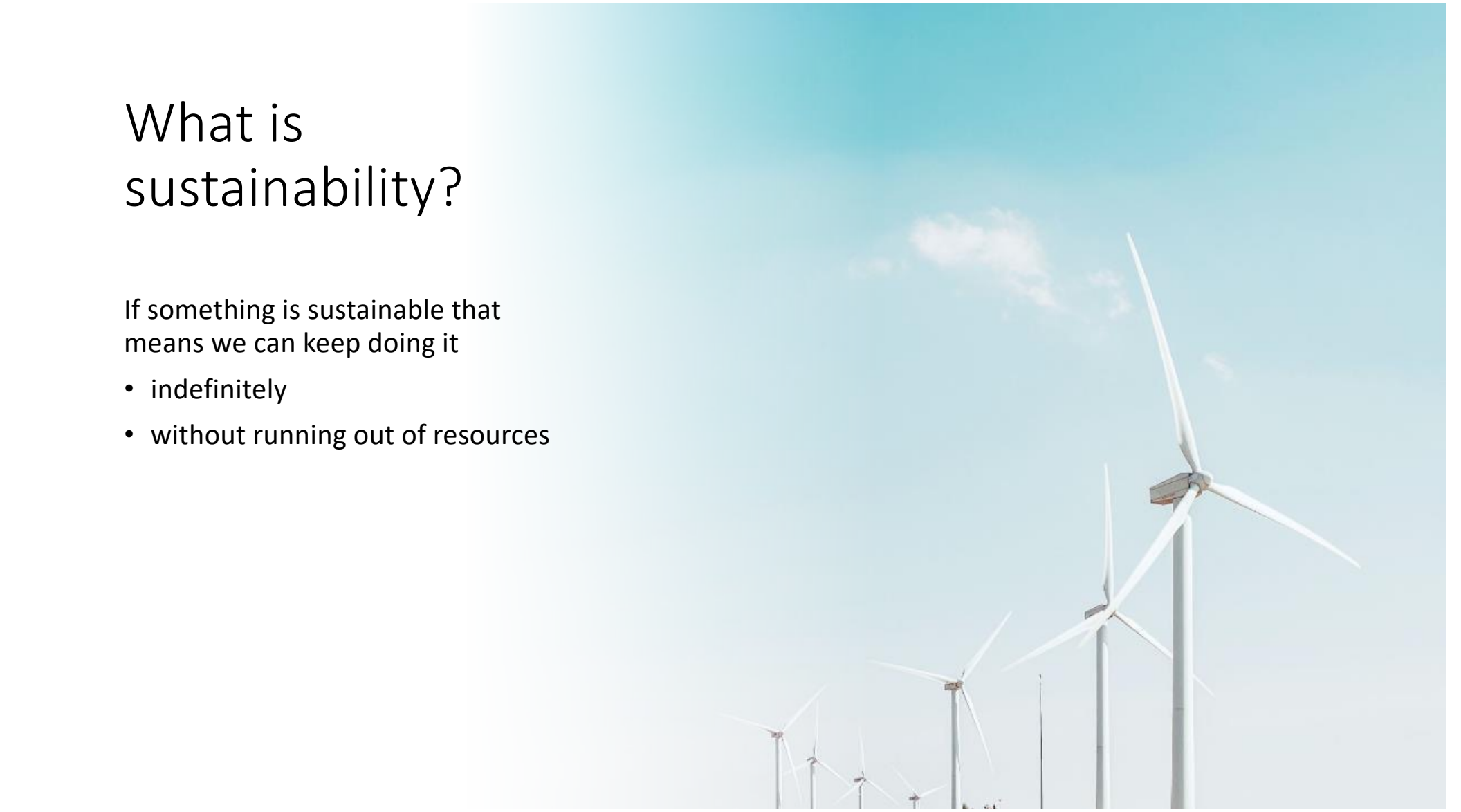
sustainable adjective

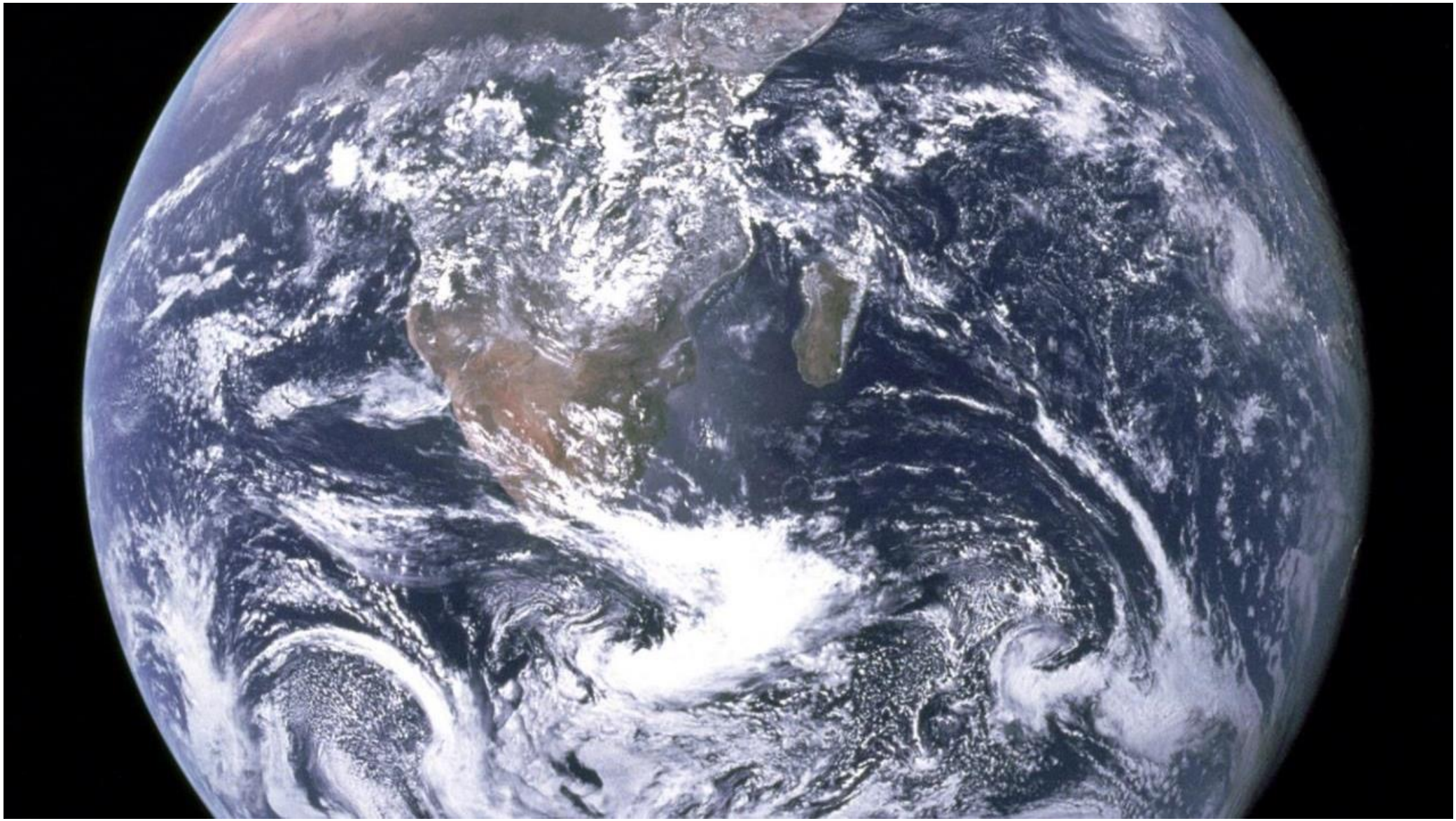
1. : capable of being sustained
2. : of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged

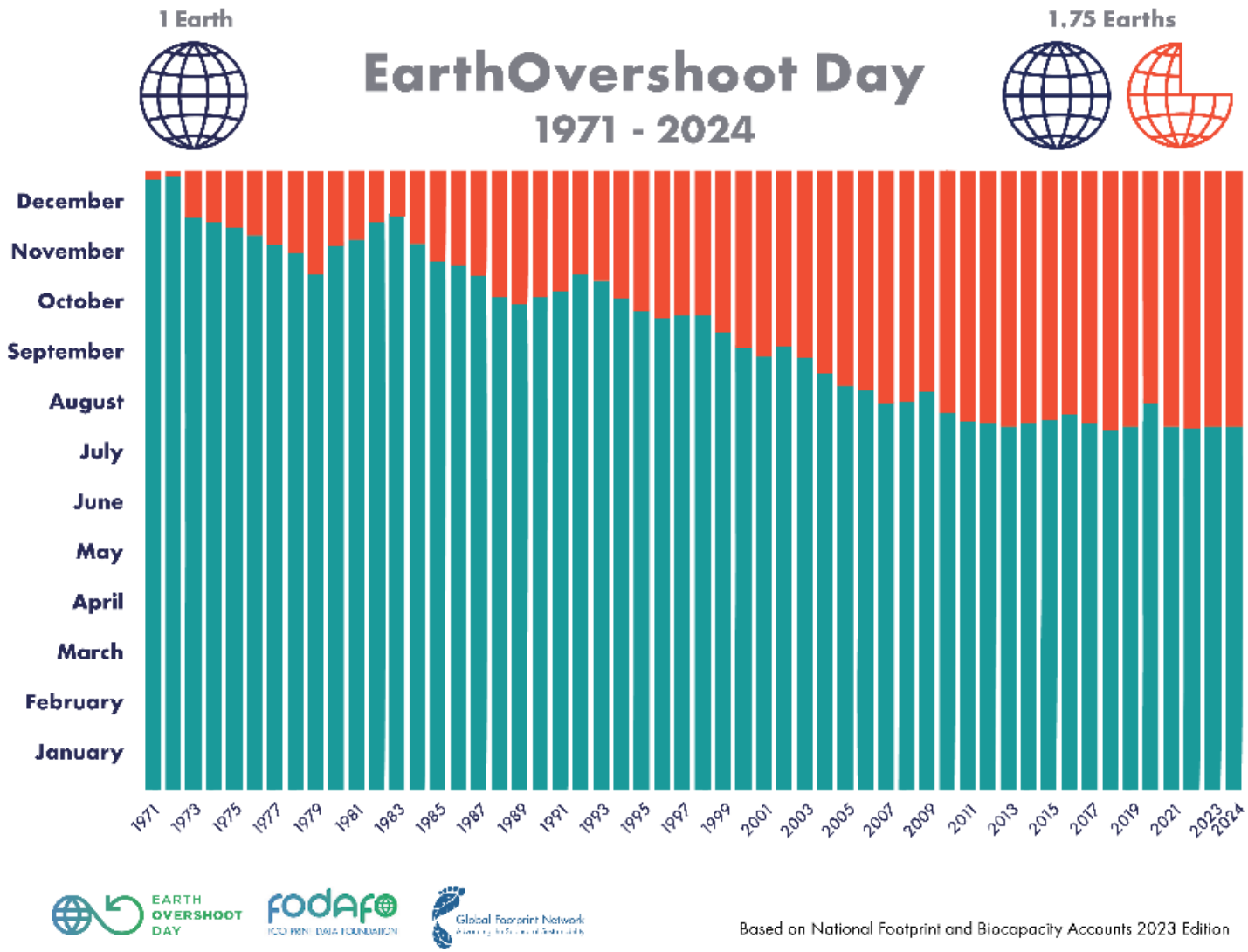
What is sustainability?

