

RCSI



SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY

February 2024



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RCSI COUNCIL COMMITTEE FOR SUSTAINABLE SURGERY



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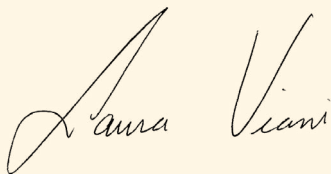
FOREWORD

There is no part of human life that is not being affected by the impact of climate change. Healthcare and Surgery are no different. I am honoured, as President of RCSI, to support the publication of "Sustainability Principles and Practice in Surgery".

At the beginning of my presidency I established a council committee on Sustainable surgery, chaired by Professor Camilla Carroll. I want to acknowledge and thank Prof Carroll for her leadership of this important work for RCSI.

I have learned a lot from this work. Global healthcare counts for 12% of global green house gas emissions and surgery has the highest carbon foot print in our hospital systems. Therefore it is vitally important that surgery takes a focus on reducing our carbon footprint, waste and demonstrate leadership in addressing climate change. The work of this RCSI committee was focussed on giving information and resources to surgeons and others to help in ways they can impact positively in lowering the impact of surgery on climate change and sustainability. RCSI along with the RCS Edinburgh, RCS England and RCP&S Glasgow, endorsed the Intercollegiate Green Surgery Checklist. This evidence based resource can help guide our surgeons and surgical teams on developing programmes aimed at reducing carbon impact and greening our theatres. RCSI as an institution is committed to the WHO Sustainable Development Goals. RCSI campuses have implemented a range of engineering and technological solutions to meet our carbon footprint targets for 2030.

I once again, want to thank Professor Carroll for delivering this important work for the College and Irish Surgery. I want to thank Ms Sinead Reilly for her project management support to the committee. I am also incredibly thankful for the members of the committee and for colleagues in the HSE, RCSI Council, Ireland East Hospitals Group, RCSI University of Medicine and Health Sciences and who contributed to this important work and resource.



Professor Laura Viani
President RCSI

KEY MESSAGES

The HSE is committed to achieving net-zero emissions no later than 2050, delivering healthcare which is environmentally and socially sustainable¹.

The Intercollegiate Royal Colleges of Surgeons have produced a "Green Theatre Checklist and Compendium of Evidence"² for current best practice in delivering sustainable surgical care, before, during and after surgery.

Global Healthcare delivery produces 12% of Global GHG emissions.

The United States, China, and the European Union (EU) account for the top 3 contributors to Healthcare's global climate footprint³.

The EU accounts for 12% of healthcare's global climate footprint .

Delivery of healthcare in Europe accounts for 5% of the overall European GHG emissions.

The Surgical suite is a carbon hot-spot within the hospital setting, it is 3 - 6 times more energy intensive than a clinical ward⁴.

The carbon hotspots within the operating theatre are secondary to

- » Energy consumption derived from non-renewable sources
- » Usage and disposal of products
- » Volatile anaesthetics especially nitrous oxide and desflurane

Reducing the burden of surgical disease will contribute to achieving the net-zero goal through

- » shared-decision making with patients
- » disease prevention
- » green models of healthcare
- » the use of low-carbon alternatives, such as digital health.

Sustainable practices must become a "core competency" for all members of the surgical team. This will require education and skills training programs to be embedded as a component of CPD.

On-site "Green Theatre Champions" will facilitate the implementation of the Green Theatre Checklist.

EXECUTIVE SUMMARY

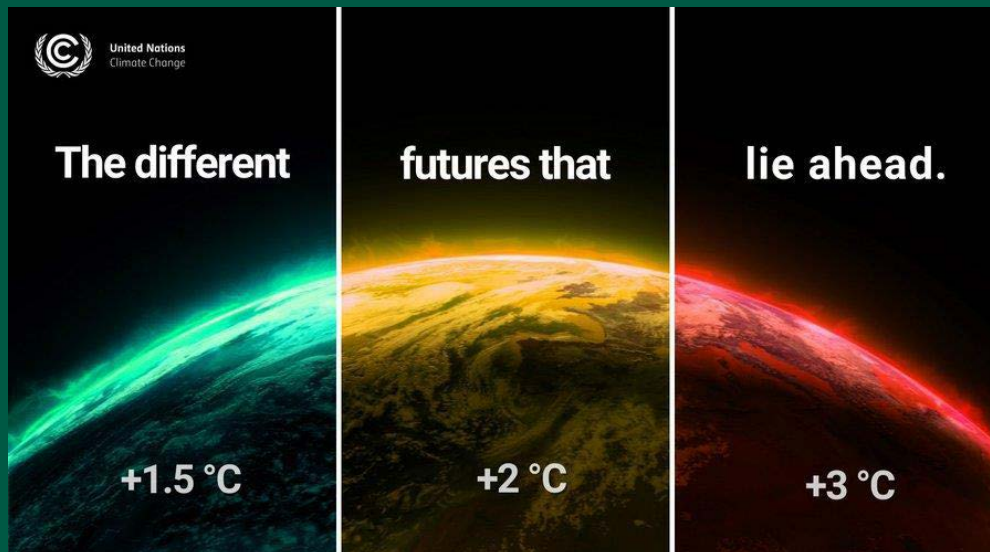


FIGURE 1: “Code Red for Humanity”, ©United Nations Climate Change

Global warming is having a serious harmful effect on human health. As planetary health continues to deteriorate so too does human health. Currently, the world is heading towards 3C of heating with the health of people in low to middle income countries being most at risk, as a result of the associated climate anomalies (Figure 1).

The 2023 report of “The Lancet Countdown on Health and Climate Change” has called it the “biggest global health threat of the 21st century”³.

Rising levels of global atmospheric greenhouse gas (GHG) emissions are largely driven by the burning of fossil fuels and industrial processes. With 2023 expected to be the hottest in human history, we are witnessing mass migration of climate refugees

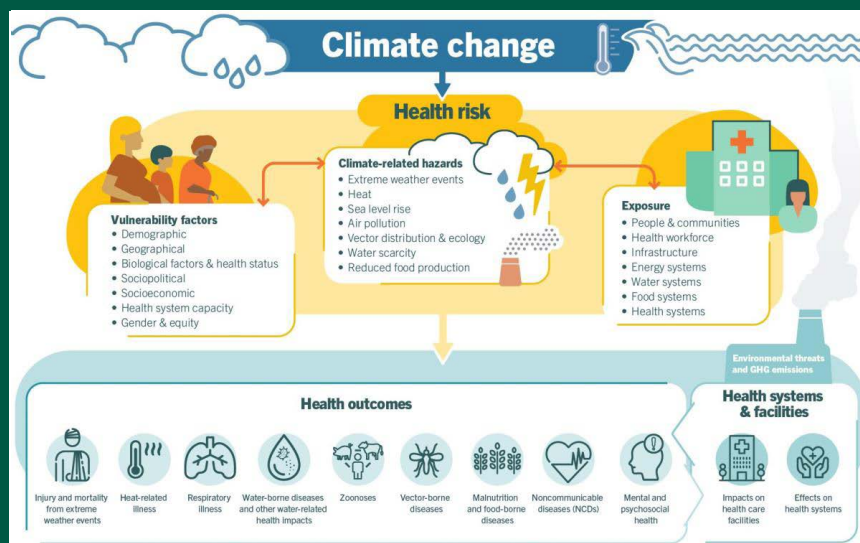


FIGURE 2: Climate Crisis is a Health Crisis WHO : An overview of climate-sensitive health risks, their exposure pathways and vulnerability factors. Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social and public health determinants.

EXECUTIVE SUMMARY

Ahead of COP28 in the UAE, the UN Secretary General Antonio Guterres has called for “dramatic climate action, as we are out of road and can’t kick the can any further. This is a failure of leadership, a betrayal of the vulnerable and a massive missed opportunity”.



Our focus must now turn to the “Global Climate Impact” of delivering safe and effective healthcare. It is recognised, that the delivery of healthcare in the 21st century is a major contributor to GHGs. If the health sector were a country, it would be the fifth largest GHG emitter on the planet.

The Green Paper produced by “Health Care Without Harm”⁶ in 2021 has identified that the “Health care climate footprint generally reflects the overall national emissions patterns”. The world’s biggest climate polluters are also associated with the biggest health sector climate footprint. (Figure 3)

The United States, China, and the European Union (EU) account for the top 3 contributors to healthcare’s global climate footprint. The EU accounts for 12% of healthcare’s global climate footprint. The Organisation for Economic Cooperation and Development (OECD) states that the delivery of healthcare in Europe accounts for 5% of the overall European carbon emissions. The European Commission is now committed to setting an ambitious climate target plan to achieving climate neutrality by 2050.

