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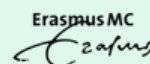
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DESHEALTH

WP2 D2.2

Report on emerging skills needs





Contents

2

Preliminary note

2

Disclaimer

3

Background

3

Project partners

4

Green skills needs

5

Survey results & discussion

7

Communication skills

8

Leadership skills

9

Proactivity skills

10

Moving forward: Collaboration

11

Other skills

11

Concluding points

12

Good practices

12

Products

18

Healthcare providers

31

Research & other initiatives



Preliminary note

This report is part of the project *DesHealth: A systemic design approach to education and training on sustainable healthcare*. As a deliverable in Work Package 2 (Building common knowledge on Sustainable Healthcare), the report aims to bring together different sectoral, disciplinary and cultural experiences and visions on the topic of Sustainable Healthcare to define and confirm topic areas to be addressed in Work Package 3's co-disciplinary training.

The content of the report builds on joint research and interviews carried out by the project partners to understand the design and management issues of health systems, as well as to identify the professional competencies and green skills required by the health sector. Examples of good practices will be presented as references to current and workable cases of Sustainable Healthcare, with the goal of informing and inspiring future topics in education and training.

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Background

Environmental sustainability of health systems within the European Union (EU) is bound to benefit from identifying and filling the educational gap in sustainable healthcare. By encompassing educational and professional sectors – higher education institutions, industries and health professionals – the DesHealth project brings together partners in the EU for cross-sectoral cooperation on topics of healthcare sustainability, product design, management and systemic design.

DesHealth aims:

- To allow organisations to increase the quality and relevance of their education activities.
- To develop and reinforce the organisations' networks of partners, increasing their capacity to operate jointly at the transnational level.
- To answer the educational gap on Sustainable Healthcare in higher and professional education by building the capacity of organisations to work transnationally and across sectors.
- To promote the sustainable transition of European health systems by training new and future practitioners addressing common needs and priorities.
- To build co-disciplinary and cross-sectoral relationships between stakeholders in the health system, particularly between academia, industry and health facilities, enabling sustainability transformations and changes.

Project partners

1. Politecnico di Torino (IT) – lead partner
2. Technische Universiteit Delft (NL)
3. Escola Superior De Comercio Internacional (ES)
4. Stiftelsen TEM (SE)
5. Bioindustry Park Silvano Fumero SpA Società Benefit (IT)
6. Erasmus Universitair Medisch Centrum Rotterdam (NL)
7. Fundació Unió Catalana d'Hospitals (ES)



Green skills needs

For the purpose of this report, a questionnaire (survey) was shared with relevant stakeholders to evaluate existing green skills in healthcare.

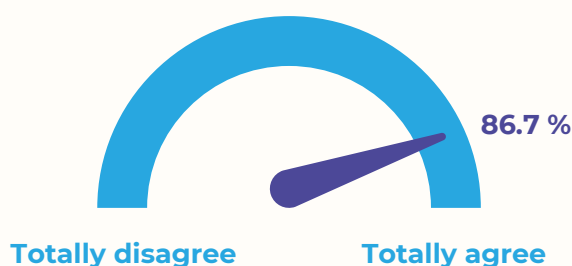
The survey centred around questions of interest in how today's professional competencies are meeting the participating organisations' activities; what training processes are present; and why certain topics should be the focus in education during upcoming years.

The DesHealth project partners conducted 18 interviews based on the survey, representing the following stakeholders in EU countries:

- Healthcare providers (regions, hospitals and similar)
- Healthcare solution suppliers (companies, architects and similar)
- Higher education providers (universities, research projects and similar)
- Healthcare clusters

In addition to these stakeholders, fostering more successful education in sustainable healthcare – through identifying the skills gap – was closely tied to collaboration and intersections between sectors (as visualised in Figure 1). Bringing in the co-disciplinary element, 86.7 % of the survey responses leaned towards the “Totally agree” side – pointing to a positive attitude and potential motivation as well as willingness to engage in future education.