If something is sustainable that means we can keep doing it

- indefinitely
- without running out of resources





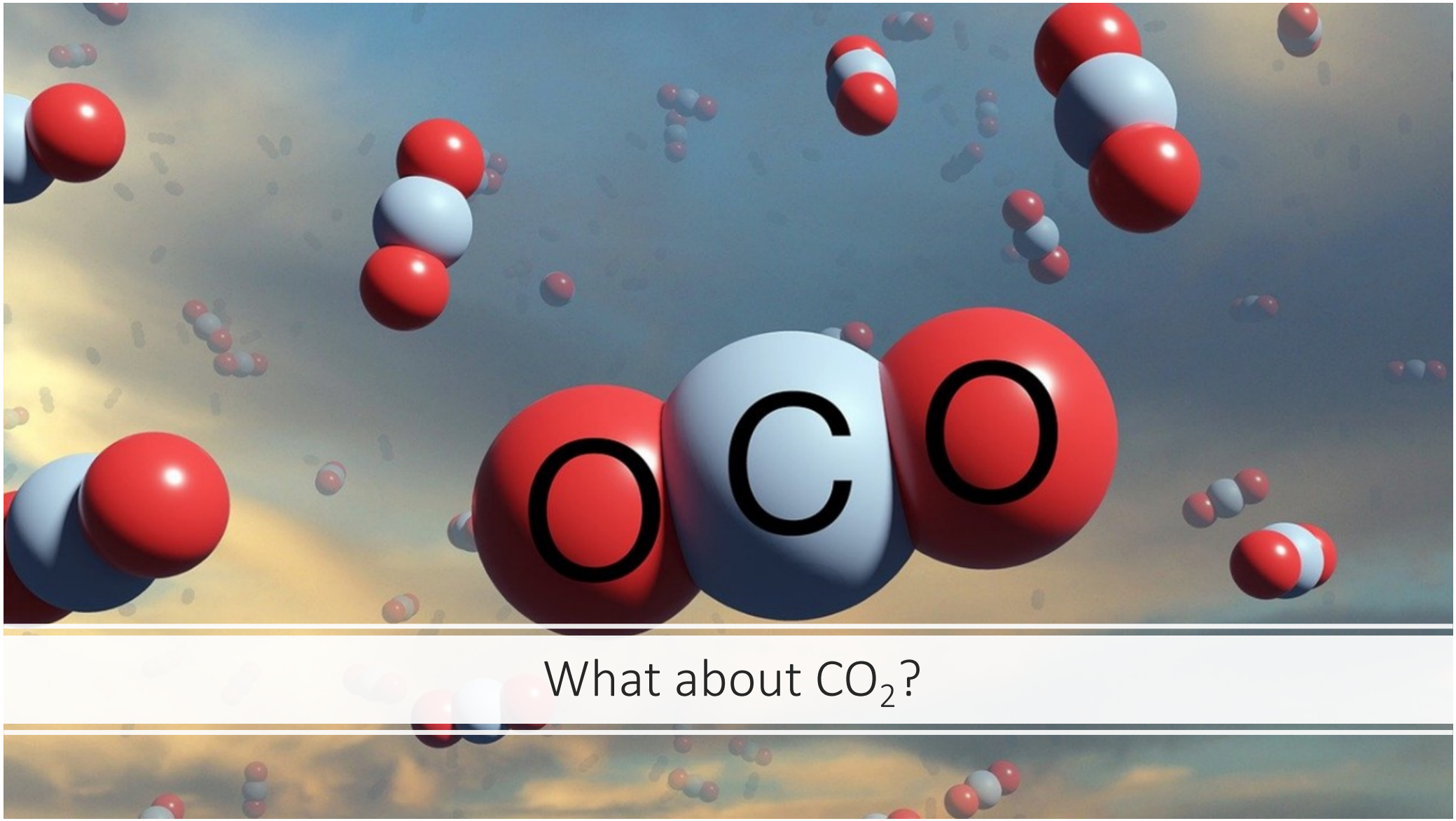


EARTH OVERSHOOT DAY

fodafo

Global Footprint Network

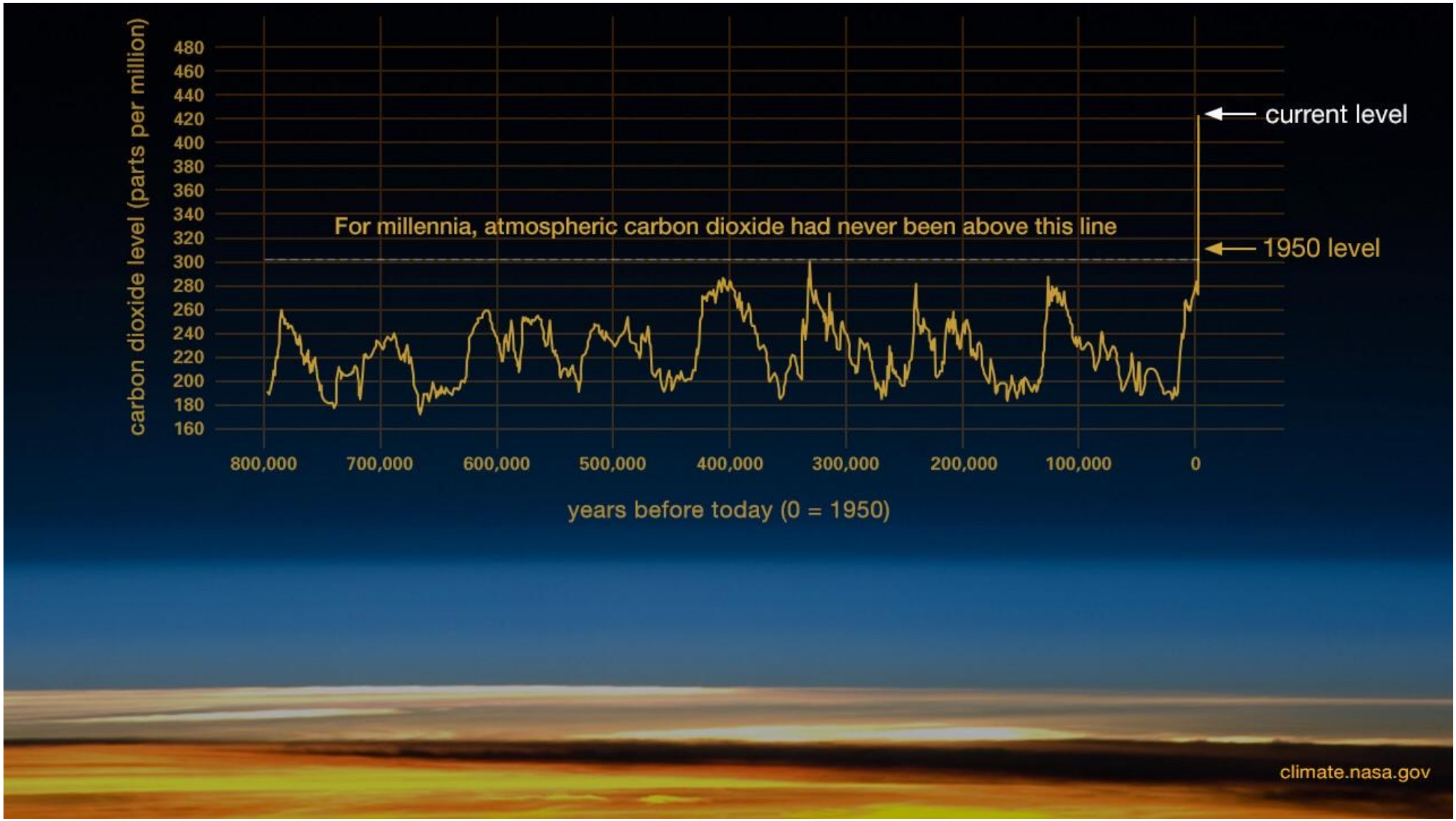
Based on National Footprint and Biocapacity Accounts 2023 Edition



What about CO_2?

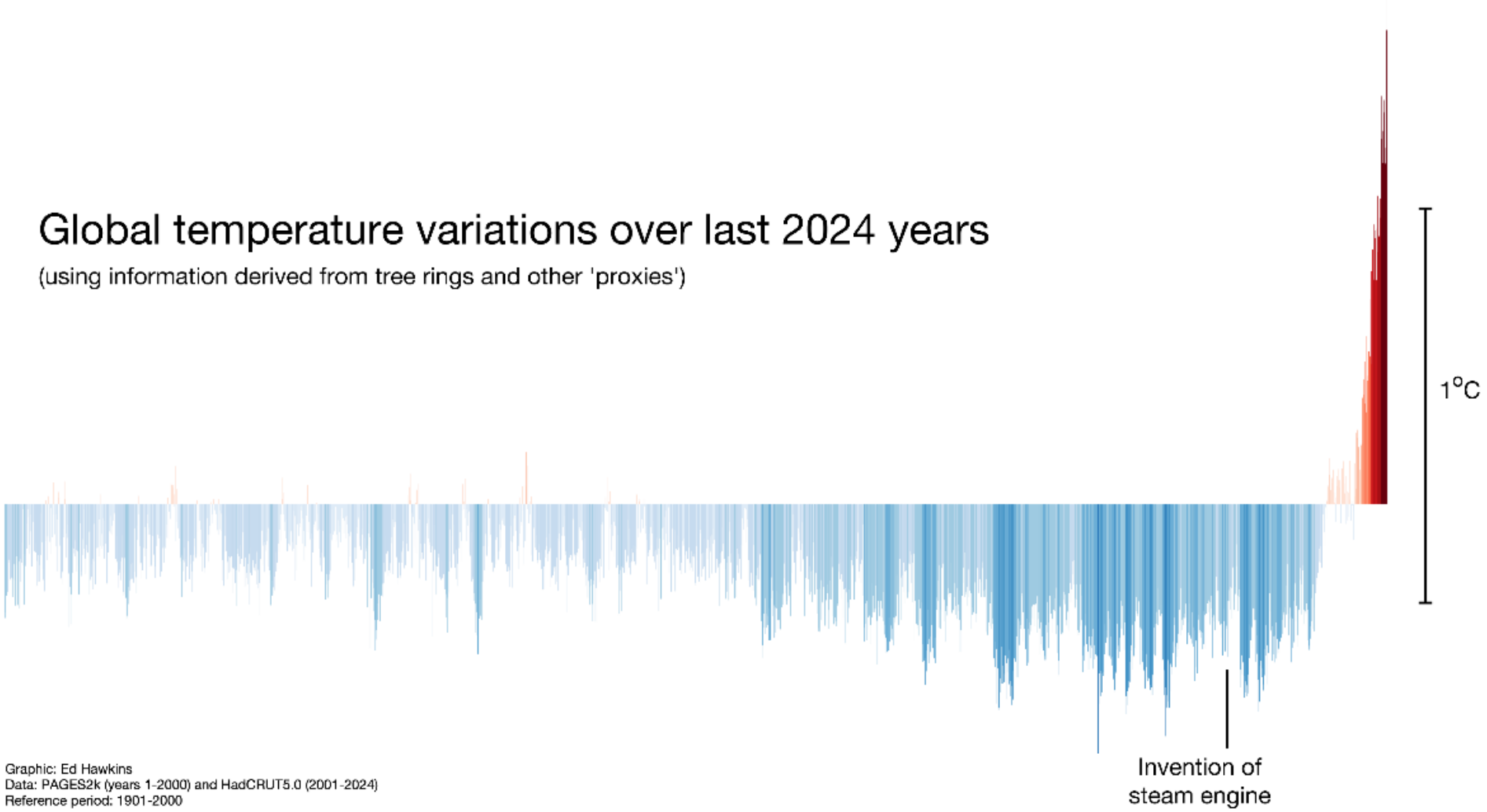
What about CO_2?

- Emitted when wood, oil, coal or gas are burned
- Almost everything has a ‘carbon footprint’
- Absorbed by the planet, but we emit more than it absorbs
- 280 ppm prior to the industrial revolution
- 330 ppm when I was born (1975, increase of 21% in ~200 years)
- 430 ppm in 2025 (increase of 39% in 50 years)
- More than 50% of the CO_2 ever emitted by humans has been emitted since 1990
- More heat trapped → Whole planet gets warmer


carbon dioxide level (parts per million)
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
For millennia, atmospheric carbon dioxide had never been above this line
current level
1950 level
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
years before today (0 = 1950)
climate.nasa.gov

Global temperature variations over last 2024 years

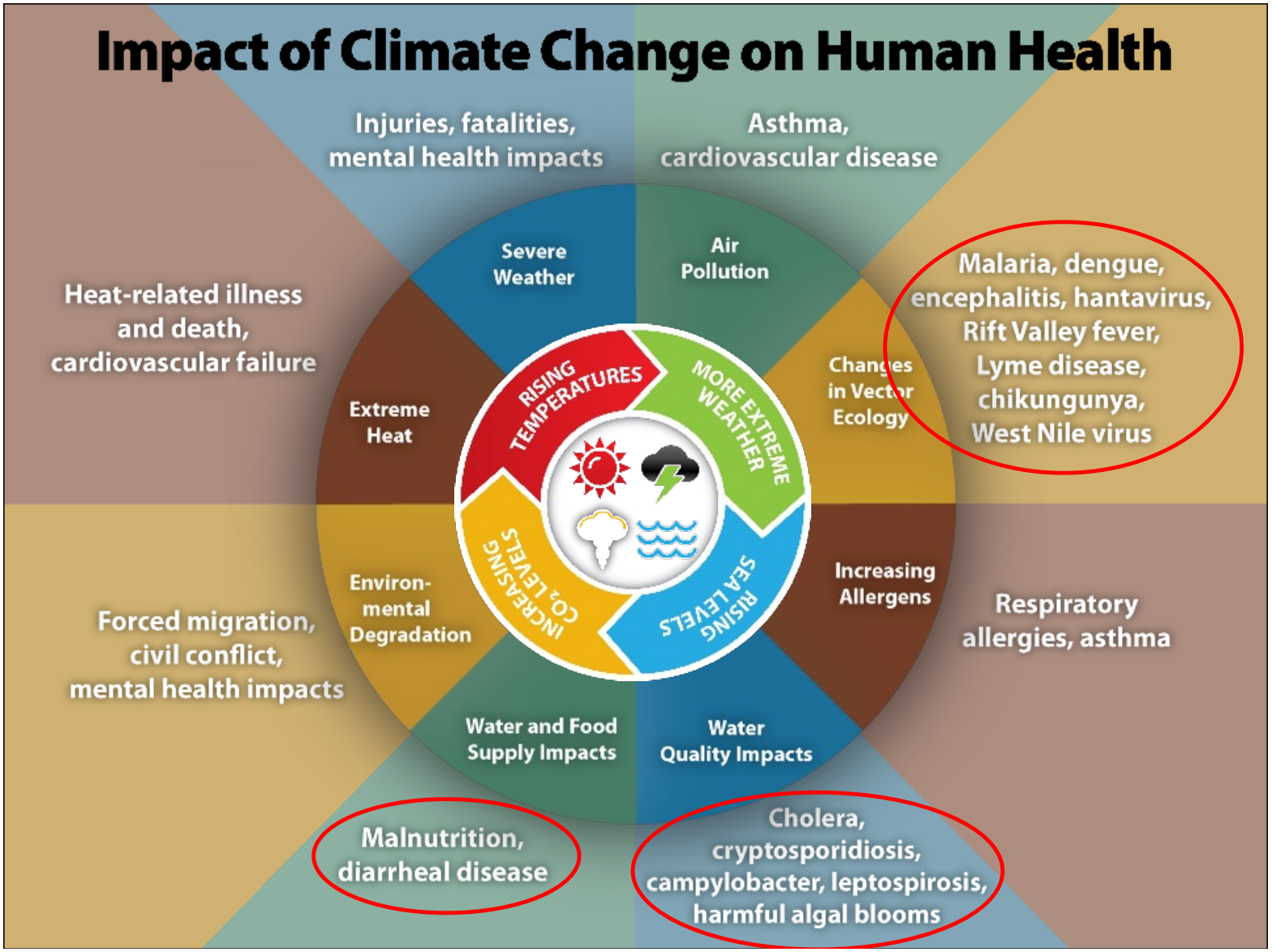
(using information derived from tree rings and other 'proxies')



Graphic: Ed Hawkins
Data: PAGES2k (years 1-2000) and HadCRUT5.0 (2001-2024)
Reference period: 1901-2000

Why does it matter?

- Warmer planet means warmer seas and warmer atmosphere
- If they're warmer they have more energy in them
- More energy means more storms as well as heatwaves
- Rising sea levels as ice caps melt
- Flooding (permanent and seasonal)
- Land loss
- Impact on food supply
- Increase in competition for resources
- Increase in migration
- Tipping points


Impact of Climate Change on Human Health
Injuries, fatalities, mental health impacts
Asthma, cardiovascular disease
Heat-related illness and death, cardiovascular failure
Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus
Forced migration, civil conflict, mental health impacts
Respiratory allergies, asthma
Malnutrition, diarrheal disease
Cholera, cryptosporidiosis, campylobacter, leptospirosis, harmful algal blooms
Severe Weather
Air Pollution
Changes in Vector Ecology
Extreme Heat
Environ-mental Degradation
Increasing Allergens
Water and Food Supply Impacts
Water Quality Impacts
RISING TEMPERATURES
MORE EXTREME WEATHER
RISING SEA LEVELS
INCREASING CO2 LEVELS

World Health Organisation

Climate change is the single biggest health threat facing humanity

Carbon footprint of healthcare

- Healthcare's carbon footprint is equivalent to 4.4% of global net emissions (2 gigatons of carbon dioxide equivalent).
- Equivalent to the annual greenhouse gas emissions from 514 coal-fired power plants.
- If the health sector were a country, it would be the fifth-largest emitter on the planet.

Source: Healthcare Without Harm (Europe)

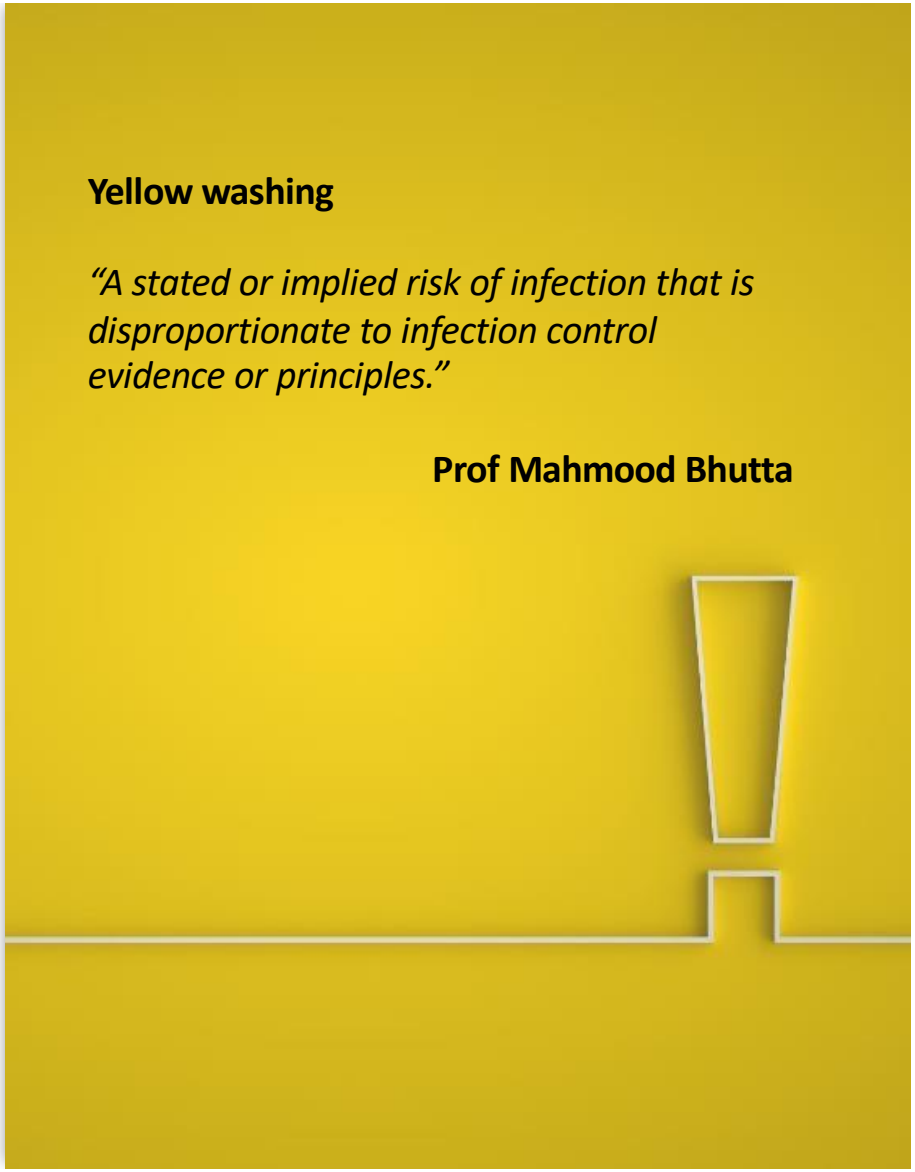
What's this got to do with IPC?