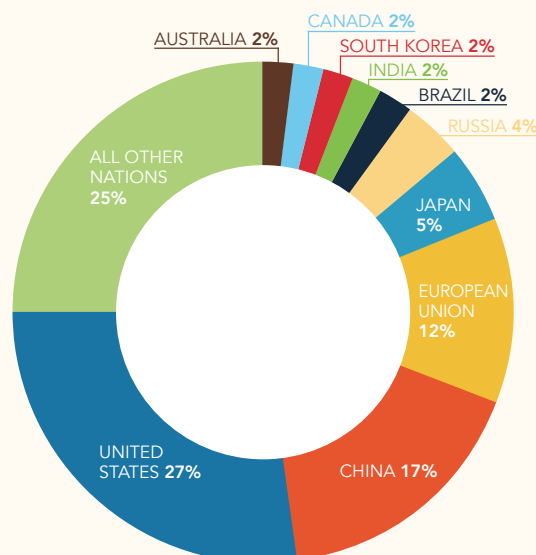


FIGURE 3: Top Ten emitters as a percentage of global health care footprint

EXECUTIVE SUMMARY

Countries with a high overall per capita emission are also high emitters when it comes to the delivery of healthcare. (Figure 4)

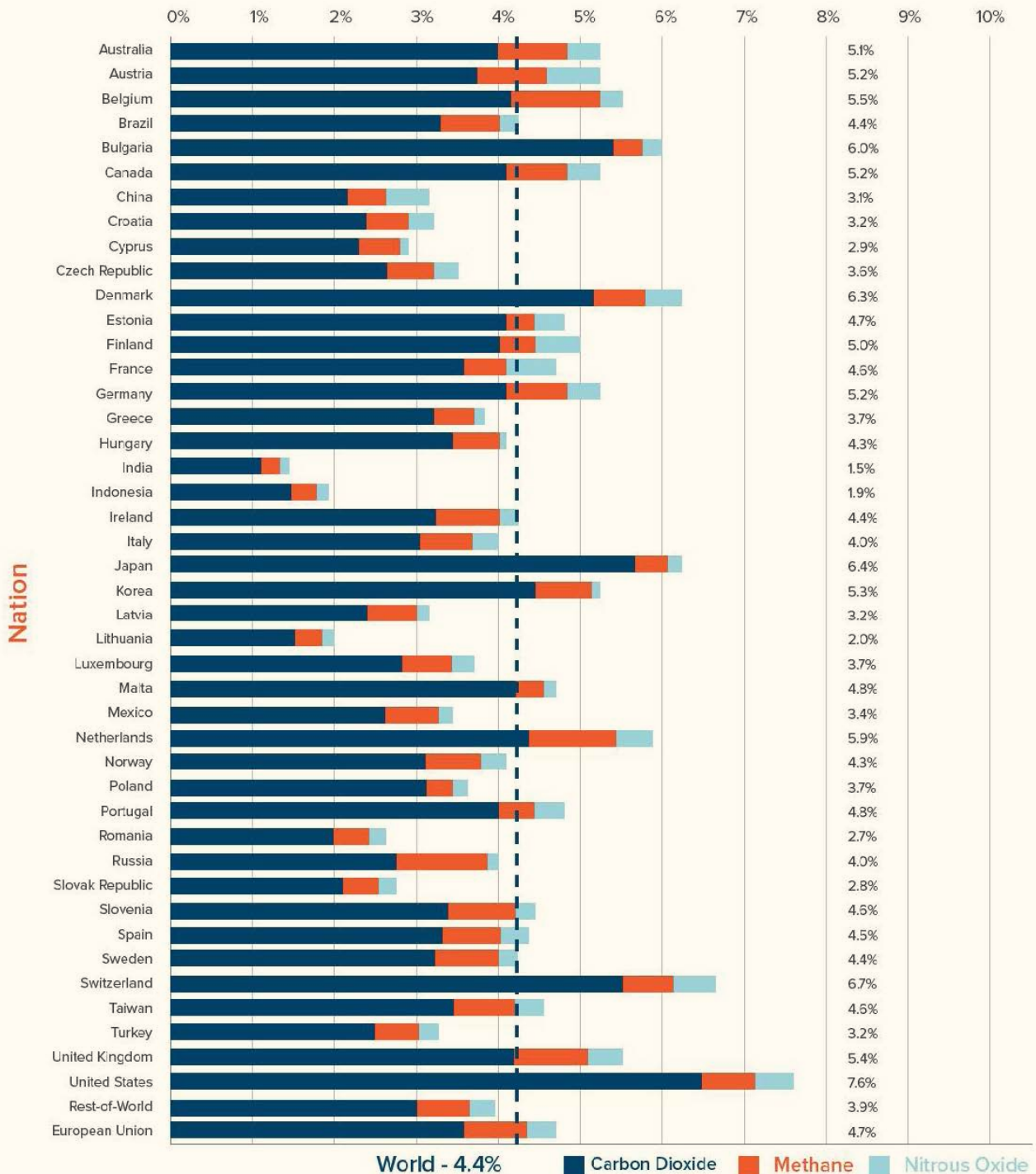


FIGURE 4 Health care footprint as a percentage of national emissions

EXECUTIVE SUMMARY

The Alliance for Transformative Action on Climate and Health (ATACH; “the Alliance”) works to realize the ambition set at COP26 to build climate resilient and sustainable health systems, using the collective power of WHO Member States and other stakeholders to drive this agenda forward at pace and scale; and promote the integration of climate change and health nexus into respective national, regional, and global plans.

Five thematic working groups seek to address common issues:

- Financing the Health Commitments on Climate Resilient and Sustainable Low Carbon Health Systems.
- Climate Resilient Health Systems.
- Low Carbon Sustainable Health Systems.
- Supply Chains.
- Climate Action and Nutrition.

The Government of Ireland Climate Action Plan 2023 CAP23² aims to reduce emissions by 51% by 2030. “Changing Ireland for the better”, by an overall reduction in carbon emissions, also includes a climate action vision for the delivery of healthcare in Ireland.



CLIMATE ACTION PLAN 2023 CAP23

Changing Ireland for the Better

- The plan sets out how Ireland can accelerate the actions that are required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.¹

Public Sector Leading by Example

The Public Sector will play a leadership role in driving far-reaching climate action across its buildings, transport, waste, and energy usage, as well as wider society.

This will include:

- reducing emissions by 51% by 2030,
- increasing the improvement in energy efficiency in the public sector from the 33% target in 2020 to 50% by 2030,
- increasing climate literacy in the public sector, implementing green public procurement, and
- retrofitting public sector buildings.

Source: Source: <https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/>

The Health Service Executive (HSE) have published their Climate Action Strategy 2023 – 2050. The goal is to deliver healthcare which is environmentally and socially sustainable by committing to the delivery of net-zero emissions by 2050. (Figure 5)

EXECUTIVE SUMMARY



HSE Climate Action Vision



The HSE is committed to achieving net-zero emissions no later than 2050, delivering healthcare which is environmentally and socially sustainable



FIGURE 5: HSE Climate Action Vision

To achieve this ambition, it is necessary for health sector institutions to quantify their GHG emissions.

A framework has been developed to facilitate healthcare institutions measure their GHG emissions, as part of the "Green House Gas Protocol".

The framework utilises "3 Scopes", which reflect the extent to which the organisation controls its GHG emissions. (Figure 6)

Scope 1 emissions are emitted on the premises of an institution e.g. anaesthetic gases.

Scope 2 emissions represent energy used by an organisation, e.g. electricity and heat. The energy is produced by an external organisation (electricity producers).

Scope 3 emissions are indirectly influenced by the organisation and usually include the embedded carbon emission in the production and supply of all the goods and services purchased by the organisation, e.g. surgical instruments.

EXECUTIVE SUMMARY

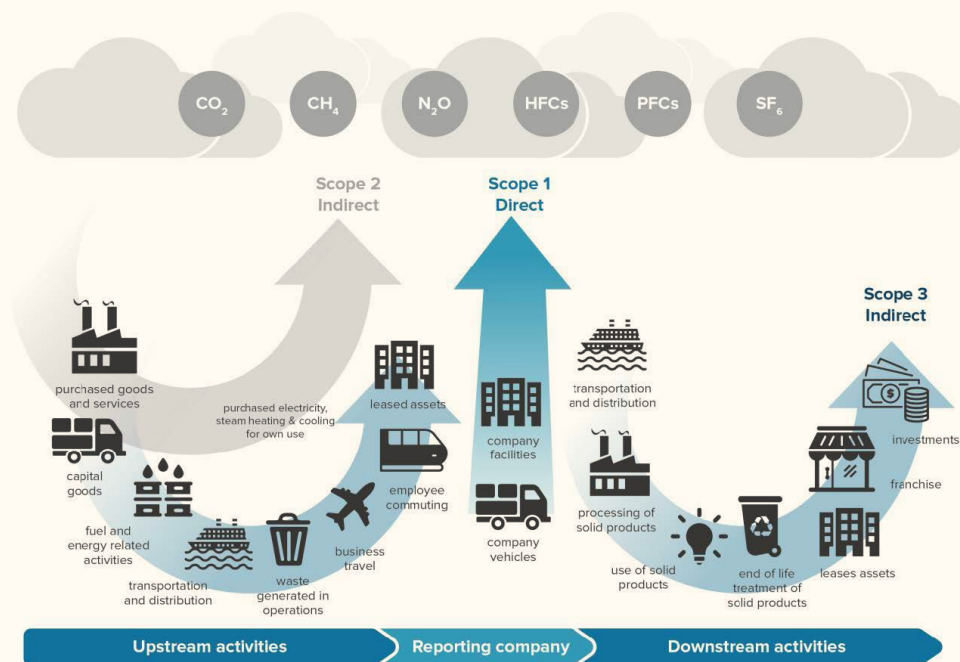


FIGURE 6: Green House Gas Protocol (GHGP) Scopes

According to the “Healthcare Climate Footprint Report”⁸, scope 1 emissions are 17% Scope 2 emissions are 12% and Scope 3 emissions are 71%. 40% of healthcare’s climate footprint comes from electricity and thermal power supply attributed to health care-related activities (Scope 3 emissions). Most of the energy is derived from the combustion of fossil fuels. This further emphasises the need for healthcare institutions to turn their focus to the procurement and utilisation of renewable green energy sources.