Figure 1. The extent of agreement with the statement: “Fostering transversal green skills between different educational and production sectors is crucial for healthcare’s transformation”



*Based on 15 responses.
(13) Totally agree; (1) Agree to a certain extent; (0) Disagree;
(0) Totally disagree; (1) No opinion*



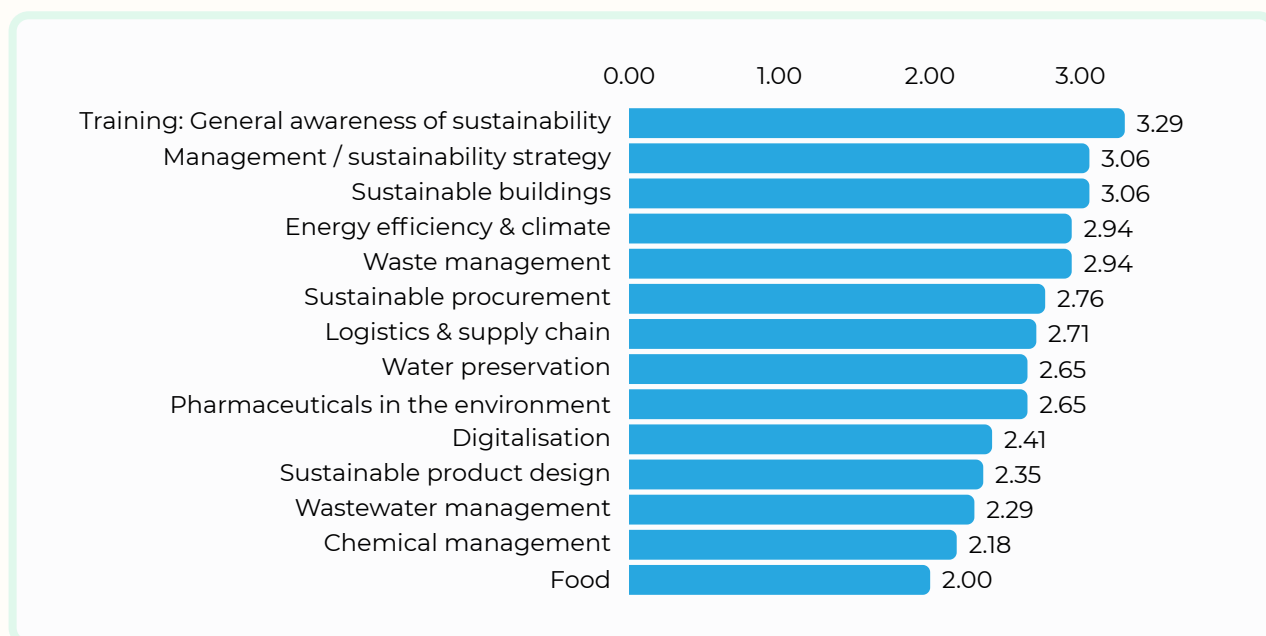
Survey results & discussion

Emerging skills needs have been pinpointed through identified topics of priority and already established know-how expressed by the interviewees. Presenting the results is done with the aim of exploring what areas future education should focus on.

On a general level, the results show that training related to skills in certain environmental issues connected with healthcare is present in the healthcare sector. For example, the sector appears relatively proficient in teaching skills of waste management, recycling, energy saving procedures and similar.

Still, polishing and improving these skills is considered important for future education in the interviewees' organisations (as shown in Figure 2):

Figure 2. Mean ranking of topics based on their importance for future education in interviewee's sector (from a sustainability point of view).



0: Not applicable; 1: Not important for the future; 2: Important to a certain extent; 3: Important; 4: A priority area for the near future



Additional topics mentioned but not included in Figure 2 are “Less use of medication”, “Sustainability in clinical decisions” and “Measuring the impact of sustainability”.

It should be noted that the answers in this type of survey tend to reflect not only topics that are on the future agenda of the organisations, but also what sustainability level the interviewee as well as its organisation are currently on.

Figure 2 highlights a maturity in healthcare sustainability’s development curve (see next paragraph). Food, with the lowest ranking number, is probably not seen as part of the interviewees’ responsibilities or as a key factor in healthcare. Additionally, the low ranking number for chemical management can be explained by the maturity aspect: In mature organisations, chemical management is often a regulatory and legislative issue.

There is a development curve within sustainability where topics like waste and chemicals are high on the agenda early-on. Management strategies and other broader topics tend to come into the curve when organisations are relatively mature within healthcare sustainability. Likewise, weighing what topics and necessary skills to focus on tends to depend on the role and past experiences of a specific professional. In a context with an organisation at another stage on the development curve, the ranking results in Figure 2 would likely look different.