- Many healthcare practices driven by IPC risks
  - Sometimes these risks are real…
  - Often they are not!
  - Beware of yellow washing!
  - IPC expertise is needed to tell the difference
  - Question and challenge everything
- "We can't do that because of IPC"
  - Have you asked IPC?
- "IPC said no"
  - Need to re-evaluate
  - What is the real risk?
  - **Include the planet in the risk assessment!**
- IPC must lead this

Yellow washing

"A stated or implied risk of infection that is disproportionate to infection control evidence or principles."

Prof Mahmood Bhutta

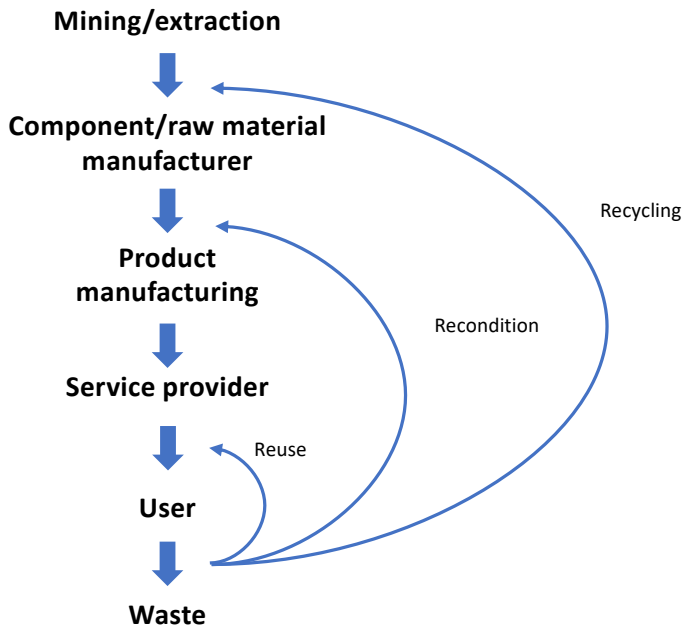


What can we do?

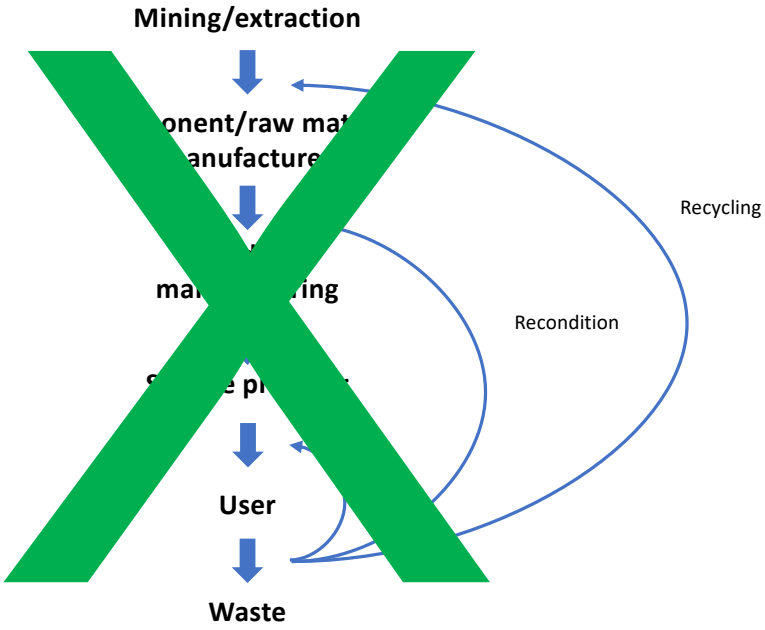
- Reduce consumption
- Reuse everything we can
- Recycle whatever we can't reuse
- Refine anything we can't recycle, so it minimises climate impact

Why reduce, then reuse, then recycle?

Why reduce, then reuse, then recycle?



Why reduce, then reuse, then recycle?



Reduce

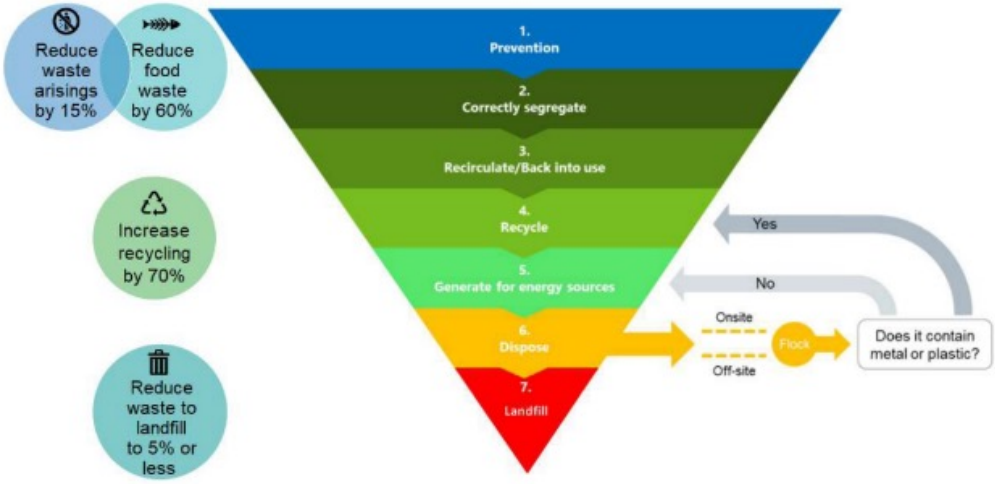
- Only use what we really need to use
- Eliminate unnecessary use
  - e.g. PPE, skin prep, couch roll
- **Include the planet in the risk assessment**
  - “just in case” – is that good enough?
- Also think about how to reduce energy, water, transport
- Prevention
  - “Reduce emissions, reduce admissions” (Greener NHS team)
  - Public health
  - Patient education
  - Understanding drivers for infection

Reuse

- Find alternatives to single-use.
- For example:
  - Aprons
  - Gowns
  - Masks
  - Tourniquets
  - Eye protection
  - Curtains
  - Surgical instruments
  - Anaesthetic masks
  - Sharps bins

Recycle

- Encourage and facilitate segregation of waste to maximise recycling
- Incineration 901 $kgCO_2e$/tonne (UK)
- Recycling 21 $kgCO_2e$/tonne (UK)
- Also saves money!!



Waste management hierarchy and NHS 2030 targets (HTM 07-01 (2022) *Safe and sustainable management of healthcare waste)*


Medical waste videos
mariakoijck.com/videos-surgery-waste

Refine

- Some things can't be reduced, re-used or recycled
- Need to minimise the impact
- Look at carbon footprint
  - Ask the company
  - Visit HealthcareLCA.com
- Look at other ways the environment is damaged
  - What waste is generated and how is it disposed of?
  - Use and treatment of water
- Alternatives to chlorine-based disinfectants
  - Other chemistry, e.g. peracetic acid, hypochlorous acid
  - Do you need to disinfect?
  - Often, clean is enough
- Alternatives to alcohol-based hand-rub
- Alternatives to decontamination wipes

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NHS Foundation Trust

Infection Prevention & Control and Sustainability

Exemplar site project report

Project summary

The project proposal from NHS England suggested that a glove or cannula reduction project could be used as a vehicle for demonstrating the benefits of formal joint working between IPC and Sustainability Teams. Since GWH was one of the sites at which collaboration between those teams had already been taking place on an ad-hoc basis, both teams saw this also as an opportunity to formalise that approach and thus additional projects were brought into the scope of the exemplar site work. The list of projects is below:

1. Green ED

Gaining Green ED accreditation from the Royal College of Emergency Medicine (including a cannula reduction project).

2. Gloves off

Implementing the Intensive Care Society's Gloves Off in Critical Care project.

3. Linen procedures

Reviewing linen procedures (use of couch roll and frequency of sheet changing).

4. Skin preparation

Reviewing the skin preparation needed for venepuncture.

5. Bag to Bedside

Implementing the 'Bag to Bedside' waste optimisation system.

6. PPE in theatres

Reviewing Personal Protective Equipment (PPE) in theatres – moving to reusable theatre caps and reducing the use of overshoes.

7. Infectious waste

Infectious waste definition and sharps bin lockdown dates – providing clarity to clinical staff in the light of updated national guidance (HTM 07-01).

8. Reusable tourniquets

Beginning a trial of reusable tourniquets.

9. Non-alcohol hand sanitiser

Trialling a more sustainable hand sanitiser.

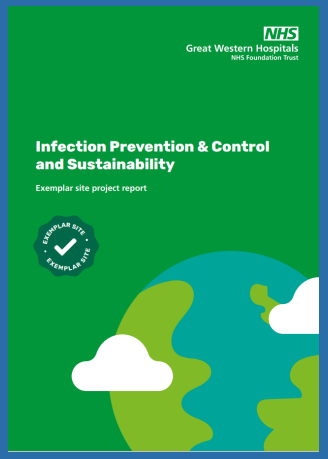
10. Recyclable curtains

Trialling curtains that can be used for longer and recycled.

11. Recycling bins

Wider roll-out of recycling bins in clinical areas.

IPC and Sustainability report



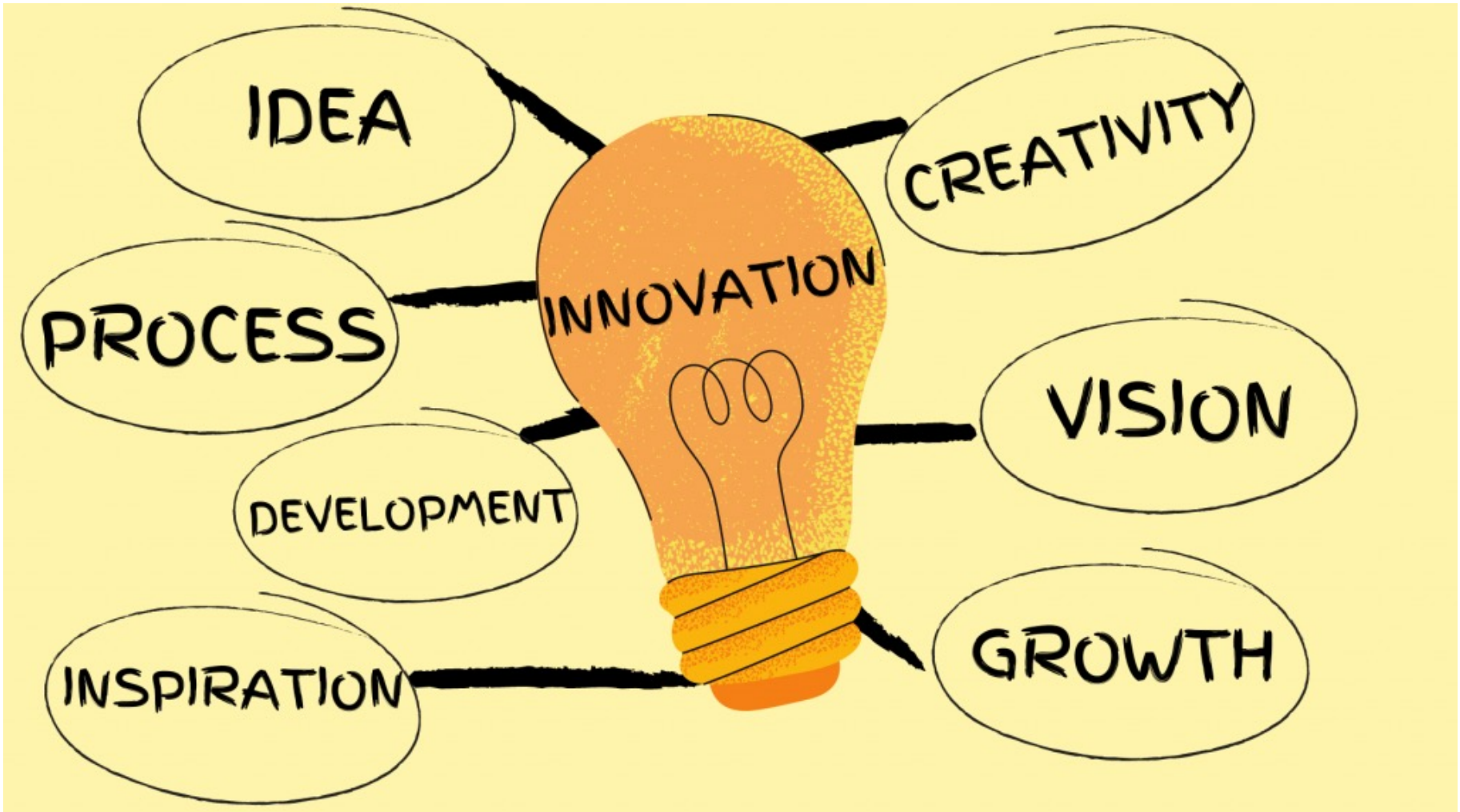
With thanks to

- NHS England CNO team
- GWH Sustainability team
- Clinical teams
- NHS Dorset graphic design team

- Download our report here

Or go to https://www.gwh.nhs.uk/media/aakj2uqq/1-gwh-ipc-sustainability-report-v1-0-digital-spreads.pdf

Net-Zero Healthcare


IDEA
CREATIVITY
PROCESS
INNOVATION
VISION
DEVELOPMENT
INSPIRATION
GROWTH

If not you, who?

If not now, when?