The delivery of Surgical Care has a unique carbon footprint within the hospital setting. There are 3 major contributing factors associated with this phenomenon. Factor 1 is related to the use of volatile anaesthetic gases and their associated detrimental impact on the environment. Factor 2 is energy usage within the surgical suite from non-renewable sources, such as fossil fuels. Factor 3 is the use of consumables and the associated carbon footprint of the supply chain. Activity within the surgical operating theatres accounts for 5% of the carbon footprint for all acute National Health Service organisations in the UK. Data from the Republic of Ireland is currently being evaluated.

The Royal Colleges of Surgeons of Great Britain and Ireland acknowledge, that it is time to review current surgical practice considering the climate crisis and the recognised negative impact it is having on human health. Currently, the delivery of surgical care relies heavily on the use of single-use, non-biodegradable products. Moving towards net-zero operating practices could reduce health-sector carbon emissions and allow surgeons and policy makers to reassess how surgery fits into the wider health ecosystem.

As we move towards the delivery of personalised surgical care, it is imperative that the effect on population health in general is also considered and the associated environmental consequences.

EXECUTIVE SUMMARY

Delivering value-based sustainable surgical care should take into account the “Whole Patient Journey”. The UK Centre for Sustainable Healthcare suggests that this is best achieved by utilising the four principles of sustainable clinical practice². These principles are prevention, patient-empowerment, lean service delivery and low-carbon alternatives. The principles are elaborated upon in the diagram below :

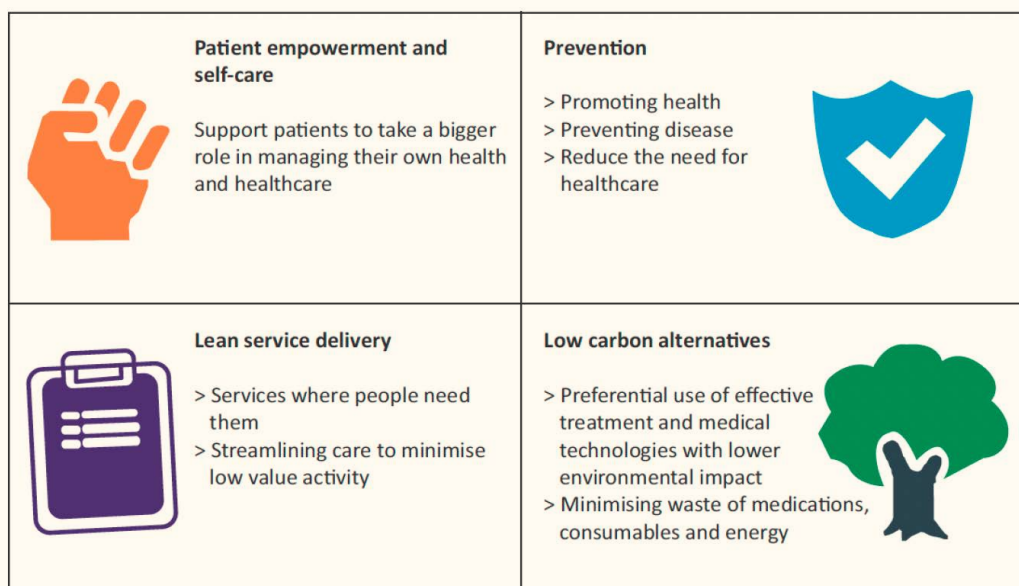


DIAGRAM 4 Principles of Sustainable Clinical Practice, “Centre of Sustainable Healthcare”.

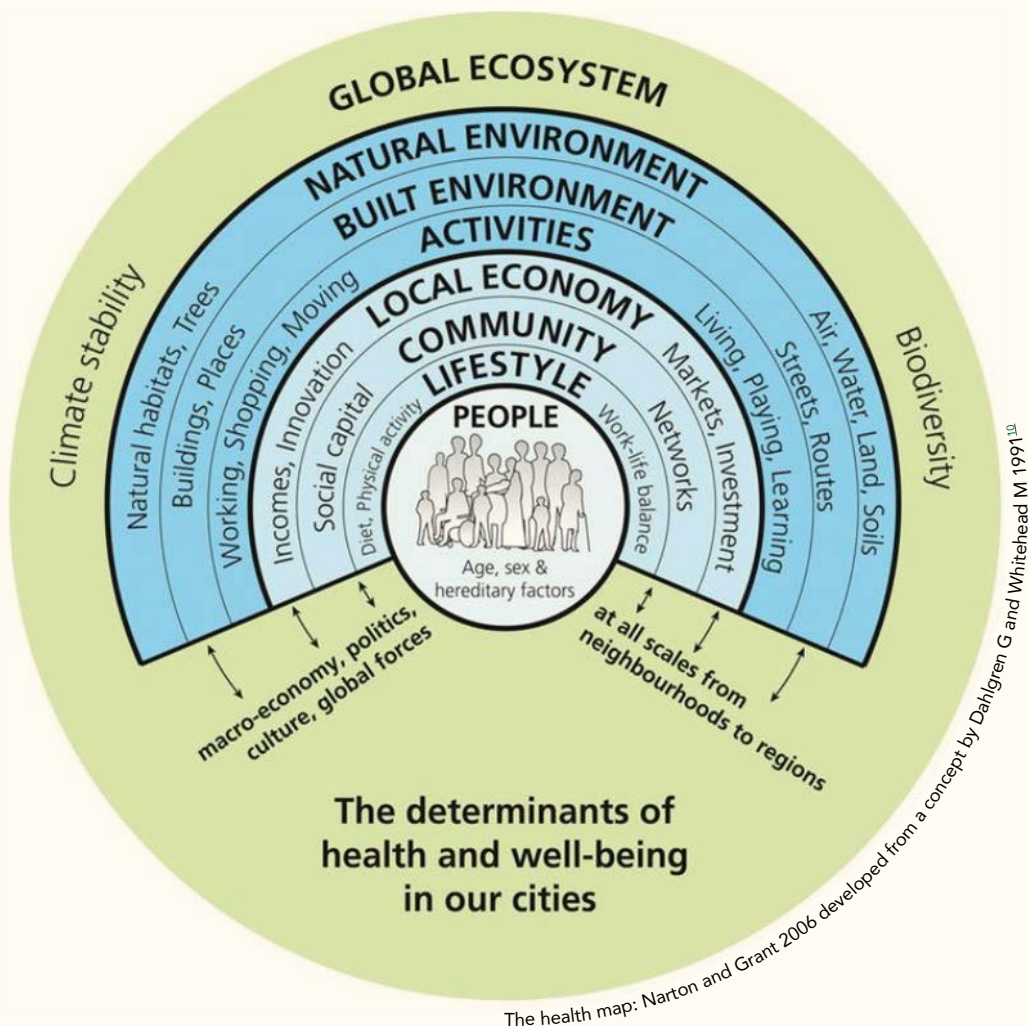
The Royal Colleges of Surgeons understand that sustainability is now an “important and legitimate” domain of quality in the delivery of surgical care. Supporting the surgical team in moving towards delivery of low - carbon surgical care resulted in the publication of the “Intercollegiate Green Theatre Checklist and Compendium of Evidence”, in November 2022.

The Royal College of Surgeons in Ireland has taken a leadership role in embracing the UN sustainable delivery goal 13 “taking urgent action to combatting climate change”. The President of RCSI established a Sub-Committee on “Sustainable Surgery” in June 2022. The work of the committee, chaired by Professor Camilla Carroll (RCSI Council Member) was to gather contemporary data from relevant stakeholders working in the area of sustainable surgery. An RCSI document would then be published based on the committee’s findings. The purpose of the document is to provide surgeons with meaningful information that will enable them to deliver sustainable surgical care to patients, without impacting on the delivery of safe surgical care.

EXECUTIVE SUMMARY

“Health sector facilities are the operational heart of service delivery, protecting health, treating patients, and saving lives. Yet health sector facilities are also a source of carbon emissions, contributing to climate change. The world’s health sector facilities churn out CO₂ through the use of significant resources and energy-hungry equipment. This is perhaps ironic — as medical professionals our commitment is to ‘first, do no harm.’ Places of healing should be leading the way, not contributing to the burden of disease.”