Escola de ENFERMAGEM
Universidade de São Paulo

PETIRAS

Sustainability in the OR and in the Reprocessing of medical devices

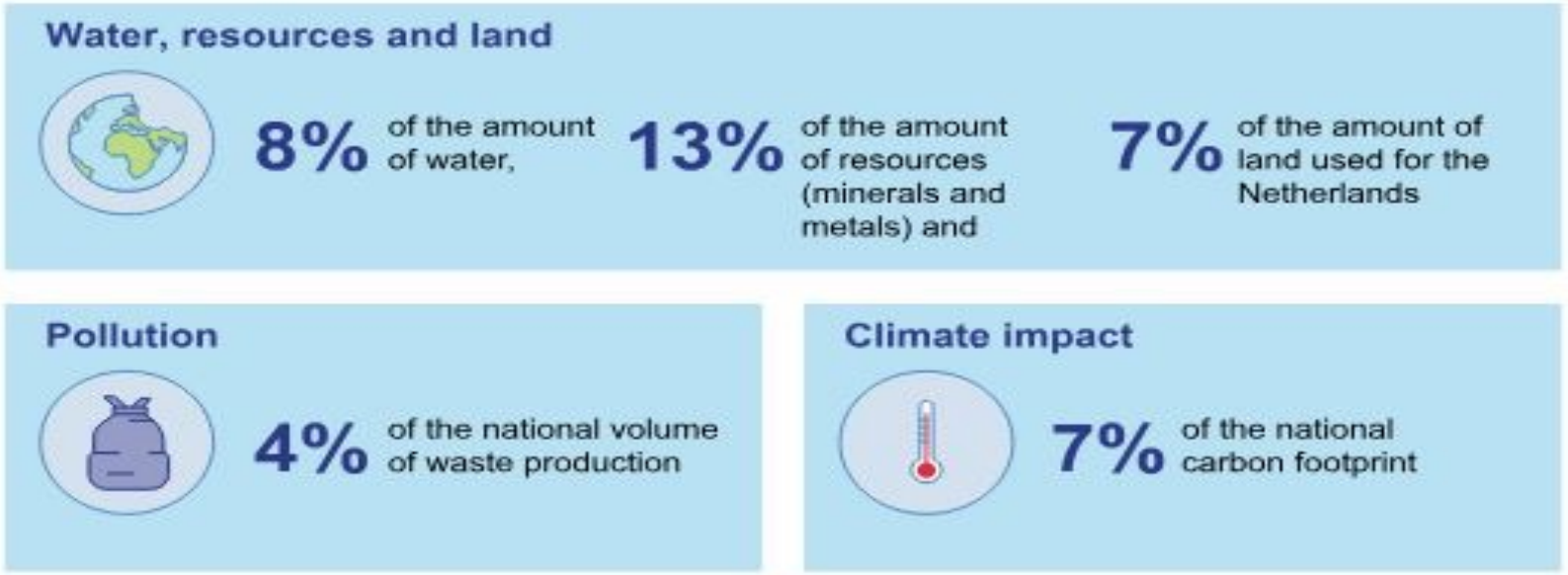
Prof Dr Camila Quartim de Moraes Bruna

Disclousure

I declare that I have no conflicts of interest that could compromise my impartiality.

The environmental impact of healthcare takes a number of forms, including greenhouse gas emissions, the use of water, resources and land, and pollution

Healthcare is responsible for:



Source: Rijksinstituut voor Volksgezondheid en Milieu (RIVM). Rapport 2022-0127. *Het effect van de Nederlandse zorg op het milieu. Methode voor milieuvoetafdruk en voorbeelden voor een gezonde zorgomgeving*. Conceptversie 5 september 2022.

Figure 1 The environmental impact of heathcare

Health Council of the Netherlands. Towards sustainable devices in healthcare . No. 2022/22e

The Lancet Commissions

Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development

John G Meara, Andrew J M Leather*, Lars Hagander*, Blake C Alkire, Nivaldo Alonso, Emmanuel A Ameh, Stephen W Bickler, Lesong Conteh, Anna J Dare, Justine Davies, Eunice Dérivois Mérisier, Shenaaz El-Halabi, Paul E Farmer, Atul Gawande, Rowan Gillies, Sarah L M Greenberg, Caris E Grimes, Russell L Gruen, Edna Adan Ismail, Thaim Buya Kamara, Chris Lavy, Ganbold Lundeg, Nyengo C Mkandawire, Nakul P Raykar, Johanna N Riesel, Edgar Rodas‡, John Rose, Nobhojit Roy, Mark G Shrime, Richard Sullivan, Stéphane Verguet, David Watters, Thomas G Weiser, Iain H Wilson, Gavin Yamey, Winnie Yip*

- 313 million surgeries worldwide
- More surgical or hospital deliveries (21.1%)

THE LANCET

The impact of surgery on global climate: a carbon footprinting study of operating theatres in three health systems

Andrea J MacNeill, Robert Lillywhite, Carl J Brown

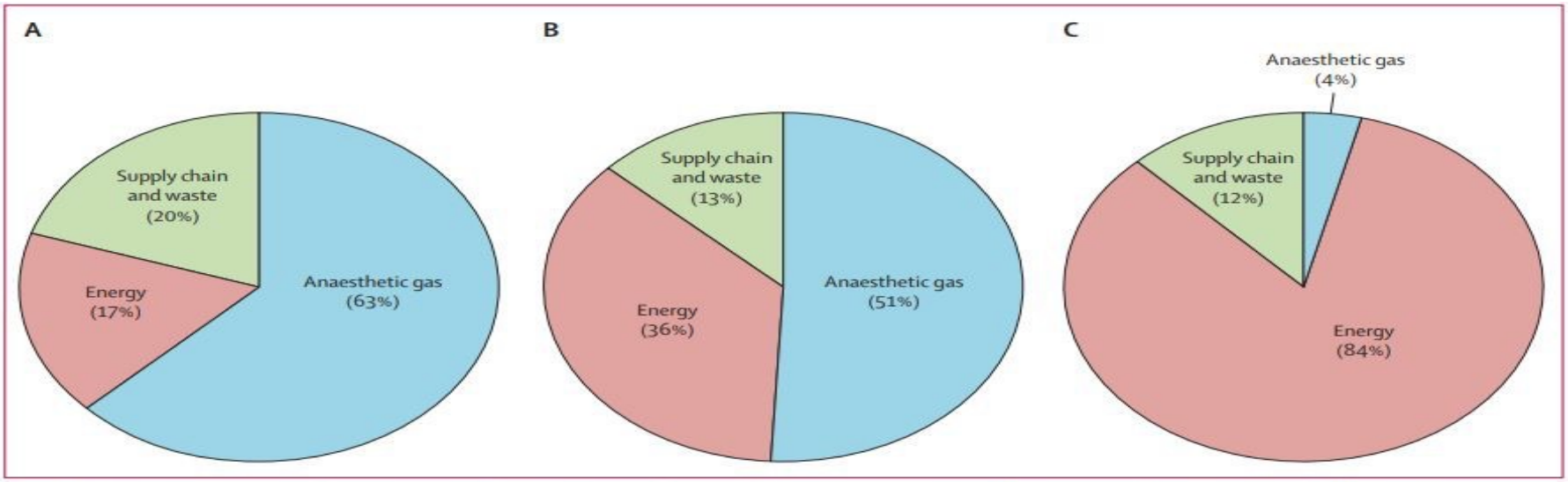


Figure 2: **Relative contribution of scopes 1, 2, and 3 to the carbon footprint of operating theatres at (A) Vancouver General Hospital, (B) University of Minnesota Medical Center, and (C) John Radcliffe Hospital**
Anaesthetic gas=scope 1. Energy=scope 2. Supply chain and waste=scope 3.

healthcare

Review

Healthcare Waste—A Serious Problem for Global Health

Edyta Janik-Karpinska [1], Rachele Brancaleoni [2], Marcin Niemcewicz [1], Wiktor Wojtas [3], Maurizio Foco [4], Marcin Podogrocki [1] and Michal Bijak [1,*]

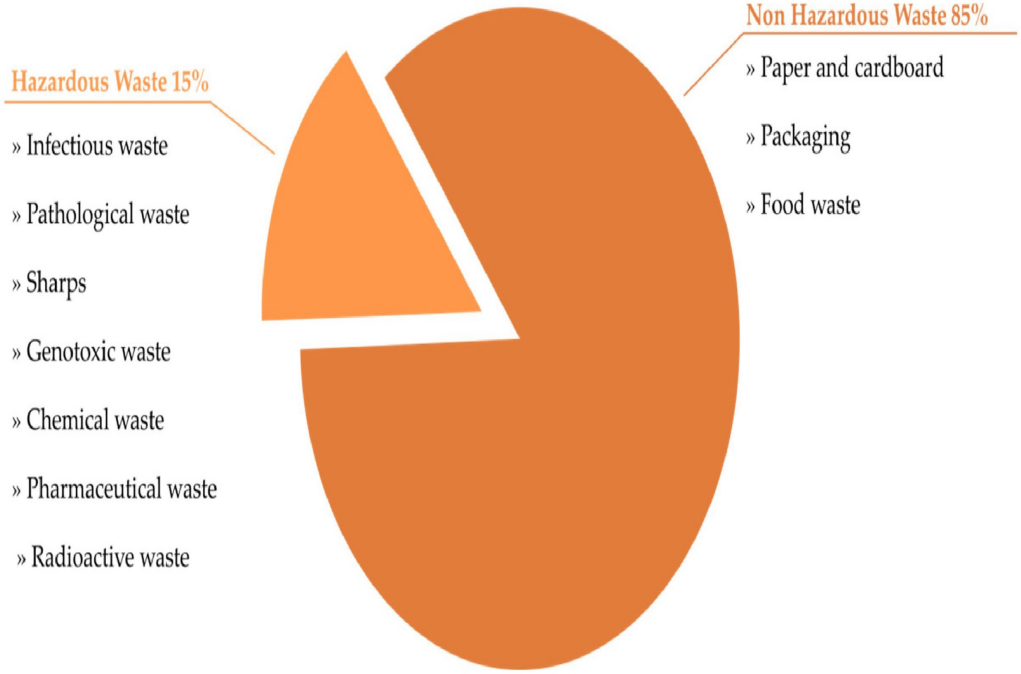
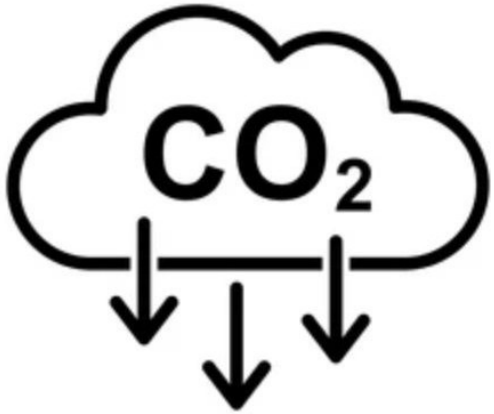


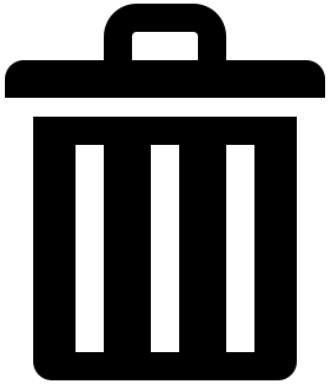
Figure 1. Standard waste composition in health facilities.

Table 3. Example of HCW production rate in various countries worldwide.

Continent	Countries	HCW Generation (kg/bed/day)	Reference
North America	USA	8.4–10.7	[16–18]
	Canada	8.2	[16,19]
Europe	Spain	3.5–4.4	[17,18,20]
	Norway	3.9	[18,20]
	Greece	0.3–3.6	[18,21,22]
	France	2.7–3.3	[17,18,23]
Asia	Kazakhstan	5.34–5.4	[8,18,24]
	China	0.6–4.03	[18,25,26]
	Jordan	2.5–6.10	[17,18,27]
	India	0.8–2.31	[18,23,28]
South America	Argentina	2.7–3.0	[18,23]
	Brazil	2.94–3.3	[17,18,29]
	Ecuador	2.09–2.1	[18,30]
Africa	Ethiopia	1.1–1.8	[18,31,32]
	Egypt	0.7–1.7	[18,19,33]
	Sudan	0.38–0.9	[18,34,35]
	Morocco	0.4–0.7	[18,36]

Biggest villains in the OR and SPD





Stall N, et al, 2013; MacNeill AJ, 2017, Beloeil H, Albaladejo P, 2021

applied sciences

MDPI

Article

Assessing the Energy Demand Reduction in a Surgical Suite by Optimizing the HVAC Operation During Off-Use Periods

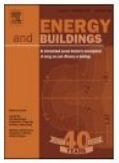
Antón Cacabelos-Reyes [1], José Luis López-González [2], Arturo González-Gil [1], Lara Febrero-Garrido [1,*], Pablo Eguía-Oller [3] and Enrique Granada-Álvarez [3]

Energy & Buildings 174 (2018) 513–526

Contents lists available at ScienceDirect

Energy & Buildings

journal homepage: www.elsevier.com/locate/enbuild



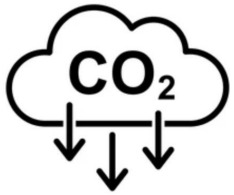
Thermal energy demand and potential energy savings in a Spanish surgical suite through calibrated simulations

A. González-Gil [a,*], J.L. López-González [b,c], M. Fernández [c], P. Eguía [c], A. Erkoreka [d], E. Granada [c]

[a] Defense University Center, Spanish Naval Academy, Plaza de España s/n, 36920 Marín, Spain
[b] SERGAS, Xunta de Galicia, Edificio Administrativo San Lazaro, s/n, 15703 Santiago de Compostela, Spain
[c] Department of Mechanical Engineering, Heat Engines and Fluid Mechanics, Industrial Engineering School, University of Vigo, 36310 Vigo, Spain
[d] ENEDI Research Group, Department of Thermal Engineering, University of the Basque Country, UPV, EHU, Alda.Urquijo s/n, Bilbao, Spain

- Air conditioning;
- Presence sensors;
- LED lights.

American Society of Anesthesiologists



Greenhouse Gas Emissions of Common Inhaled Anesthetic Agents. (Adapted from Ryan, et al.[72])

MAC inhaled agent	Atmospheric lifetime (years)	100-year Global Warming Potential (GWP)[71] (per kg, in comparison with 1 kg CO_2, where GWP CO_2 = 1)	Equivalent auto miles* driven MAC-hour of anesthetic use at 1 L/min
Isoflurane 1.2%	3.6	539	8
Sevoflurane 2.2%	1.9	144	4
Desflurane 6.7%	14	2,540	190
60% Nitrous Oxide (0.6 MAC)	114	273	49

MAC = mean alveolar concentration

* Based on EPA 2022 emission factor of 4.03 x 10-4 metric tons of CO_2- equivalent/mile

Recommendations

Anaesthesia 2022, 77, 201–212 doi:10.1111/anae.15598

Guidelines

Principles of environmentally-sustainable anaesthesia: a global consensus statement from the World Federation of Societies of Anaesthesiologists

S. M. White,[1] C. L. Shelton,[2,3] A. W. Gelb,[4] C. Lawson,[5] F. McGain,[6,7] J. Muret[8] and J. D. Sherman,[9] representing the World Federation of Societies of Anaesthesiologists Global Working Group on Environmental Sustainability in Anaesthesia*

- Sustainable disposal of chemicals;
- Reduce gas flow (O_2);
- Routinely check for leaks (gases);
- Desflurane < N_2O < Isoflurane < Sevoflurane < Propofol < Local;
- Education on sustainability.

ASA, 2023

Chin et al. Journal of Otolaryngology - Head and Neck Surgery 2014, 43:46
http://www.journalotohns.com/content/43/1/46

JOURNAL OF OTOLARYNGOLOGY - HEAD & NECK SURGERY

ORIGINAL RESEARCH ARTICLE Open Access

Reducing otolaryngology surgical inefficiency via assessment of tray redundancy

Christopher J Chin[1], Leigh J Sowerby[1], Ava John-Baptiste[2,3,4] and Brian W Rotenberg[1*]

Abstract

Background: Health care costs in Canada continue to rise. As a result of this relentless increase in healthcare spending, ways to increase efficiency and decrease cost are constantly being sought. Surgical treatment is the mainstay of therapy for many conditions in the field of Otolaryngology- Head and Neck Surgery. The evidence suggests that room exists to optimize tray efficiency as a novel means of improving operating room throughput.

Methods: We conducted a review of instruments on surgical trays for 5 commonly performed procedures between July 5th, 2013 and September 20th, 2013 at St Joseph's Hospital. The Instrument Utilization Rate was calculated; we then designed new 'optimized' trays based on which instruments were used at least 20% of the time. We obtained tray building times from Central Processing Department, then calculated an overall mean time per instrument (to pack the freshly washed instruments). We then determined the time that could be saved by using our new optimized trays.

Results: In total, 226 instrument trays were observed (Table 1). The average Instrument Utilization Rate was 27.8% (+/− 13.1). Our optimized trays, on average, reduced tray size by 57%. The average time to pack one instrument was 17.7 seconds.

Conclusions: By selectively reducing our trays, we plan to reduce tray content by an average of 57%. It is important to remember that this number looks at only 5 procedures in the Department of Otolaryngology- Head and Neck Surgery. If this was expanded city-wide to the rest of the departments, the improved efficiency could potentially be quite substantial.

Keywords: Otolaryngology, Efficiency analysis, Surgery

JOURNAL OF SURGICAL RESEARCH • DECEMBER 2017 (220) 320–326

ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Association for Academic Surgery

Surgical tray optimization as a simple means to decrease perioperative costs

James S. Farrelly, MD, MHS,[a,] Crystal Clemons, MPH, PMP,[b] Sherri Witkins, BSN, RN, CNOR,[b] Walter Hall,[b] Emily R. Christison-Lagay, MD,[a,b] Doruk E. Ozgediz, MD, MSc,[a,b] Robert A. Cowles, MD,[a,b] David H. Stitelman, MD,[a,b] and Michael G. Caty, MD, MMM[a,b]*

[a] *Department of Surgery, Yale University School of Medicine, New Haven, Connecticut*
[b] *Department of Surgery, Yale New Haven Children's Hospital, New Haven, Connecticut*

Patient Safety/Quality Improvement

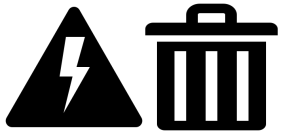
AMERICAN ACADEMY OF OTOLARYNGOLOGY-HEAD AND NECK SURGERY FOUNDATION

Otolaryngology–Head and Neck Surgery 2020, Vol. 162(2) 215–219

DOI: 10.1177/0194599819885635
http://otojournal.org
SAGE

Surgical Instrument Optimization to Reduce Instrument Processing and Operating Room Setup Time

Lauren Crosby, MSc[1], Eric Lortie, MHA[2], Brian Rotenberg, MD, MPH, FRCSC[3], and Leigh Sowerby, MD, MHM, FRCSC[3]



Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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Journal of Pediatric Urology (2019) 15, 153.e1–153.e6

ELSEVIER

Decreasing operating room costs via reduction of surgical instruments

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[a]Dell Children's Hospital, Austin, TX, USA

[b]Rady Children's Hospital, San Diego, CA, USA

* Corresponding author. kswords@rchsd.org (K.A. Swords)

Keywords
Surgical; Cost; Reduction

Summary

Background
Rising costs in health care demand waste reduction and improved efficiency throughout the hospital. Surgeons have an important role in regard to the number of instruments used in procedures. Previous studies have demonstrated instrument maintenance and sterilization cost approximately $0.51–$0.77 per instrument and found that only 13–21.9% of instruments opened are used.

Results
The GU minor instrument tray was reduced from 57 to 35 instruments, a 39% reduction in size. Scrotal orchiopexy uses the least instruments (16.9), a utilization percentage of 48.3% after reduction. Inguinal orchiopexy with hernia repair uses the most

orchiopexy with hernia cases, 10 scrotal orchiopexy cases, and 10 inguinal hernia cases were counted. The percentage of utilization was calculated. This process was then replicated in other surgical trays.

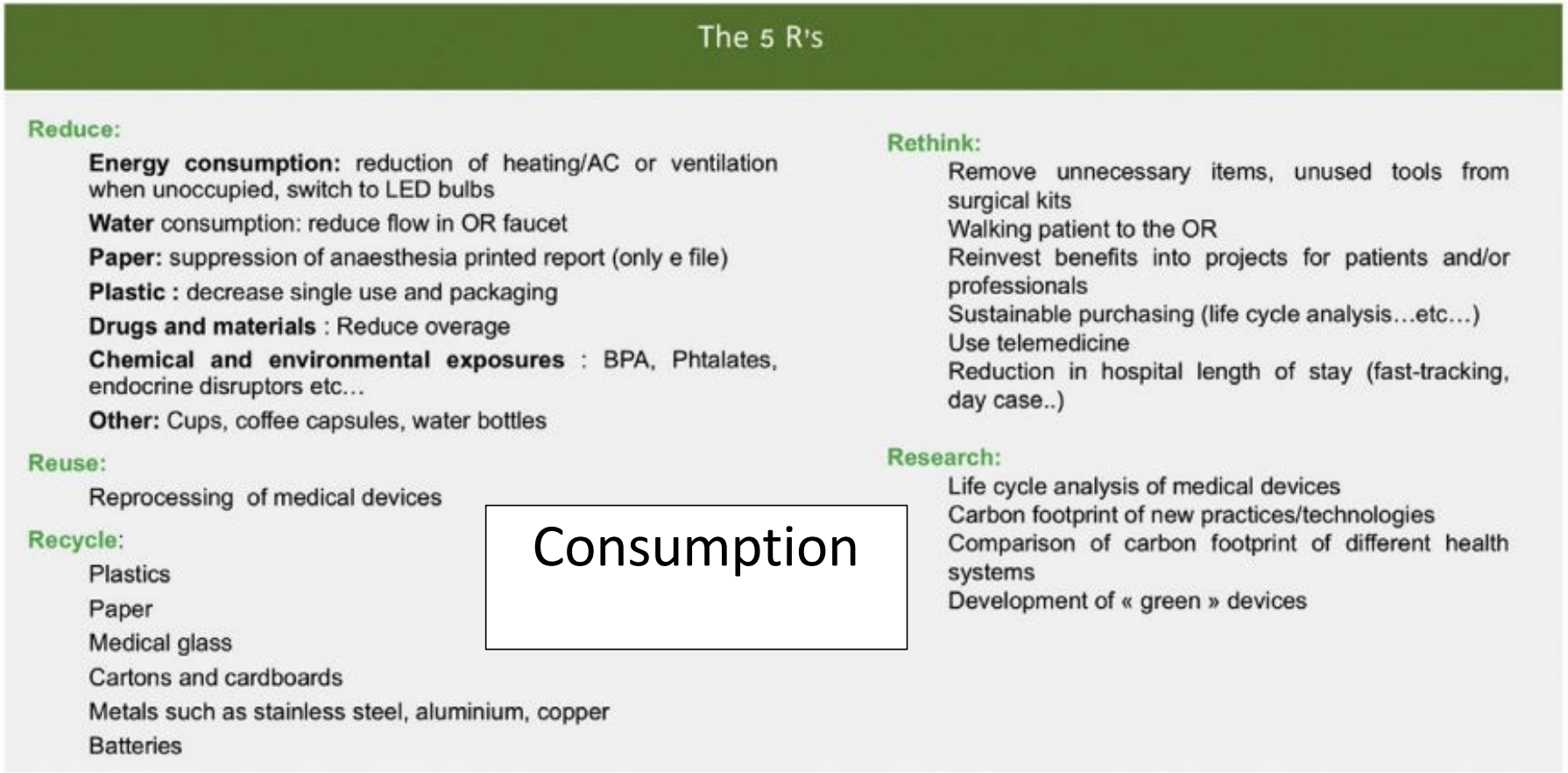


Fig. 1. The 5R's in the operating room (from ESA tool kit for beginners [43]).

Chin et al. Journal of Otolaryngology - Head and Neck Surgery 2014, 43:46
http://www.journalotohns.com/content/43/1/46

JOURNAL OF OTOLARYNGOLOGY - HEAD & NECK SURGERY

ORIGINAL RESEARCH ARTICLE Open Access

Reducing otolaryngology surgical inefficiency via assessment of tray redundancy

Christopher J Chin[1], Leigh J Sowerby[1], Ava John-Baptiste[2,3,4] and Brian W Rotenberg[1*]

Abstract

Background: Health care costs in Canada continue to rise. As a result of this relentless increase in healthcare spending, ways to increase efficiency and decrease cost are constantly being sought. Surgical treatment is the mainstay of therapy for many conditions in the field of Otolaryngology- Head and Neck Surgery. The evidence suggests that room exists to optimize tray efficiency as a novel means of improving operating room throughput.

Methods: We conducted a review of instruments on surgical trays for 5 commonly performed procedures between July 5th, 2013 and September 20th, 2013 at St Joseph's Hospital. The Instrument Utilization Rate was calculated; we then designed new 'optimized' trays based on which instruments were used at least 20% of the time. We obtained tray building times from Central Processing Department, then calculated an overall mean time per instrument (to pack the freshly washed instruments). We then determined the time that could be saved by using our new optimized trays.

Results: In total, 226 instrument trays were observed (Table 1). The average Instrument Utilization Rate was 27.8% (+/− 13.1). Our optimized trays, on average, reduced tray size by 57%. The average time to pack one instrument was 17.7 seconds.

Conclusions: By selectively reducing our trays, we plan to reduce tray content by an average of 57%. It is important to remember that this number looks at only 5 procedures in the Department of Otolaryngology- Head and Neck Surgery. If this was expanded city-wide to the rest of the departments, the improved efficiency could potentially be quite substantial.

Keywords: Otolaryngology, Efficiency analysis, Surgery

JOURNAL OF SURGICAL RESEARCH • DECEMBER 2017 (220) 320–326

ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Association for Academic Surgery

Surgical tray optimization as a simple means to decrease perioperative costs

James S. Farrelly, MD, MHS,[a,] Crystal Clemons, MPH, PMP,[b] Sherri Witkins, BSN, RN, CNOR,[b] Walter Hall,[b] Emily R. Christison-Lagay, MD,[a,b] Doruk E. Ozgediz, MD, MSc,[a,b] Robert A. Cowles, MD,[a,b] David H. Stitelman, MD,[a,b] and Michael G. Caty, MD, MMM[a,b]*

[a] *Department of Surgery, Yale University School of Medicine, New Haven, Connecticut*
[b] *Department of Surgery, Yale New Haven Children's Hospital, New Haven, Connecticut*

Patient Safety/Quality Improvement

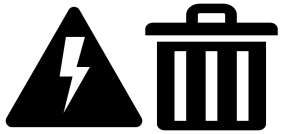
AMERICAN ACADEMY OF OTOLARYNGOLOGY-HEAD AND NECK SURGERY FOUNDATION

Otolaryngology–Head and Neck Surgery 2020, Vol. 162(2) 215–219

DOI: 10.1177/0194599819885635
http://otojournal.org
SAGE

Surgical Instrument Optimization to Reduce Instrument Processing and Operating Room Setup Time

Lauren Crosby, MSc[1], Eric Lortie, MHA[2], Brian Rotenberg, MD, MPH, FRCSC[3], and Leigh Sowerby, MD, MHM, FRCSC[3]



Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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Journal of Pediatric Urology (2019) 15, 153.e1–153.e6

ELSEVIER

Decreasing operating room costs via reduction of surgical instruments

K. Nast [a], K.A. Swords [b,*]

[a]Dell Children's Hospital, Austin, TX, USA

[b]Rady Children's Hospital, San Diego, CA, USA

* Corresponding author. kswords@rchsd.org (K.A. Swords)

Keywords
Surgical; Cost; Reduction

Summary

Background
Rising costs in health care demand waste reduction and improved efficiency throughout the hospital. Surgeons have an important role in regard to the number of instruments used in procedures. Previous studies have demonstrated instrument maintenance and sterilization cost approximately $0.51–$0.77 per instrument and found that only 13–21.9% of instruments opened are used.

Results
The GU minor instrument tray was reduced from 57 to 35 instruments, a 39% reduction in size. Scrotal orchiopexy uses the least instruments (16.9), a utilization percentage of 48.3% after reduction. Inguinal orchiopexy with hernia repair uses the most

orchiopexy with hernia cases, 10 scrotal orchiopexy cases, and 10 inguinal hernia cases were counted. The percentage of utilization was calculated. This process was then replicated in other surgical trays.

The Journal of Arthroplasty 34 (2019) 2834–2840

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Health Policy & Economics

Optimization of Orthopedic Surgical Instrument Trays: Lean Principles to Reduce Fixed Operating Room Expenses

Kyle H. Cichos, BS [a], Zane B. Hyde, MD [a], Scott E. Mabry, MD [a], Elie S. Ghanem, MD [a, *], Eugene W. Brabston, MD [a], Leslie W. Hayes, MD [b], Gerald McGwin Jr., PhD [c], Brent A. Ponce, MD [a]

[a] Department of Orthopaedic Surgery, University of Alabama at Birmingham, Birmingham, AL
[b] Department of Pediatrics, University of Alabama at Birmingham, Birmingham, AL
[c] Department of Epidemiology, UAB School of Public Health, Birmingham, AL

Quality Improvement Study

Medicine

OPEN

Implementing a perioperative efficiency initiative for orthopedic surgery instrumentation at an academic center

A comparative before-and-after study

Richard Capra, BS[a], Stefano A. Bini, MD[a], Dawn E. Bowden, PhD[b,*], Katherine Etter, PhD[b], Matt Callahan, MSBA[a], Richard T. Smith, MBA[b], Thomas Parker Vail, MD[a]

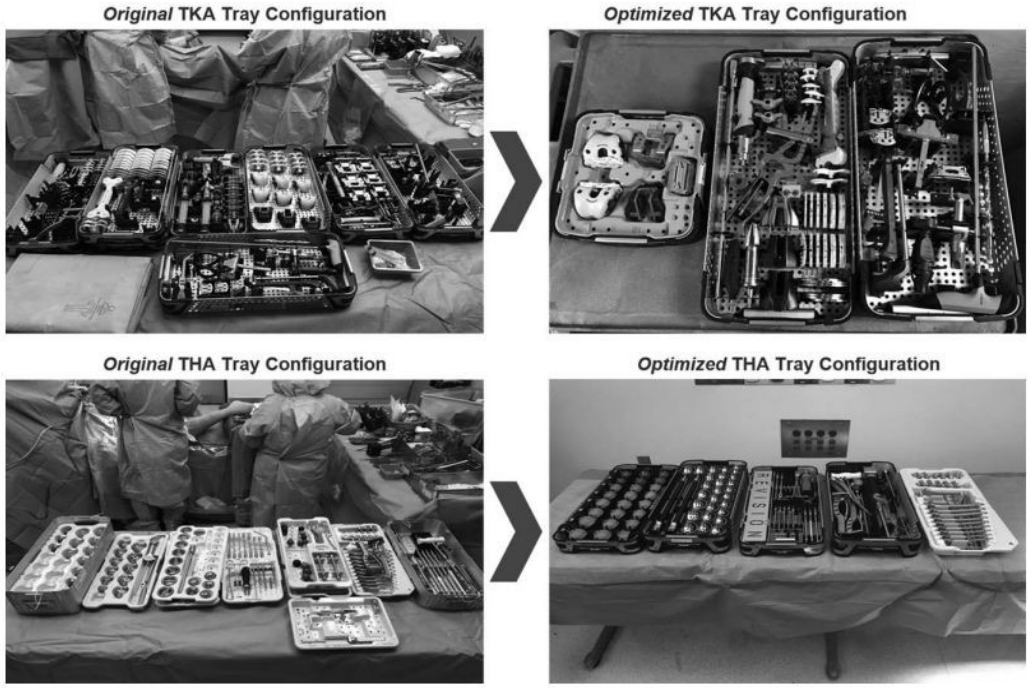


Figure 1. Optimized tray configuration. TKA = total-knee arthroplasty, THA = total-hip arthroplasty.