Tedros Adhanom Ghebreyesus,
Director General, World Health Organization



LIST OF ABBREVIATIONS

ATACH	The Alliance for Transformative Action on Climate and Health
BMJ	British Medical Journal
CAP23	The Government of Ireland Climate Action Plan 2023
COP28	28th Conference of the Parties
CPD	Continuing Professional Development
CSA	RCSI Committee for Surgical Affairs
ENT	Ear, Nose Throat
ESG	Environmental, Social, Governance).
GA	General anaesthesia
GHG	Green House Gas
GTC	Green Theatre Compendium
HSE	Health Service Executive
IEHG	Ireland East Hospital Group
IPCC	UN's Intergovernmental Panel on Climate Change
MSK	musculoskeletal
NCHD	Non-consultant hospital doctor
NCPS	National Clinical Programme in Surgery
NDTP	National Doctors Training & Planning
NHS	National Health Service
OECD	The Organisation for Economic Cooperation and Development
OR	Operating Room
PPE	Personal protective equipment
RCSI	Royal College of Surgeons
SDGs	Sustainable Development Goals
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
WHO	World Health Organisation

INTRODUCTION



“There is a powerful synergy between health, environmental protection, and sustainable resource use. Individuals and societies who share the responsibility for achieving a healthy environment and managing their resources sustainably become partners in ensuring that global cycles and systems remain unimpaired”¹¹.

Dr. Liji Thomas OBGYN Kerala, India

We are now in the Anthropocene era, where the health of our planet has been distinctly changed as a result of our human activity. The warming of our atmosphere, air and oceans caused by burning fossil fuels is having a deleterious impact on the health of our planet. In 2021, it is estimated that 36 billion tons of CO₂ gases were emitted globally. The burning of fossil fuels is responsible for the production of 80% of global CO₂ emissions.

INTRODUCTION

The first time world leaders met to discuss climate change was in 1972 at the United Nations Conference on the Environment. Fifteen years later the concept of “Sustainable Development” was introduced at the “World Commission on Environment and Development”, which took place in Oslo in 1987. The Commission defined sustainable development as a model that could meet the “needs of today without negatively impacting or compromising the needs of future generations”. The Chair of the meeting Gro Harlem Brundtland published his report in March 1987. The title of the report was “Our Common Future”. This report introduced the three pillars or principles of environmental, social and economic sustainability, also known as ESG (Environmental, Social, Governance)¹².



3 pillars of Sustainable Development

On the 25th of September 2015, the United Nations General Assembly signed into law the UN Sustainable Development Goals (SDGs). The UN 2030 Agenda, which is a plan of action for people, planet and prosperity is built around the SDGs¹³. The Agenda includes 17 goals which are framed on the 3 pillars of sustainable development and are valid for all global citizens.

INTRODUCTION



We are aware of the impact of planetary health on human health and the growing need for collective global action on climate change. Policy reports from the UN's Intergovernmental Panel on Climate Change (IPCC) in 2021¹⁴ make it clear that "Carbon removal is basically non-optional". The UN report suggests that "it's now nearly impossible to prevent 1.5° c of global warming without substantial efforts to remove carbon and very, very difficult to steer clear of 2° c without it as well".

However, there are steps that everyone can take towards environmental stewardship and mitigation against climate change.

Following Cop26 in 2022, Ireland joined the alliance for transformative action on climate and health (ATACH). This WHO initiative is committed to building climate resilient and low carbon health systems. The Government of Ireland is committed to Carbon Net Zero by 2050. The HSE climate action vision is a commitment to delivering healthcare, which is environmentally and socially sustainable, with net zero emissions by 2050.

INTRODUCTION



BACKGROUND AND CONTEXT

Delivering surgical care as an essential component of universal health care is challenging. As many as 5 billion people do not have access to safe, timely and affordable surgical care (Lancet Commission on Global Surgery 2030)¹⁵. Most of these children and adults live in low to middle income countries. These are some of the regions in the world which are now impacted by severe adverse weather conditions due to climate change. The “carbon costs of health care” must be assessed with regard to health outcomes.

The unique surgical ecosystem is identified within the hospital system as a “carbon hotspot”. This is due to the use of volatile anaesthetic gases, energy consumption derived mainly from non-renewable energy sources and the use of consumables especially single-use plastics. The supply chain (Scope 3 purchased goods) accounts for 71% of emissions within the EU.

It is a matter of significant importance that the surgical community takes immediate steps to mitigate the carbon footprint associated with surgical care and moves towards a sustainable delivery of low carbon alternatives.

Barriers to implementing sustainable principles and practices in the delivery of surgical care have been a lack of top-down and bottom-up leadership due to inadequate education and training in this evolving area.

The Royal Colleges of Surgeons in Great Britain and Ireland have endeavoured to meet these challenges. They have produced an evidence - based document called the “Green Theatre Checklist and Compendium of Evidence”¹⁶. This document is for the multidisciplinary surgical team and guides them in choosing sustainable options “before, during and after” surgery.

INTRODUCTION

METHODOLOGY

In order to become familiar with the current literature and science relating to the delivery of sustainable surgical care, a thematic approach to analysing the subject matter was undertaken. A series of webinar engagement's was planned with national and international stakeholders. 4 Webinars took place at 3 monthly intervals.

Webinar 1

The terms of reference of the Committee were established at the first webinar. The themes for the subsequent 3 webinars were chosen and content experts were identified and invited to take part. Each webinar was scheduled to last for 2 hours including enough time for the committee to engage with the speakers. The themes of each webinar and invited speakers are outlined below:

Webinar 2

Leadership in delivering Sustainability Principles and Practice in Surgery at Intercollegiate level

Content Experts

RCSI Director of Surgical Affairs Kieran Ryan

Report Chair Green Surgery Professor Mahmood Butta

RCSI University Health Science Professor of Public Health Debbie Stanistreet

IEHG Tommy Bracken

Webinar 3

Leadership in delivering Sustainability Principles and Practice in Surgery at National Level

Content Experts

NCPS General Surgery Lead Professor Paul Ridgway

Blackrock Health Group Clinical Director Ms Margaret O'Donnell

RCSI University Ms Abie Kelly Director of Corporate Affairs

Webinar 4

Leadership in delivering Sustainability Principles and Practice in Surgery at Local level

Content Experts

Mr Philip Crowley Director of Strategy HSE

Mr David Moore RCSI Council Member Orthopaedic Surgeon

Ms Claire Shannon Director Healthtech Ireland

Ms Barbara Julius RCSI Specialist Registrar General Surgery

A comprehensive report was completed by the Committee administrator Ms Sinead Reilly after each webinar and presented to the RCSI Council Chair of the Committee for Surgical Affairs (CSA) Ms Brigid Egan. The minutes of each report was presented at CSA, by the Chair of the Sustainable Surgery Committee Professor Camilla Carroll RCSI Council Member. Following completion of the series of thematic webinars, Professor Carroll presented the Committee's preliminary findings to the President and Council of RCSI in October 2023. A final document based on this presentation has now been compiled and forms the basis of this report.

Each webinar will now be described in more detail in sections 2 – 4.

INTRODUCTION

ESTABLISHING THE SUB-COMMITTEE FOR SUSTAINABLE SURGERY

In June 2022, the President of RCSI Professor Laura Viani established a sub-committee on Sustainable Surgery. The role of this committee was to review emerging evidence associated with the principles and practice of delivering sustainable surgery. The committee would then publish its findings in a document, which could be used by surgeons in practice and the multidisciplinary surgical team working in the Irish Health system.

The Sub - Committee members included:

Chair

Professor Camilla Carroll

Council Members

Mr David Moore

Mr Sean Johnson

Mr Keith Synott

Professor Thomas H. Lynch

Director of Surgical Affairs

Kieran Ryan

Committee Administrator

Sinead Reilly

RCSI Institute of Global Surgery

Lucia Boccato

RCSI President

Professor Laura Viani

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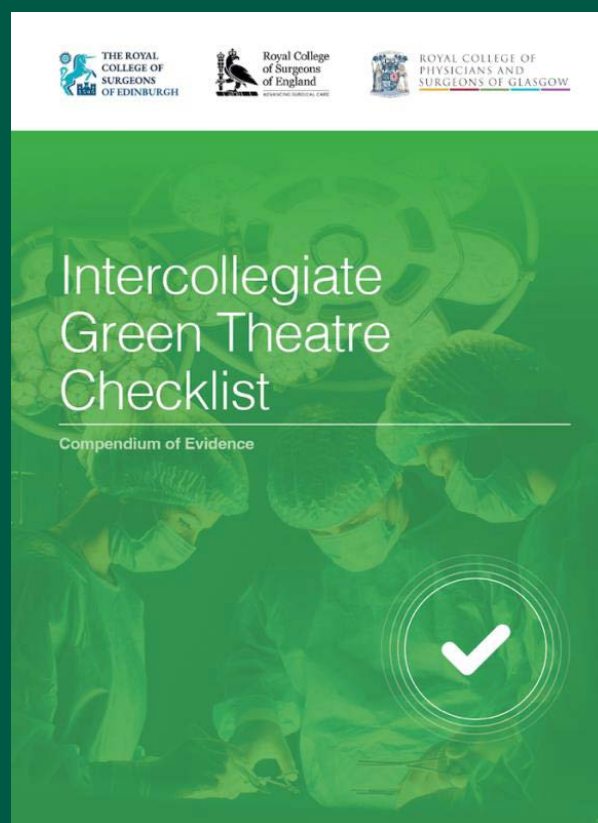
02 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT INTERCOLLEGIATE LEVEL

The Royal Colleges of Surgeons Great Britain and Ireland have taken a leadership role in informing members and fellows on how best to advance the delivery of sustainable surgical care by publishing a “Compendium of Evidence and Green Theatre Checklist” in November 2022¹⁷.