Commentary

The Royal Society of Medicine

Journal of the Royal Society of Medicine; 2020, Vol. 113(2) 49–53
DOI: 10.1177/0141076819890554

Plastics in healthcare: time for a re-evaluation

Chantelle Rizan[1,2,3], **Frances Mortimer**[2], **Rachel Stancliffe**[2] **and Mahmood F Bhutta**[1,4]

[1]Department of ENT, Brighton and Sussex University Hospitals NHS Trust, Brighton BN2 5BE, UK
[2]Centre for Sustainable Healthcare, Oxford OX2 7JQ, UK
[3]Royal College of Surgeons of England, London WC2A 3PE, UK
[4]BMA Medical Fair and Ethical Trade Group, British Medical Association, London WC1H 9JP, UK
Corresponding author: Chantelle Rizan. Email: chantelle.rizan@sustainablehealthcare.org.uk

Figure 2. 101 single-use pieces of plastic, generated by one typical adenotonsillectomy operation.

https://talkintrashwithuhn.com/2022/01/21/put-on-your-thinking-wrap/

Journal of Cleaner Production 403 (2023) 136790

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Developing environmental transformational leadership with training: Leaders and subordinates environmental behaviour outcomes

Chibuike K. Nduneseokwu [a], Marie K. Harder [a,b,*]

[a] Department of Environmental Science and Engineering, Fudan University, 2205, Songhu Rd., Shanghai, 200438, PR China
[b] Values & Sustainability Research Group, School of Architecture, Technology and Engineering, University of Brighton, UK

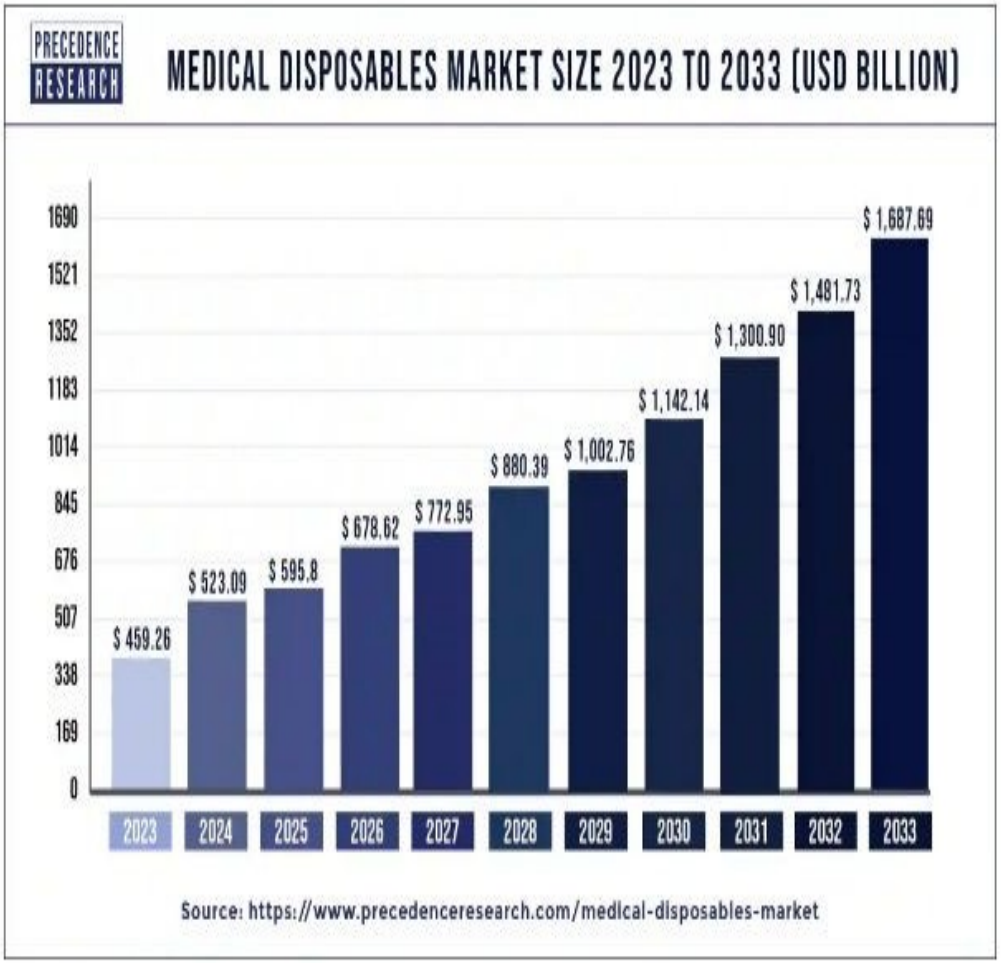
- Role model, example!
- Optimism;
- Passion;
- Recognition.

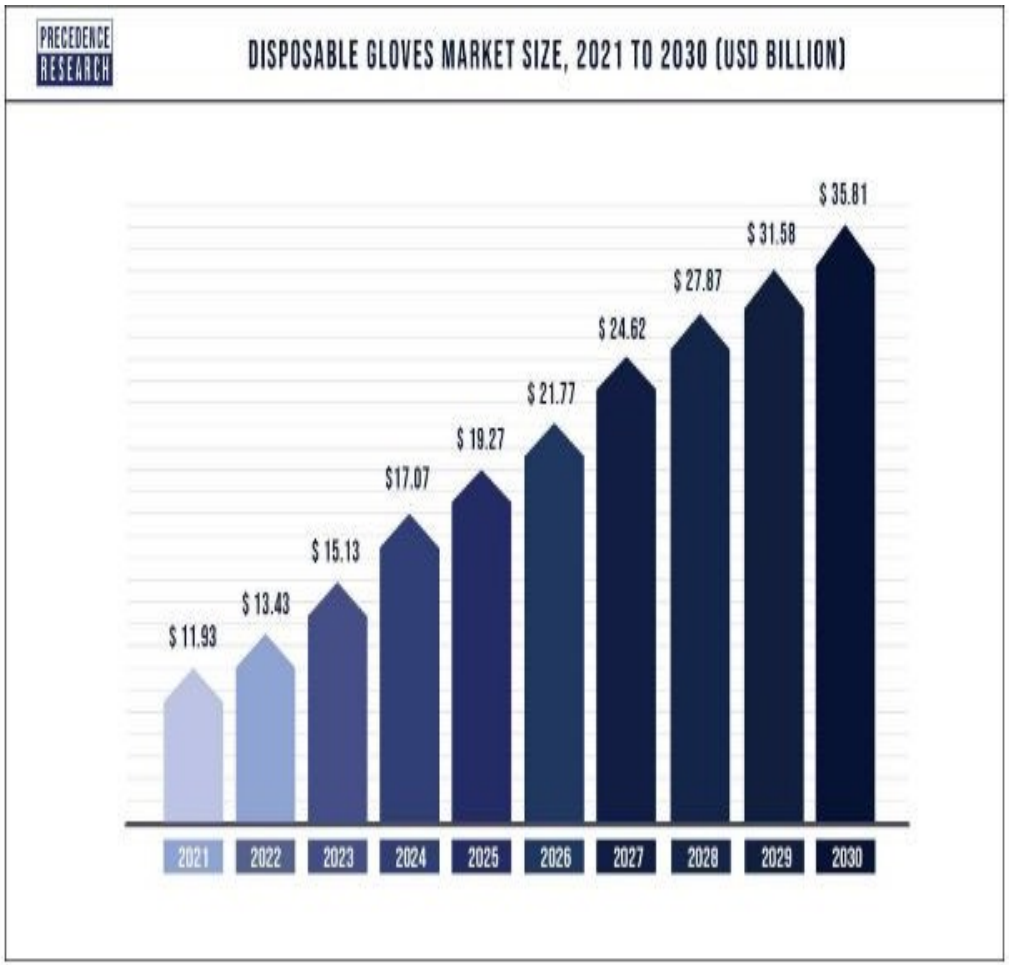
INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JANUARY 2010, VOL. 31, NO. 1

ORIGINAL ARTICLE

Positive Deviance: A New Strategy for Improving Hand Hygiene Compliance

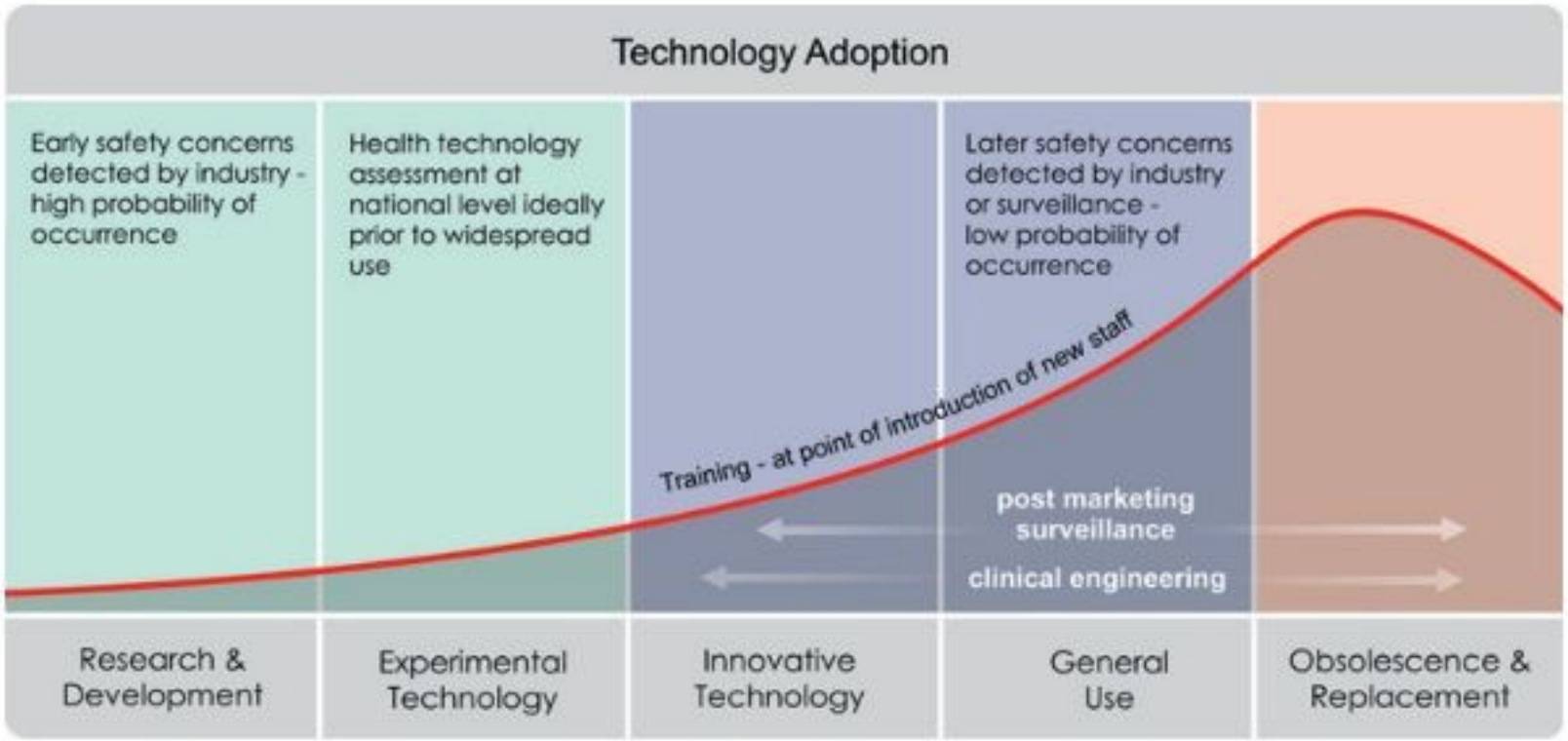
Alexandre R. Marra, MD; Luciana Reis Guastelli, RN; Carla Manuela Pereira de Araújo, RN; Jorge L. Saraiva dos Santos, RN; Luiz Carlos R. Lamblet, RN; Moacyr Silva Jr, MD; Gisele de Lima, PharmD; Ruy Guilherme Rodrigues Cal, MD; Ângela Tavares Paes, PhD; Miguel Cendoroglo Neto, MD; Luciana Barbosa, PharmD; Michael B. Edmond, MD, MPH, MPA; Oscar Fernando Pavão dos Santos, MD


PRECEDENCE RESEARCH
MEDICAL DISPOSABLES MARKET SIZE 2023 TO 2033 (USD BILLION)
1690
1521
1352
1183
1014
845
676
507
338
169
0
$ 459.26
$ 523.09
$ 595.8
$ 678.62
$ 772.95
$ 880.39
$ 1,002.76
$ 1,142.14
$ 1,300.90
$ 1,481.73
$ 1,687.69
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
Source: https://www.precedenceresearch.com/medical-disposables-market


PRECEDENCE RESEARCH
DISPOSABLE GLOVES MARKET SIZE, 2021 TO 2030 (USD BILLION)
$ 11.93
$ 13.43
$ 15.13
$17.07
$ 19.27
$ 21.77
$ 24.62
$ 27.87
$ 31.58
$ 35.81
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030


Boston
Scientific

Figure 1 Life cycle of technology. Different safety concerns emerge through out the life of a new technology.



Oliver T Mytton OT et al, Introducing new technology safely. Qual Saf Health Care, 2010

“Throw away” to where?

Fonte imagem: vecteezy

From our planet's point of view,
there's no throwing garbage out.
Because there is no "out".

Disposable

In the long run, EVERYTHING is disposable!

ARTICLE

Endophthalmitis reduction with intracameral moxifloxacin in eyes with and without surgical complications: Results from 2 million consecutive cataract surgeries

Aravind Haripriya, MD, David F. Chang, MD, Ravilla D. Ravindran, MD

Purpose: To analyze the posterior capsule rupture (PCR) rates among staff and trainee cataract surgeons, and the postoperative endophthalmitis (POE) rates in uncomplicated and complicated eyes both with and without intracameral moxifloxacin prophylaxis (ICMP).

Setting: Ten regional Aravind Eye Hospitals in India.

Design: Retrospective multicenter clinical registry within a single hospital network.