This peer reviewed document was compiled after extensive consultation and is aimed at encouraging surgeons to get involved in delivering meaningful sustainable surgical care to our patients, by looking at the “Whole Surgical Pathway”. Taking the necessary steps before, during and after surgery to reduce the carbon footprint of surgical engagement with patients will significantly reduce the environmental, social and economic impact of delivering surgical care.

By engaging in this top-down leadership role, the Royal Colleges seek to enhance the collective knowledge of surgeons and influence the behaviour of the “whole surgical team” towards delivering a leaner and low-carbon model of surgical care.

The Compendium of Evidence includes a “Green Theatre Checklist”, which can be used by the surgical team in their own operating departments to “reduce, reuse and recycle”, during the working day. It is recommended that the Green Checklist is incorporated into the daily surgical brief in much the same way as the WHO Surgical Safety Checklist has been embedded into surgical practice in the operating room¹⁸.



02 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT INTERCOLLEGIATE LEVEL

Anaesthesia

- 1 Consider local/regional anaesthesia where appropriate (with targeted O₂ delivery only if necessary) ☐
- 2 Use TIVA whenever possible with high fresh gas flows (5-6 L) and, if appropriate, a low O₂ concentration ☐
- 3 Limit Nitrous Oxide (N₂O) to specific cases only and if using:
 - ▶ check N₂O pipes for leaks or consider decommissioning the manifold and switching to cylinders at point of use;
 - ▶ introduce N₂O crackers for patient-controlled delivery.☐
- 4 If using inhalational anaesthesia:
 - ▶ use lowest global warming potential (sevoflurane better than isoflurane better than desflurane);
 - ▶ consider removing desflurane from formulary;
 - ▶ use low-flow target controlled anaesthetic machines;
 - ▶ consider Volatile Capture Technology.☐
- 5 Switch to reusable equipment (e.g. laryngoscopes, underbody heaters, slide sheets, trays) ☐
- 6 Minimise drug waste (*"Don't open it unless you need it"*, pre-empt propofol use) ☐

Preparing for Surgery

- 7 Switch to reusable textiles, including theatre hats, sterile gowns, patient drapes, and trolley covers ☐
- 8 Reduce water and energy consumption:
 - ▶ rub don't scrub: after first water scrub of day, you can use alcohol rub for subsequent cases;
 - ▶ install automatic or pedal-controlled water taps.☐
- 9 Avoid clinically unnecessary interventions (e.g. antibiotics, catheterisation, histological examinations) ☐

Intraoperative Equipment

- 10 REVIEW & RATIONALISE:
 - ▶ surgeon preference lists for each operation - separate essential vs. optional items to have ready on side;
 - ▶ single-use surgical packs - what can be reusable and added to instrument sets? what is surplus? (request suppliers remove these);
 - ▶ instrument sets - open only what and when needed, integrate supplementary items into sets, and consolidate sets only if it allows smaller/fewer sets (please see guidance).☐
- 11 REDUCE: avoid all unnecessary equipment (eg swabs, single-use gloves), *"Don't open it unless you need it"* ☐
- 12 REUSE: opt for reusables, hybrid, or remanufactured equipment instead of single-use (e.g. diathermy, gallipots, kidney-dishes, light handles, quivers, staplers, energy devices) ☐
- 13 REPLACE: switch to low carbon alternatives (e.g. skin sutures vs. clips, loose prep in gallipots) ☐

After the Operation

- 14 RECYCLE or use lowest carbon appropriate waste streams as appropriate:
 - ▶ use domestic or recycling waste streams for all packaging;
 - ▶ use non-infectious offensive waste (yellow/black tiger), unless clear risk of infection;
 - ▶ ensure only appropriate contents in sharps bins (sharps/drugs);
 - ▶ arrange metals/battery collection where possible.☐
- 15 REPAIR: ensure damaged reusable equipment is repaired, encourage active maintenance ☐
- 16 POWER OFF: lights, computers, ventilation, AGSS, temperature control when theatre empty ☐

02 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT INTERCOLLEGIATE LEVEL

RECOGNISING THE “CARBON-HOTSPOTS” IN THE OPERATING SUITE

The NHS is responsible for 4% of the total carbon footprint of the UK, which has been calculated to be equivalent to the total emissions of Croatia. However, when this is further analysed the supply chain, which are Scope 3 Emissions account for over 60% of the carbon footprint of delivering healthcare in the UK.

Carbon Footprint of Healthcare

- » NHS = 4% of total carbon footprint of UK
- » Equivalent to total emissions of Croatia
- » Aim for net zero by 2040

Delivering a 'Net Zero' National Health Service NHS England & Improvement 2020¹²

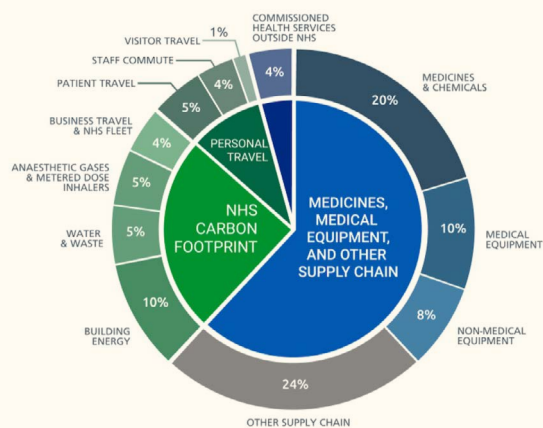


FIGURE 7: Sources of Carbon Emissions by Proportion of NHS Carbon Footprint Plus Patient and Visitor Travel and Home Medications

The surgical suite is a discrete functional unit within the hospital setting and the operating theatre is used by multi-professional teams. Each surgical sub-speciality requires specialised equipment and consumables.

The operating theatre has been identified, as producing a significant amount of GHGs within the hospital setting.

This arises from 3 sources.

Source 1

Volatile anaesthetic gases

Specifically Nitrous oxide and Desflurane

Source 2

Energy consumption

Burning fossil fuels as a result of energy derived from non-renewable sources

Source 3

Consumables

The supply chain and its associated carbon footprint and the use of single-use products.

The operating suite uses 3-6% more energy when compared to the rest of the hospital setting and produces 21 -30% more waste.

However, the use of consumables is responsible for the most significant production of GHGs. Single-use surgical instruments are responsible for the top 20 contributors to high GHG intensity procured items. Data presented in the “Green Surgery” document states that “Average reductions in carbon footprint of 38-56% are achieved through switching from single - use to reusable equipment”. Product selection by the surgical team is a very important part of addressing scope 3 emissions associated with the operating suite.

02 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT INTERCOLLEGIATE LEVEL

CASE STUDY

Over 20,000 tonsillectomies were carried out in the UK from 2019-2020. A case study analysing the carbon footprint of the commonest ENT operation performed in the NHS identifies that over 100 pieces of single-use plastic items are routinely used during this procedure.

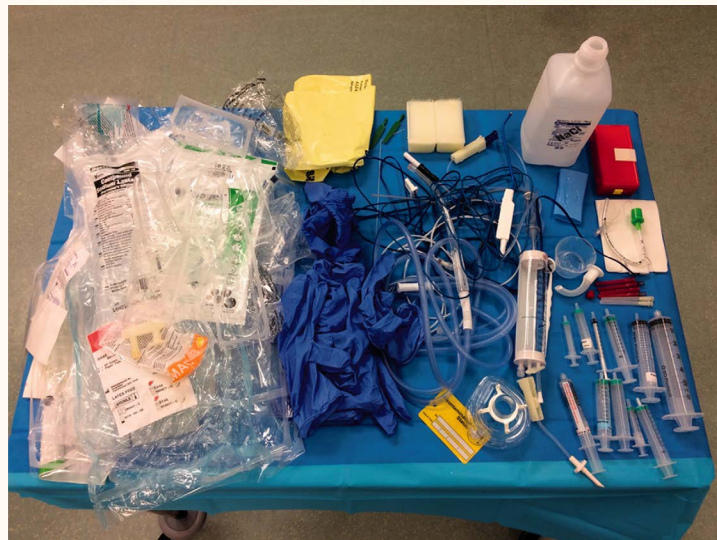


FIGURE 8:
Carbon Hotspot
within the
Operating Room

101 Pieces of Single - Use Plastic in an Adenotonsillectomy

Rizan C et al. J RSM. 2020 <https://doi.org/10.1177/0141076819890554>²⁰

CASE STUDY

Anaesthetic gas leaks

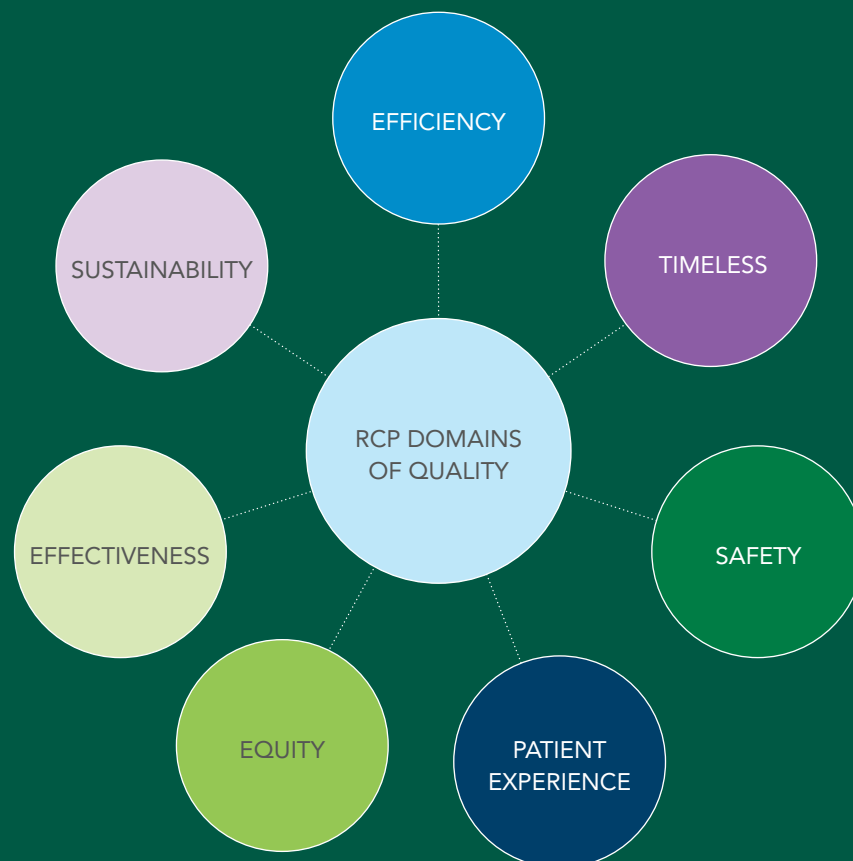
The Royal Victoria Eye and Ear Hospital Dublin, which is a level 2 Speciality Hospital treating both children and adults with Ophthalmic and ENT conditions, concluded that leaking gas pipes were contributing to major Nitrous Oxide gas leaks. In 2021, the anaesthetics department in collaboration with hospital estates decommissioned the leaking pipe system and switched to cylinders, at point of use.



03 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT NATIONAL LEVEL

At a national level, if we are to engage in delivering sustainable surgical care to our patients, we must “get it right first time”. The National Clinical Programs in Surgery (NCPS) supported by RCSI and the HSE have over the past number of years published specialty specific “Models of Care”, to support appropriate surgical decision making with a view to improving patient outcomes. The Models of Care address unwarranted variation in surgical care, by recommending care pathways and evaluating the under or over use of specific surgical procedures. The NCPS also seek to improve theatre efficiency and usage, which has an overall impact on an institution’s carbon footprint.

Integrating “Sustainability”, as part of the quality improvement process in the delivery of healthcare SusQI, is appropriate as we seek to reduce the carbon footprint associated with the delivery of modern healthcare.

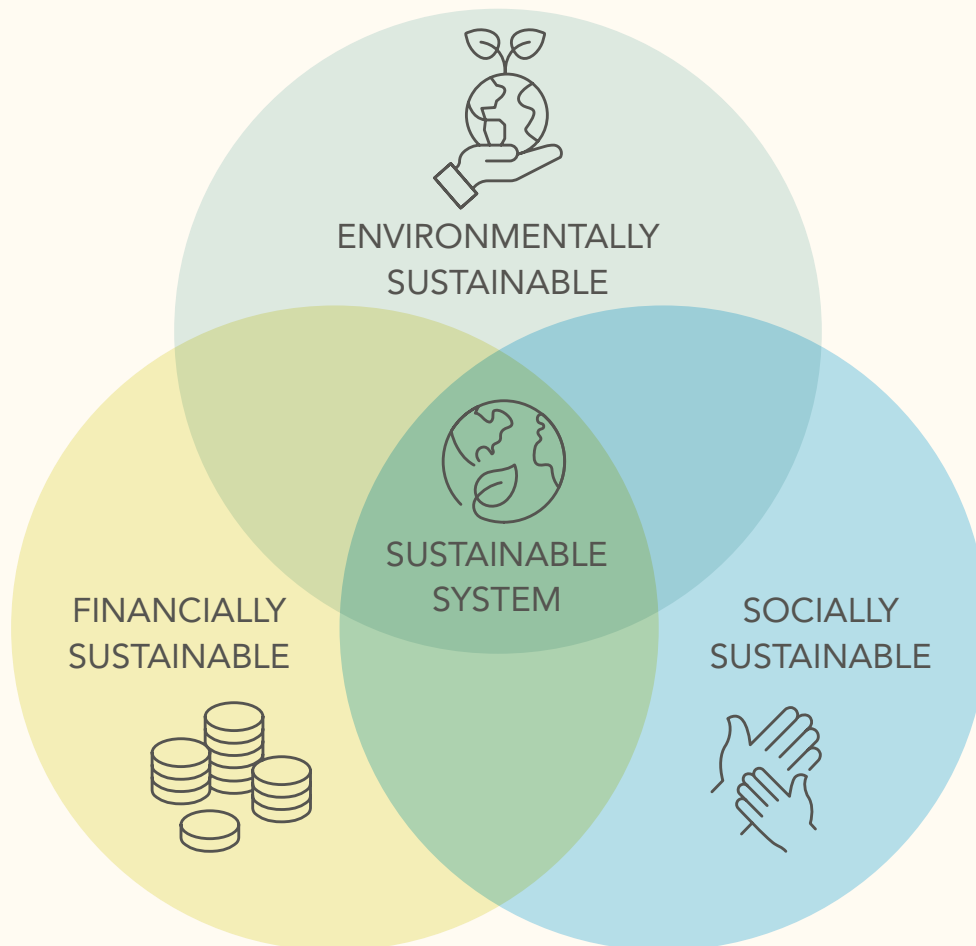


Quality in healthcare²¹

03 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT NATIONAL LEVEL

When evaluating the overall cost of delivering surgical care to our patients, we need to look beyond the financial cost associated with the procedure. We must consider the impact of the procedure on the individual patient and the population. We must also evaluate the environmental and social impact of the care being provided. This framework has been described as the triple bottom line of sustainability. Systems are “sustainable”, only when all 3 areas intersect.

By paying consideration to the “triple bottom line” associated with the delivery of healthcare, we seek “to protect the health of current and future generations by minimising the health service’s contribution to climate change and its ongoing impact on determinants of health”²².

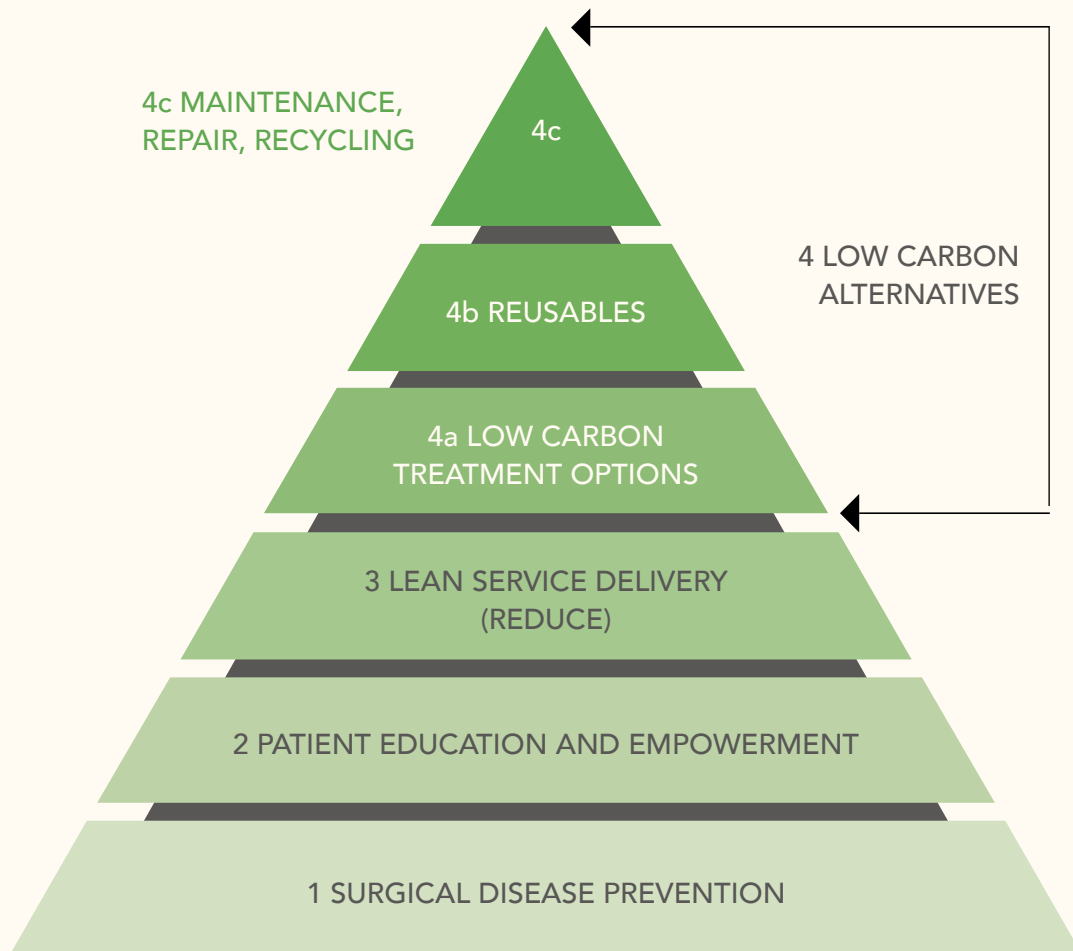


Triple Bottom Line of Sustainability

03 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT NATIONAL LEVEL

The environmental impact of surgical care can be reduced by interventions throughout the surgical care pathway. This can best be addressed by evaluating the 4 principles of sustainable healthcare, according to the "Centre for Sustainable Health Care". They are presented in order of impact on reducing the carbon footprint of care