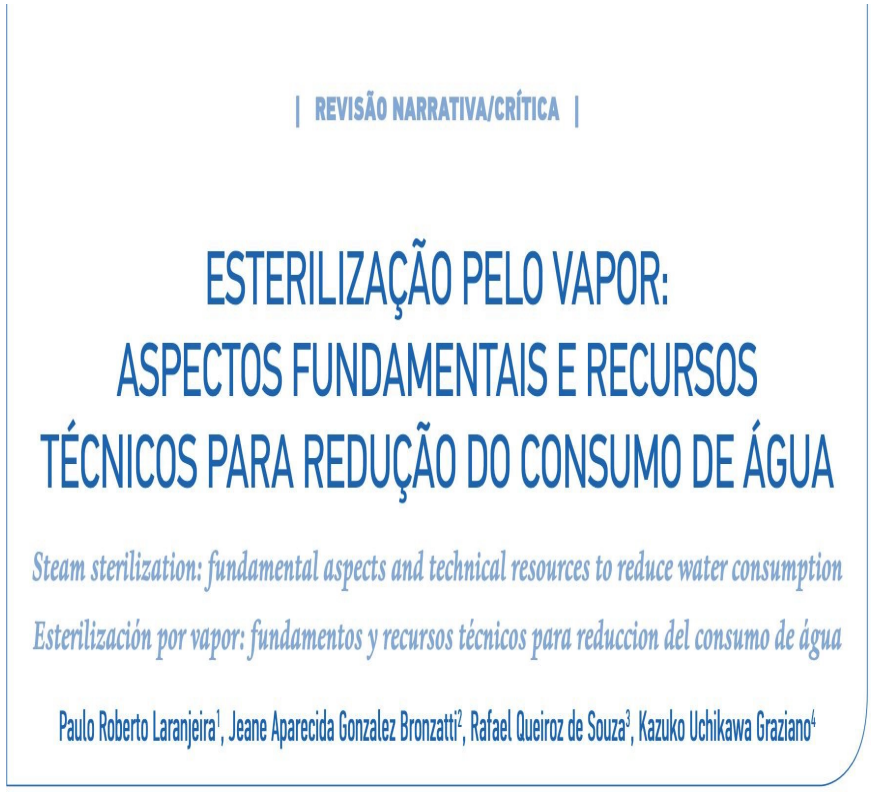
Methods: POE rates with and without ICMP were statistically compared for all eyes and separately for trainees versus staff, for phacoemulsification versus manual small-incision cataract surgery (M-SICS), and for a subgroup of eyes complicated by PCR or requiring secondary surgery.

Results: All cataract surgeries (2 062 643) performed during the 8-year period from 2011 to 2018 at the 10 regional Aravind Eye hospitals were included in the analysis. With ICMP, the overall POE rate declined from 692 (0.07%) of 993 009 eyes to 185 (0.02%) of 1 069 634 eyes ($P < .001$). This was independently significant for phacoemulsification and for M-SICS ($P < .001$). The overall PCR rate was 28 352 (1.37%) of 2 062 643 eyes, and it was statistically higher for trainees irrespective of surgical method ($P < .001$). Both staff and trainee surgeons had higher PCR rates with phacoemulsification than with M-SICS ($P < .001$). Absent ICMP, PCR increased the overall POE rate by more than 7-fold to 63 (0.43%) of 14 505 eyes. ICMP reduced the POE rate after PCR to 25 (0.18%) of 13 847 eyes ($P = .002$). This ICMP benefit was separately significant for both M-SICS (0.54% vs 0.26%, $P = .01$) and phacoemulsification (0.29% vs 0.06%, $P = .005$). The POE rate was especially high after secondary IOL implantation (0.90% without ICMP vs 0.34% with ICMP; $P = .10$).

Conclusions: ICMP reduced the POE rate overall, with phacoemulsification, with M-SICS, and in eyes with PCR.

J Cataract Refract Surg 2019; 45:1226–1233 © 2019 ASCRS and ESCRS

- More than 2 million cataract surgeries performed in India, predominantly using reusable equipment, endophthalmitis rates were significantly lower than those reported in the United Kingdom (where single-use products are routinely used).



Reduction of water consumption:

- preferential purchase of equipment with water-free pumps;
- turning off the steam generator when the equipment is not in use;
- equipment with built-in degassers;
- loading the equipment in a way that facilitates steam penetration and reduces drying time;
- re-adjusting the vacuum depth to reduce the time the vacuum pump is used;
- preventive maintenance.

HEALTH SERVICE RESEARCH

CSIRO PUBLISHING

Australian Health Review, 2017, 41, 26–32
http://dx.doi.org/10.1071/AH15142

Steam sterilisation's energy and water footprint

Forbes McGain[1,4] MBBS, FANZCA, FCICM, Anaesthetist, Intensive Care Unit Physician

Graham Moore[2] BEng, PhD, Associate Professor

Jim Black[3] MBBS, PhD, Associate Professor

[1]Departments of Anaesthesia and Intensive Care, Western Health, Footscray Hospital, Gordon Street, Footscray, Vic. 3054, Australia.

[2]Department of Infrastructure Engineering, Melbourne School of Engineering, The University of Melbourne, Vic. 3010, Australia. Email: grahamam@unimelb.edu.au

[3]Nossal Institute for Global Health, Melbourne School of Population and Global Health, University of Melbourne, Vic. 3010, Australia. Email: jim.black@unimelb.edu.au

[4]Corresponding author. Email: forbes.mcgain@wh.org.au

- Considerable electricity and water consumption occurred during standby mode;
- Light loads had higher consumption.

International Journal of Consumer Studies

International Journal of Consumer Studies ISSN 1470-6423

Usage of dishwashers: observation of consumer habits in the domestic environment

Christian Paul Richter

Household and Appliance Technology Section, Institute of Agricultural Engineering, University of Bonn, Bonn, Germany

Keywords
Consumer habits, dishwasher, dishwashing, dishwasher loading, pretreatment, programme choice.

Correspondence
Christian Paul Richter, Household and Appliance Technology Section, Institute of Agricultural Engineering, University of Bonn, Nussallee 5, 53115 Bonn, Germany.
E-mail: haushaltstechnik@uni-bonn.de

Abstract

Over the years, appliance manufacturers have been successful in developing dishwashers that enable consumers to save time, energy and water very conveniently. Within the last 20 years the savings in energy consumption exceed 30%, and the average water consumption per cycle has been more than halved. As a result, it is very hard for the majority of people to compete with the efficiency of a dishwasher when dishes are done by hand. However, consumer habits (e.g. regarding the use of the dishwasher load capacity, programme choice and particularly the additional pretreatment of dishes with water) are influencing the overall efficiency of the dishwashing process and resource use. Still, detailed information on consumer behaviour in everyday life concerning these issues is rare.

- Dishwashers used, on average, 50% less water and 28% less energy per item cleaned compared to manual cleaning;

- No pre-cleaning with water.

Ling *et al. Antimicrobial Resistance and Infection Control* (2018) 7:25
https://doi.org/10.1186/s13756-018-0308-2

Antimicrobial Resistance
and Infection Control

GUIDELINES ARTICLE Open Access

APSIC guidelines for disinfection and sterilization of instruments in health care facilities

Moi Lin Ling[1*], Patricia Ching[2], Ammar Widitaputra[3], Alison Stewart[4], Nanthipha Sirijindadirat[5] and Le Thi Anh Thu[6]

Recommendations for disinfection of reusable medical equipment / devices [39–42]

When selecting a disinfectant for reprocessing medical equipment/devices in the health care setting, consideration needs to be given to:

a. Efficacy for the intended use;
b. Compatibility with the equipment/device and surfaces to be disinfected;
c. The intended end use of the equipment/devices to be disinfected;
d. The method for monitoring the product concentration;
e. Recommendations for rinsing following disinfection (e.g., water quality, volume, time);
f. Safety for use, with minimal toxic and irritating effects to staff; and
g. Environmental safety and biodegradability.

Rev. Latino-Am. Enfermagem
nov.-dez. 2013;21(6):1228-34
DOI: 10.1590/0104-1169.2920.2358
www.eerp.usp.br/rlae

Artigo Original

O custo de desperdício de materiais de consumo em um centro cirúrgico[1]

Liliana Cristina de Castro[2]
Valeria Castilho[3]

- Avoidable waste: material that should not have been opened;
  - total loss of the quantity contained in the package, due to advance and/or inadvertent request

- Unavoidable waste: there was no need to use all items;
  - quantity of packaging

- Most wasted items: surgical sutures and gauze.

Rev. Latino-Am. Enfermagem
2023;31:e4063
DOI: 10.1590/1518-8345.6716.4063
www.eerp.usp.br/rlae

Simone Garcia Lopes[1,2]
https://orcid.org/0000-0001-6091-3133
Vanessa de Brito Poveda[1]
https://orcid.org/0000-0002-5839-7253

RLAE
Revista Latino-Americana de Enfermagem

Artigo Original

Proposta de modelo para cálculo de desperdício associado ao processamento de instrumentais cirúrgicos consignados*

- Surgeries with consignment canceled;
- Surgeries: waste of R$ 34,340.18 (2019 to 2021 – preparation only);
  - hip arthroplasty;
  - spinal arthrodesis;
  - knee arthroplasty.

✓ Inappropriate material for use (incorrect or incomplete);
✓ Wet material;
✓ Presence of dirt;
✓ Delay in preparation;
✓ Problems related to the patient;
✓ Problems related to the medical team.

Environmental Science and Pollution Research (2022) 29:85742–85760
https://doi.org/10.1007/s11356-021-18316-2

NOVEL CORONA VIRUS (COVID-19) IN ENVIRONMENTAL ENGINEERING PERSPECTIVE

Environmental impacts of the widespread use of chlorine-based disinfectants during the COVID-19 pandemic

Naseeba Parveen[1] · Shamik Chowdhury[1] · Sudha Goel[1,2]

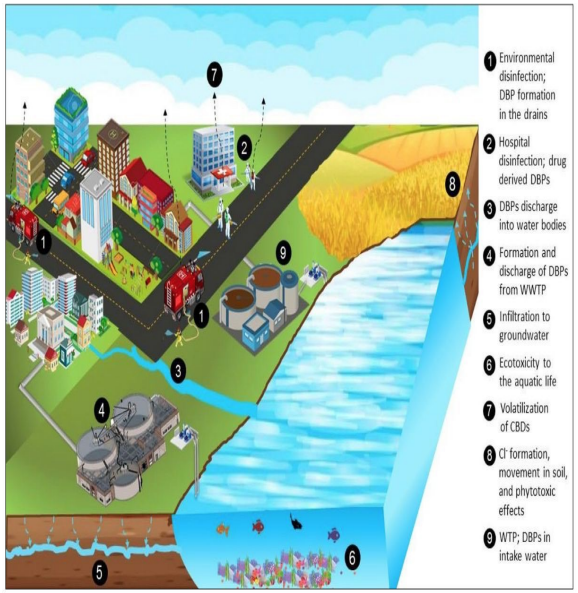


Fig. 2 Overview of possible fate and transport of CBDs during and after application

Science of the Total Environment 857 (2023) 159228

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Widespread occurrence of quaternary alkylammonium disinfectants in soils of Hesse, Germany

Kai Jansen[a,*], Christian Mohr[a], Katrin Lügger[b], Christian Heller[b], Jan Siemens[a], Ines Mulder[a]

[a] Institute of Soil Science and Soil Conservation, iFZ Research Center for BioSystems, Land Use and Nutrition, Justus Liebig University Giessen, Heinrich-Buff-Ring 26-32, 35392 Giessen, Germany
[b] Hessian Agency for Nature Conservation, Environment and Geology, Rheingaustrasse 186, 65203 Wiesbaden, Germany

Ecotoxicology and Environmental Safety 233 (2022) 113334

Contents lists available at ScienceDirect

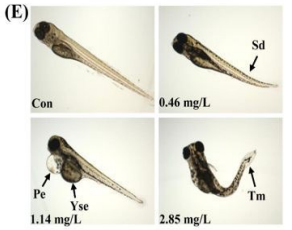
Ecotoxicology and Environmental Safety

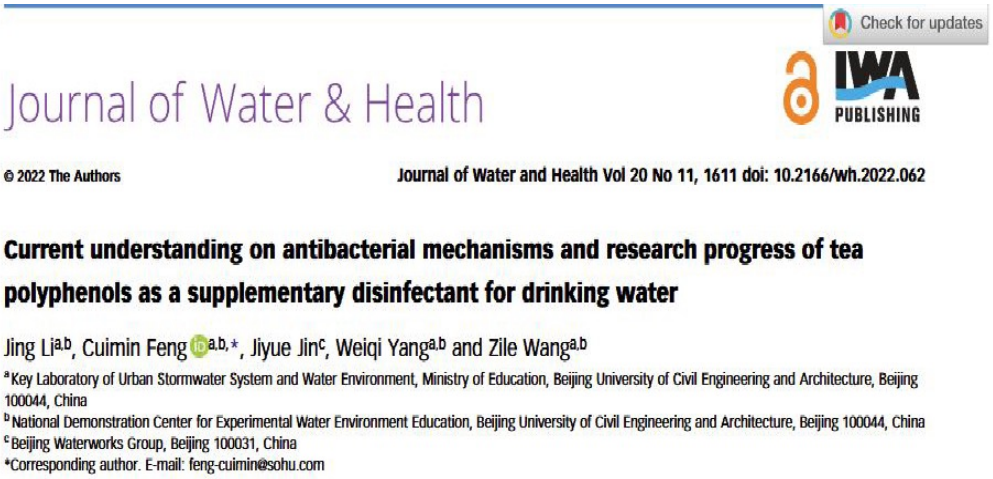
journal homepage: www.elsevier.com/locate/ecoenv

Developmental toxicity of bromoacetamide via the thyroid hormone receptors-mediated disruption of thyroid hormone homeostasis in zebrafish embryos

Wei Wang[a,b,1], Qiyao Ma[a,b,1], Xinliang Ding[c,1], Yihua Xu[a], Mengting He[a,b], Jie Xu[a,]
Jianjun Liu[a,b], Cheng Ji[a,*], Jie Zhang[a,b,**]

[a] Medical College of Soochow University, Suzhou, China
[b] Department of Toxicology, School of Public Health, Medical College of Soochow University, Suzhou, 215123 Jiangsu, China
[c] Department of Public Health, Wuxi Center for Disease Control and Prevention, Wuxi, 214023 Jiangsu, China





Journal of Water & Health

Check for updates

IWA PUBLISHING

Journal of Water and Health Vol 20 No 11, 1611 doi: 10.2166/wh.2022.062

Current understanding on antibacterial mechanisms and research progress of tea polyphenols as a supplementary disinfectant for drinking water

Jing Li[a,b], Cuimin Feng[a,b,*], Jiyue Jin[c], Weiqi Yang[a,b] and Zile Wang[a,b]

[a]Key Laboratory of Urban Stormwater System and Water Environment, Ministry of Education, Beijing University of Civil Engineering and Architecture, Beijing 100044, China
[b]National Demonstration Center for Experimental Water Environment Education, Beijing University of Civil Engineering and Architecture, Beijing 100044, China
[c]Beijing Waterworks Group, Beijing 100031, China
*Corresponding author. E-mail: feng-cuimin@sohu.com

Science of the Total Environment 802 (2022) 149846

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Review

Current and future chemical treatments to fight biodeterioration of outdoor building materials and associated biofilms: Moving away from ecotoxic and towards efficient, sustainable solutions

Mattea Romani [a], Thomas Warscheid [b], Lionel Nicole [c], Lionel Marcon [a], Patrick Di Martino [d], Marcelino T. Suzuki [a], Philippe Lebaron [a], Raphaël Lami [a,*]

[a] Sorbonne Université, CNRS, Laboratoire de Biodiversité et Biotechnologies Microbiennes (LBBM), Observatoire Océanologique de Banyuls sur Mer, Avenue Pierre Fabre, 66650 Banyuls-sur-Mer, France
[b] LBW-Bioconsult, Schwarzer Weg 27, 26215 Wiefelstede, Germany
[c] Sorbonne Université, CNRS, Laboratoire de chimie de la matière condensée de Paris (LCMCP), 4 Place Jussieu, 75005 Paris, France
[d] Université de Cergy-Pontoise, Laboratoire ERRMECe, rue Descartes site de Neuville-sur-Oise, 95031 Cergy-Pontoise, France

Green disinfectants

- Several challenges in their scale-up:
  - Substantial cost of production on a per-cost basis;
  - Unclear mode of action;
  - Lack of chemical standardization and quality control;
- Herbal disinfectants are often used as auxiliary agents to enhance the effectiveness of chemical disinfectants.