1. Disease Prevention
2. Patient Education and Empowerment
3. Lean Models of Healthcare
4. Low carbon treatment options



Principles of sustainability in healthcare²³

03 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT NATIONAL LEVEL

The whole patient perioperative journey can be streamlined by optimising the patient's health pre-operatively, reducing unnecessary hospital visits by digital-health engagement and appropriate use of ambulatory care.

Reducing the need for unnecessary surgical care can be facilitated by utilising shared-decision making programs. These programs facilitate patient-surgeon dialogue aimed at enabling the patient to become more active in decisions surrounding their care. Patient education models, where the benefits, risks, alternatives and "what if nothing were done" have been associated with 1 in 5 elective procedures being "unwanted" by patients.

Frailty score should be considered when discussing non-surgical alternatives with patients aged over 65 years of age. A high frailty score is associated with increased rates of post-operative complications and revision surgeries²⁴.

**The SHARE Approach:
A Model for Shared Decision Making**

The SHARE Approach is a five-step process for shared decision making that includes exploring and comparing the benefits, harms, and risks of each option through meaningful dialogue about what matters most to the patient.²⁴

- STEP 1** **S**eek your patient's participation.
- STEP 2** **H**elp your patient explore & compare treatment options.
- STEP 3** **A**ssess your patient's values and preferences.
- STEP 4** **R**each a decision with your patient.
- STEP 5** **E**valuate your patient's decision.

Shared decision making occurs when a health care provider and a patient work together to make a health care decision that is best for the patient. The optimal decision takes into account evidence-based information about available options, the provider's knowledge and experience, and the patient's values and preferences.

 
Agency for Healthcare Research and Quality

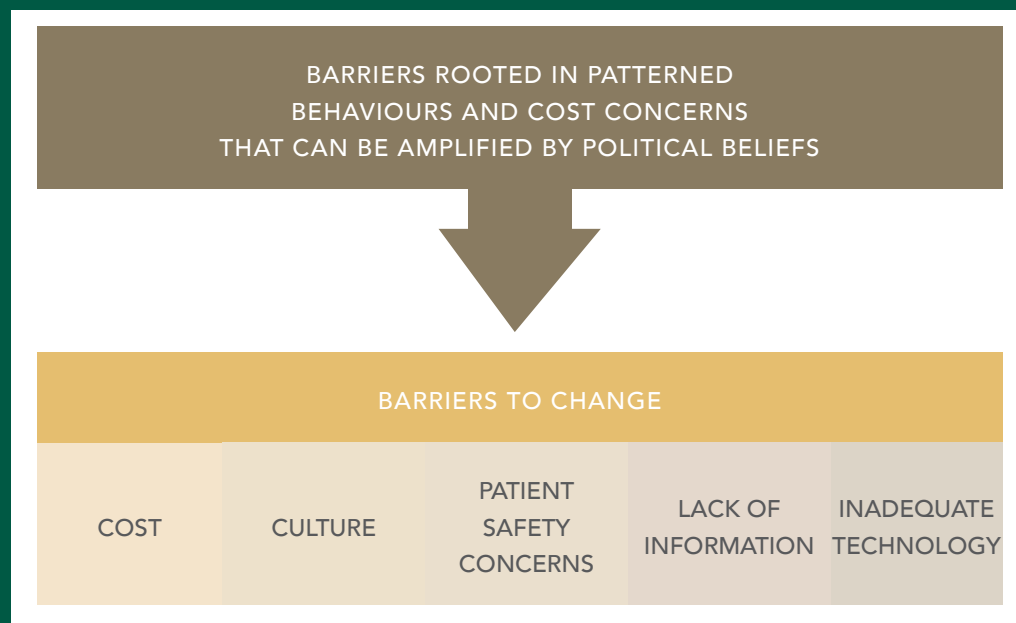
04 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT LOCAL LEVEL

Climate change is recognised as the most significant issue, that will shape the health of nations for centuries to come. Healthcare delivery is a resource intense industry. Decarbonising healthcare and promoting climate-smart practices will protect patients and the population as a whole.

Identifying and implementing sustainable practice in healthcare to reduce the associated carbon footprint is now a major priority. The Carbon footprint of delivering Healthcare in the Republic of Ireland has yet to be determined. However, we know that the European Union has the 3rd highest GHGs emissions as a percentage of the global healthcare footprint, estimated to be at 12%.

Engaging healthcare staff at a local grassroots level is an essential component of introducing meaningful change when it comes to implementing sustainable clinical care. Significant barriers to change exist amongst healthcare workers as a result of lack of education and training in the principles and practice of delivering sustainable healthcare.

Frequently cited reasons for resisting change when it comes to introducing low-carbon alternatives include a perceived extra cost when switching to reusable consumables, organisational culture and apprehension relating to patient safety.



04 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT LOCAL LEVEL

The HSE¹ has sought to address some of these issues by publishing a Climate Action Strategy in the autumn of 2023. This document seeks to inform HSE staff how we can all work together to achieve net zero by 2050. An information and educational program has been launched to guide staff in all areas of the organisation on how to “be sustainable” in the workplace. The education around the implementation of greener models of healthcare is based on the 4 principles of sustainability in healthcare. Focus is also placed on delivering SusQI as part of the HSE Climate Action plan.



We're taking climate action

4 Greener Models of Healthcare

Simple things you can do

- Be an active promoter for healthy living - prevention is the most sustainable healthcare of all.
- Quality and safety for patients and staff are first priority.
- Think before you open, will it be used or possibly wasted
- Reuse clinical and medical products when safe to do so.
- Consider environmental impact of medications.
- In your work, use online meetings and consultations.



#ClimateAction

Visit hse.ie/climateandhealth for more information

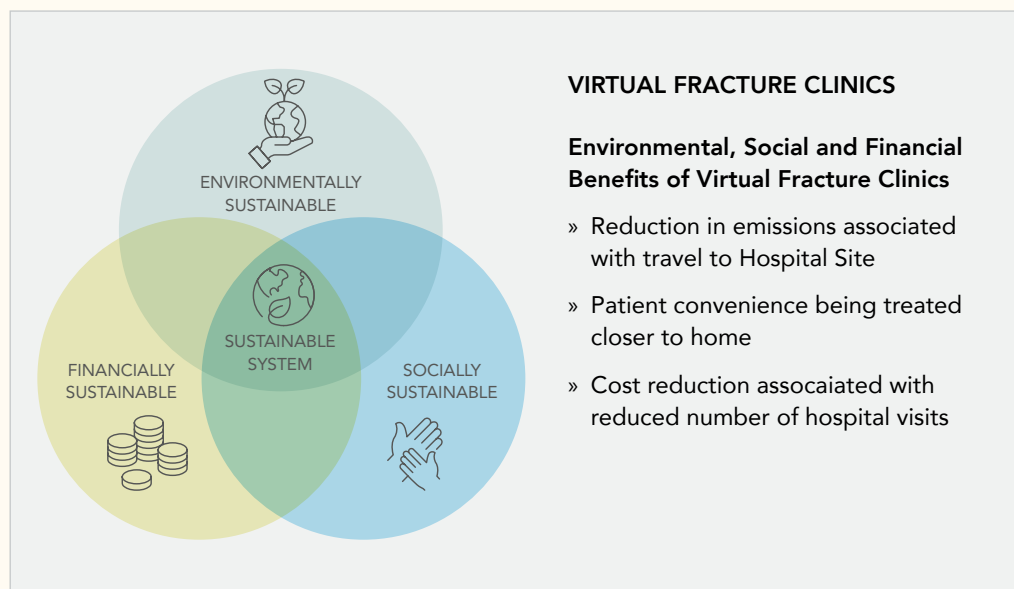
04 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT LOCAL LEVEL

AN EXAMPLE OF A GREENER MODEL OF HEALTHCARE VIRTUAL FRACTURE CLINIC

Dr Colm Henry, HSE Chief Clinical Director and Deirdre McNamara, HSE Director of Strategic Programmes introduced a “Virtual Fracture Clinic Program” in August 2023. This is a patient focused safe alternative to the traditional fracture clinic.