DfE-Certified Products are Evaluated Based On:

Search Products that Meet the Safer Choice Standard

Busque productos que cumplan con la norma Safer Choice

Looking for safer cleaning and other products? Use the search box below to find products that meet the Safer Choice Standard.

A downloadable spreadsheet of Safer Choice-certified products list is also available on EPA Envirofacts.

Search Safer Choice–Certified Products

Product or Company Name (Optional)
peroxide

Home or Business Use (Optional)

Product Type (Optional)

Show only:
- Fragrance-free products[1]
- Products with outdoor uses[2]

Note: in the product listing, the notation (" ‡ ") means that the partner company is overdue for their yearly partnership review with Safer Choice.

Show 25 entries Previous 1 2 Next

Product Name	Company	Sector	Type
LYNX LXL-12 Peroxide Cleaner	ABC Compounding Co., Inc.	Business	All-Purpose Cleaners
Green Earth Peroxide Cleaner	Betco Corporation	Business	All-Purpose Cleaners
Husky 908 PeroxAll Concentrated Peroxide Cleaner	Canberra Corporation	Business	All-Purpose Cleaners

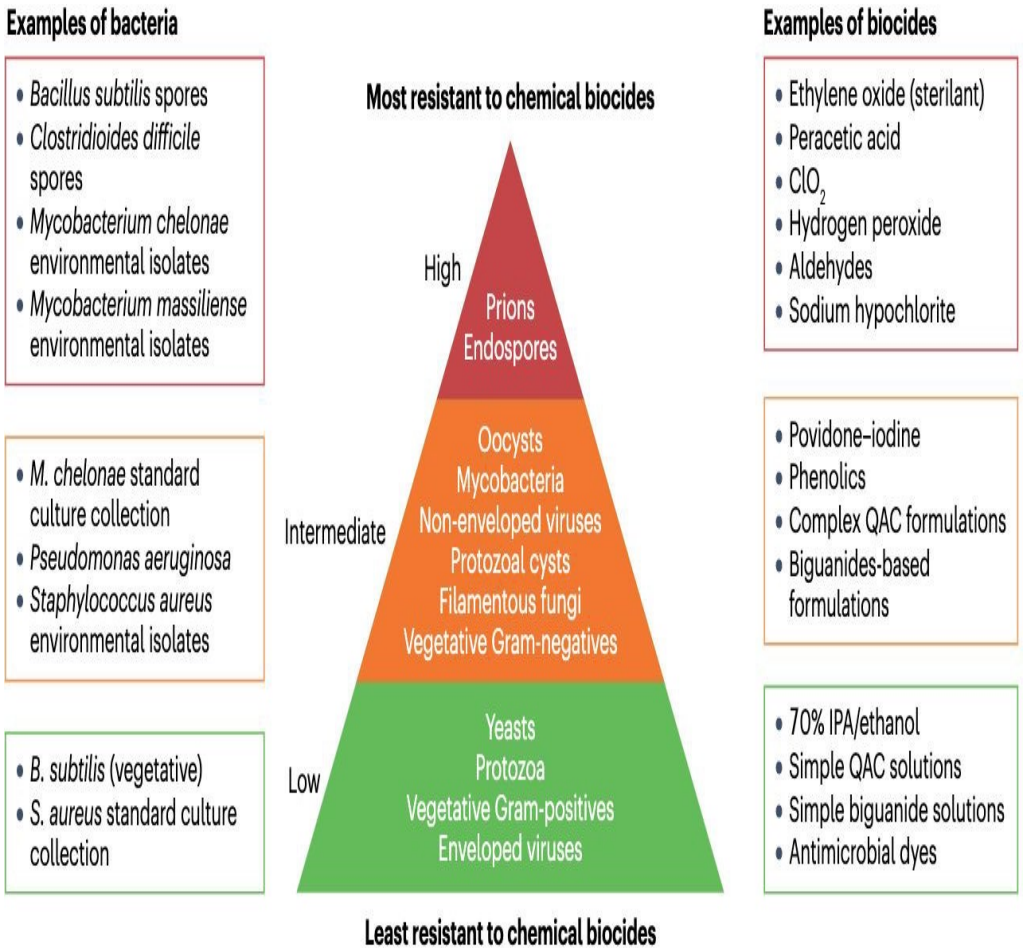
Eco-friendly Disinfectants

Green disinfectants

Natural Disinfectants

Chlorine

Peracetic Acid



Maillard JY, Pascoe M. Disinfectants and antiseptics: mechanisms of action and resistance. Nature Reviews Microbiology, 2024

Infection, Disease & Health 30 (2025) 74–78

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://www.journals.elsevier.com/infection-disease-and-health/

ELSEVIER

Discussion paper

Sustainability and novel technologies to improve environmental cleaning in healthcare — Implications and considerations

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Table 1 Risk assessment checklist for introduction of novel cleaning and disinfection technology.

No.	Item	YES	NO
1	Is there sufficient evidence from well-designed non-inferiority studies that the approach or change is not inferior to the existing cleaning method/s?	☐	☐
2	Have any potential unintended consequences of the approach or change been considered and evaluated?	☐	☐
	• Are there any storage requirements for products that may have shorter shelf-life?	☐	☐
	• Are there any waste disposal implications?	☐	☐
	• Is there a risk of resistance developing?	☐	☐
	• Is there a risk of skin or other allergic reactions in staff?	☐	☐
	• Will any changes in personal protective equipment be required?	☐	☐
	• Will overall costs rise, including is the system more requiring of staff time?	☐	☐
	• Is the required contact time for efficacy achievable in normal use?	☐	☐
	• Are there any material compatibility issues?	☐	☐
	• Do manufacturers of products approve the use of the product on materials used in healthcare?	☐	☐
	• Are there any potential reactions with other chemicals?	☐	☐
	• Does the product meet all regulatory requirements?	☐	☐
3	Is additional infection prevention and control education or training required for individuals who will be utilising this product?	☐	☐
4	Have human behavioural considerations been taken into account?	☐	☐
	• Will this change increase or complicate workflow?	☐	☐
	• Will this change increase or complicate compliance?	☐	☐
5	Has the carbon cost of the product been considered?	☐	☐
6	Has a Life Cycle Assessment (LCA) of the product been undertaken?	☐	☐
7	Has the LCA been independently verified?	☐	☐
8	Are additional actions required to reduce the carbon emissions and associated waste[a] from the product?	☐	☐
10	Does it include a net zero target?	☐	☐
	What is the target?		
	Comment:		
	What demonstrable actions are underway to meet your target?		
	Comment:		

[a] NB: Waste may include pharmaceuticals, chemical waste, heavy metals, pressurized containers, radioactive waste, and nonhazardous/general waste.

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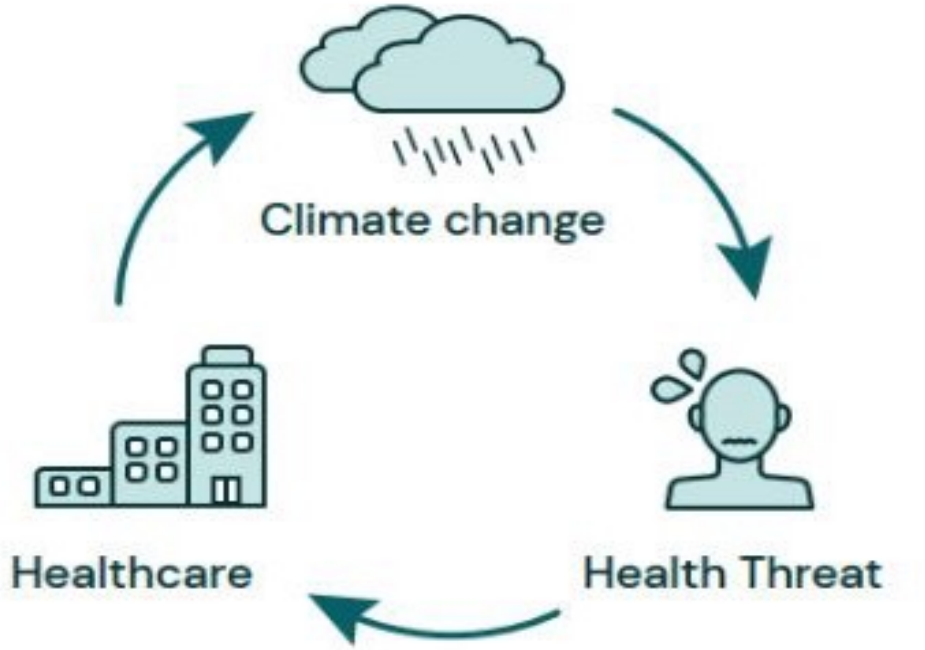
19 September 2024 | News release | Geneva | Reading time: 3 min (892 words)

Antimicrobial resistance: top 10 dangers to public health, along with climate change and global warming.

(Masterson et al., 2021)

Planetary Health

Figure 1: Interplay between human and planetary health



Brighton & Sussex Medical School, Centre for Sustainable Healthcare, and UK Health Alliance on Climate Change (2023). Green surgery: Reducing the environmental impact of surgical care. London: UKHACC.

Sustainability deserves a place within the framework of good healthcare

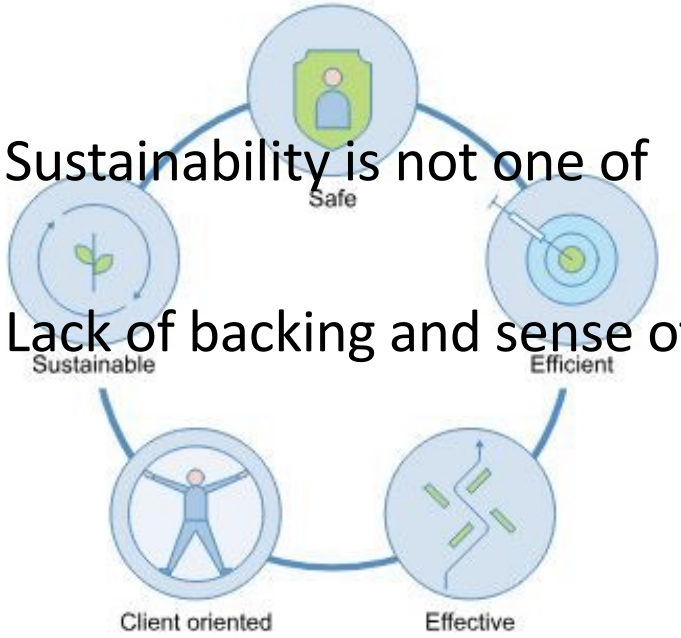


Figure 3 Frameworks for good care

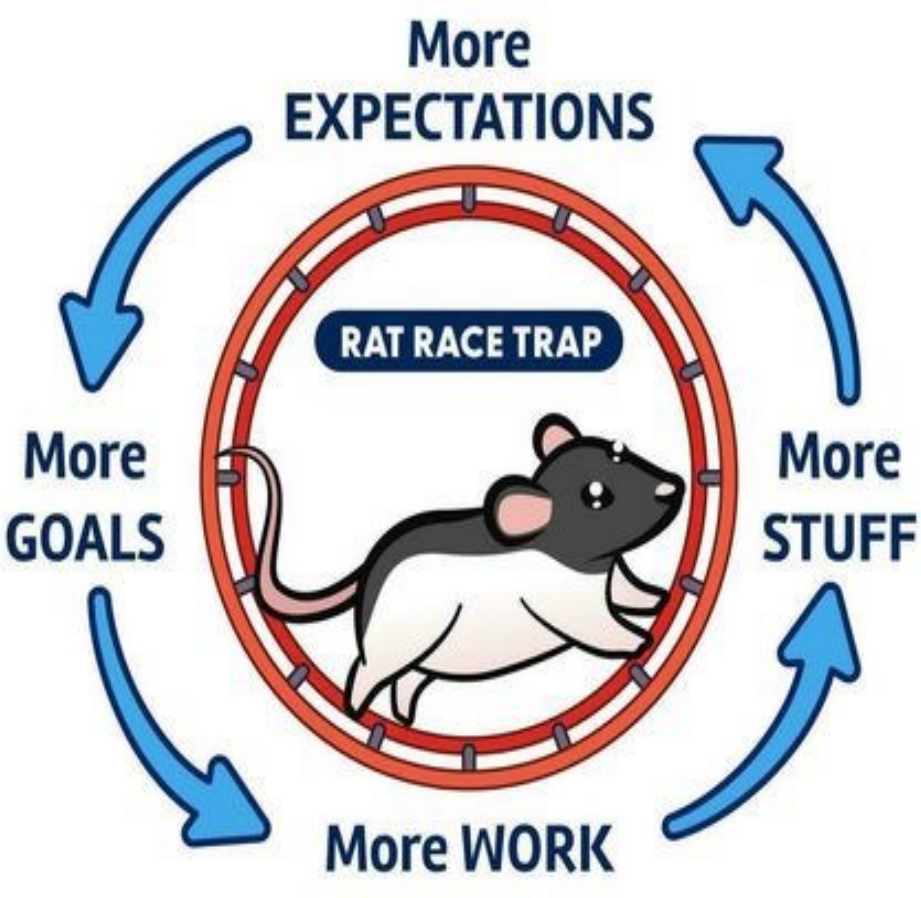
Barriers:

- Sustainability is not one of their primary tasks;
- Lack of backing and sense of urgency perceived.

Health Council of the Netherlands. Towards sustainable devices in healthcare . No. 2022/22e

Small steps, big change

Escape the "rat race"



Fonte: Veectzy

Muito obrigada!

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OCTOBER

2 ... Sustainable Healthcare and IPC: Can They Co-Exist? (an IFIC teleclass)
Afro-European Teleclass With Dr. Graham Pike, UK, and Profa. Dra. Camila Quartim de Moraes Bruna, Brazil

7 ... Clean Hospitals Day 2025: Human Factors and Collaboration
Afro-European Teleclass With Dr. Alexandra Peters, Switzerland, and Dr. Martina Močenić, Croatia

15 ... What Can Knowing Something About the Evolution of *Clostridium difficile* Teach Us About IPAC?
Australasian Teleclass With Prof. Thomas Riley, Australia

23 ... Discussion: Are Current Healthcare Cleaning Guidelines Sufficient to Fight Antimicrobial Resistance Spread?
With Dr. Jon Otter, UK & Dr. Curtis Donskey, US

28 ... Research Priorities to Strengthen Environmental Cleaning in Healthcare Facilities: the CLEAN Group Consensus
Afro-European Teleclass With Dr. Giorgia Gon, UK

NOVEMBER

11 ... The Use of Faecal Microbiota Transplant as Treatment for *Clostridium difficile*
Afro-European Teleclass With Simon Goldenberg, UK

13 ... Solve the LTC Outbreak!
With Steven J. Schweon

19 ... Special Lecture for World Toilet Day

DECEMBER

4 ... What's On a Surface Doesn't Stay On a Surface - The Dynamics and Risk of Microbial Resuspension From Surfaces
With Prof. Charles Gerba, US

16 ... Patience, Patients and Persistent Antimicrobial Resistance
Afro-European Teleclass With Colm Dunne, UK

18 ... Empowering Patients to Prevent Healthcare-Associated Infections
With Dr. Curtis Donskey, US

Thanks to Teleclass Education

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