Patients with low-complexity orthopaedic injuries seen in the Emergency Department will have their diagnostic images reviewed remotely, within 3 days by a Consultant Orthopaedic Specialist. The patient will be contacted by musculoskeletal (MSK) physiotherapist via a telehealth platform and informed of their treatment plan.

Current data suggests that 60% of patients will be suitable for discharge without having to attend the hospital out-patients department. The remaining 40% will be managed by the MSK physiotherapist via a telehealth platform. The patient will receive a hospital visit, if their injury does not respond to the prescribed physiotherapy exercise program. This HSE “modernised care pathway”, takes into consideration the impact of the delivery of care on the patient, the environment and the financial cost to the patient as well as the healthcare system. The Virtual Fracture Clinic is an example of how to deliver sustainable healthcare in a safe and effective manner.



04 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT LOCAL LEVEL

GREENING THE OPERATING ROOM – TOWARDS SUSTAINABLE SURGERY. AN EDUCATION AND TRAINING INITIATIVE FOR SURGICAL NCHDS

Embedding sustainability into everyday practice through education and training of the surgical team is essential if we are to achieve the goal of net – zero by 2050, as outlined in the HSE Climate Action Strategy¹.

Currently, NCHDs do not receive any education or training in the principles and practice of delivering sustainable perioperative care in the Republic of Ireland²⁵.

Perioperative educational interventions based on sustainability principles and practice have been shown to have a measurable impact on climate change. The UK Royal College of Anaesthetists pioneering model of sustainability education has been associated with a 50% reduction in the use of environmentally harmful gases each year since 2018²⁶.

Recognising the significant carbon footprint associated with the delivery of perioperative care is a “call to arms” for change and the implementation of the “6Rs of Sustainability”, as outlined below.

6 R’S OF SUSTAINABILITY

RETHINK AND RATIONALISE	Does the patient need an operation? Does it have to be under GA or even in the OR?
REFUSE	Don’t accept the status quo.
REDUCE	Reduce use of resources
REUSE	Reusable, reloadable, remanufactured instruments.
REPAIR	Where is your repair service? How is it accessed?
RECYCLE	Correct waste segregation pre-contamination and after.

At RCSI postgraduate surgery, in collaboration with the NDTP, we believe that NCHDs are well placed to undertake a leadership role in promoting green theatre principles and being “Climate-smart” healthcare advocates now and into the future. We have developed a novel e-learning education and skills program for surgical NCHDs. It is based on the principles of sustainable quality improvement in healthcare. This will enable NCHDs to fully evaluate and utilise low-carbon alternatives in their daily surgical practice.

04 LEADERSHIP IN DELIVERING SUSTAINABILITY PRINCIPLES AND PRACTICE IN SURGERY AT LOCAL LEVEL

BRIEF DESCRIPTION OF THE E-LEARNING CURRICULUM

The curriculum content is based on the Intercollegiate “Green Theatre Compendium (GTC)” of the Royal Colleges of Surgeons. The GTC is evidence based and peer-reviewed by experts in the domain of sustainable healthcare. 5 Key areas, which have been recognised as priorities in implementing environmentally sustainable perioperative care will be covered in the e-learning program. They are outlined below:

1. Safety issues associated with the introduction and use of reusable surgical equipment.
2. Ethical procurement of operative equipment using sustainable principles.
3. Empowering the Surgical team to adopt sustainable actions in practice.
4. Minimising perioperative waste.
5. The environmental impact of surgical and nonsurgical treatment for specific pathological conditions.

Certification of completion of the e-learning program will be achieved by completing all 5 of the integrated assessments at the end of each section of the program. Further online engagement will take place with the NCHDs at 6 and 12 months following completion of the program. The format of the follow-up will be an online survey. We will evaluate, if the doctor has been able to action sustainable practice at their hospital site, as a result of their newly acquired competencies.

FUTURE DIRECTION

An upskilled NCHD will be in a position to act as a “Green Theatre Champion” at their hospital site. The role of the Green Theatre Champion will be to promote and sustain “Green Theatre Principles” in the perioperative workplace in collaboration with the multidisciplinary surgical team.

Each hospital site has an NCHD Committee. Going forward we recommend that each committee would have a Green Theatre Champion representative. In so doing the “Green Theatre Checklist” would be a standing item for discussion at committee level.

“A **successful COP28** is not about a single individual or nation, but the collective will and concerted efforts of all countries in these negotiations. The science compels us: phase out fossil fuels, rapidly accelerate renewable energy adoption, and radically scale up finance.”

MARY ROBINSON

CHAIR OF THE ELDERS

FORMER PRESIDENT OF IRELAND

FORMER UN HIGH COMMISSIONER FOR HUMAN RIGHTS

The
Elders

05 RECOMMENDATIONS

We recommend adoption of the principles and practices of delivering sustainable surgical care, if we are to achieve net zero by 2050 as stated in the HSE vision for climate action.

We recommend the intercollegiate "Green Theatre Checklist and compendium of evidence" as a tool that will enable the surgical team to engage in delivering sustainable surgical practice at a local hospital level.

We recommend the establishment of Green Teams and a Green Theatre Champion at local hospital sites. The Green Team will engage with the wider hospital community and senior management to develop and implement sustainable principles and practice in the day to day delivery of clinical and surgical care. This enables easy wins to be implemented in reducing the local carbon footprint by focusing on the circular economy.

We recommend a reduction in the reliance on single use items in favour of reusable items.

32% of the carbon footprint of a surgical operation results from the use of consumables.

We recommend local engagement with the procurement team to rationalise the use of single-use items and encourage multiuse alternatives, utilising circular economy principles.

We recommend that surgical sets are evaluated and rationalised to include only items that are necessary for the task at hand.

We recommend that appropriate attention is paid to waste segregation. 90% of medical waste generated in the surgical suite is non-risk waste. Local education and training

NON - RISK WASTE

This waste is not hazardous and is disposed of in the usual domestic waste disposal system

RISK WASTE

This waste is potentially hazardous to anyone who comes in contact with (infectious, biological, chemical or radioactive or by being categorised as sharp). Such waste has come in contact with patients' body fluids such as blood and/or saliva.

05 RECOMMENDATIONS

SEGREGATION & PACKAGING OF HEALTHCARE RISK & Non-Risk WASTE

RISK WASTE

YELLOW BAG



- All blood-stained items and all items soiled with body fluids assessed as infectious
- Suction catheters & tubing
- Incontinence waste from known or suspected enteric infections
- Bag should be closed using 'swan neck' when 2/3 full

* NO SHARPS, LIQUIDS OR HARD OBJECTS

RISK WASTE

YELLOW SHARPS BIN (with blue or red lid)



- All Needles
- All Syringes
- Scalpels
- Contaminated slides
- Sharps tips of clear IV giving sets



- Blood-stained or contaminated glass
- Stitch cutters
- Guide wires/trocars
- Razors

NOTE: Use Long Bin for large trocars, livers, stapling guns, etc.

* NO FREE LIQUIDS

RISK WASTE

YELLOW 30/60 LITRE RIGID BIN (with yellow lid)



- Blood Administration Sets (never disconnect line from bag)
- Contained blood and body fluids
- Non-cultured laboratory waste (including autoclaved microbiological cultures)
- Disposable suction liners
- Redivac drains (ensure drain closure sealed)
- Sputum containers
- Chest drains

NOTE: Absorbent material or gelling agent should be used in sufficient quantities to hold the fluid and prevent leakage.

* NO SHARPS OR FREE LIQUIDS

NON-RISK WASTE - RESIDUAL

CLEAR BAG



- Incontinence wear (from non-infectious patients)
- Oxygen face masks
- Empty urinary drainage and empty stoma drainage bags
- Clear tubing (e.g. oxygen, urinary catheters, ventilator, naso gastric)
- Enteral feeding bags and tubing
- Non contaminated gloves, aprons and masks
- Empty CAPD Bags
- All other household non-risk, non-recyclable waste
- Infusion lines not contaminated with blood or used for Chemotherapy or blood products with sharp end removed)

* NO SHARPS, LIQUIDS OR HARD OBJECTS

RECYCLABLE WASTE

GREEN BAG



- Mixed Dry Recyclables - Paper, Cardboard, Tetra Packs, Plastic Packaging / Wrappings, Tins/Cans, Plastic Bottles

* NO SHARPS, LIQUIDS OR HARD OBJECTS

PLEASE NOTE:

- Waste Bags must **not** be used for sharp or breakable items or for liquids
- Sharps bins should be signed and sealed correctly when **2/3 full** or at manufacturers fill line
- Sharps Bins should be securely closed at manufacturer's fill line or when **2/3 full**
- Label all Healthcare Risk Waste appropriately at point of generation
- Apply traceability tags to all Healthcare waste at source
- For waste not specified above please refer to www.dohc.ie/publications

REPRODUCTION OF THIS DOCUMENT IS PROHIBITED

05 RECOMMENDATIONS

We recommend local campaigns to educate staff on the appropriate use of PPE such as gloves. Gloves are only necessary for contact with bodily fluid, non-intact skin, or mucus membranes.

We recommend the education and training of existing healthcare staff in the principles and practice of delivering sustainable surgical care through programs delivered at local and national level by the professional bodies. These programs should be made available to all members of the multidisciplinary surgical team.



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