Acknowledging the influence of this curve and that sustainability competencies in the interviewees’ organisations appear rather well established, the most valued skill on the ranking list in Figure 2 should not be overlooked: “Training: General awareness of sustainability”. This priority of training and the building of general awareness can, when taken together with the other results, aid in the formation of three main themes mentioned by the interviewees for narrowing the educational gap:

- Communication skills
- Leadership skills
- Proactivity skills



Communication skills



“You can lead the horse to water, but you can’t make him drink.”

As a quote from one of the interviewees, this saying can be rephrased to: In order for a training in sustainable healthcare to be successful and skills to be learned, there needs to be a basis of motivation and engagement by those taking part in the material. Such a basis was expressed by the majority of the participants in the survey, pointing to the importance of communicating *why* sustainability is a crucial topic to be competent in.

Involving motivation and engagement goes hand in hand with additional suggestions by the interviewees, like the value in using interactive elements in trainings, improving pedagogics, and ensuring an open conversation throughout the training process – offering flexibility based on employees’ topics of concern in the healthcare sector.

Communication skills were also spoken about as the ability to disseminate information to make it coherent and understandable to a targeted audience (whether the audience is made up by staff at different organisational levels, management officials interested in the cost savings of an investment, or clients in need of data to support their procurement process).

One interviewee further articulated that if communication skills are in place, other skills and knowledge gaps can be filled between stakeholders.



Leadership skills



Several interviewees mentioned the leadership skills of making decisions and delegating responsibility for various sustainability areas as key to the sustainable transformation of healthcare.

By employing expert knowledge and providing basic sustainability training relevant for those working on the floor, competence will be represented in the right places.

“Everyone should not know everything” was a statement by one of the survey respondents, indicating the benefits of diversity when it comes to sustainable healthcare skills. This was echoed by another interviewee who said: “We need to set clear expectations for different roles and functions; who needs basic skills and who needs more specialist skills”.

Related with communication skills, leadership skills were further said to be connected to a move away from top-down decisions that force trainings onto employees without communicating the reason(s) for the trainings.



Proactivity skills



Many interviewees perceived their and their colleagues' green competencies in sustainable healthcare to be sufficient to meet *today's* demands. At the same time, the majority also expressed the importance of proactivity skills, enabling the ability to identify *future* demands and articulate priorities not yet in place. Proactivity could in turn translate into continuous training processes in sustainable healthcare.

Such processes would go beyond simply relying on one introductory training for new employees or on sporadic educational opportunities. Instead, the processes could involve collaborating with other actors to keep skills and knowledge in the field of healthcare sustainability up-to-date – or, as one interviewee stated: “not solely based on the current state of affairs”.

Challenges to emerging skills

Alongside the opportunities for future training in sustainable healthcare and green skills, interviewees mentioned some challenges to the improvement of educational material: budget constraints, lacking engagement, and time deficits. These are challenges that may limit investments in new trainings.

But as several interviewees made clear, the challenges can in many cases be met by improving skills in communication, leadership and proactivity. Moving sustainability to the everyday flows of an organisation could likely overcome



hinders such as additional costs. Or, to pull a quote from the survey: “as routines need to be learned in any case, these might as well be taught with sustainability in mind from the very start”.

Moving forward: Collaboration

The outcome of the survey show relatively positive perceptions of collaboration for developing training in sustainable healthcare, with the sectors included in Figure 3 – albeit with varying results.

What the highest rounded percentages in the table – grouped in the category “Can be improved” – indicate, is that there could be value in working simultaneously with strengthening collaboration alongside developing training. In other words, collaboration “Can be improved”.

Figure 3. The perception of collaboration in terms of education and knowledge exchange between the interviewees’ organisation and the sectors in the table (the numbers are based on the rounded percentage of answers per sector). NN = No number.

	PUBLIC SECTOR	INDUSTRIES RELATED TO THE HEALTHCARE SECTOR	UNIVERSITIES / TECHNICAL INSTITUTIONS	NGOS	INTERNATIONAL PARTNERS	HEALTHCARE PROVIDERS
GOOD	21.42 %	28.57 %	40 %	NN	21.86 %	42.86 %
CAN BE IMPROVED	50 %	71.43 %	46.66 %	53.33 %	50 %	57.14 %
BAD	14.29 %	NN	6.67 %	26.67 %	21 %	NN
N/A	14.29 %	NN	6.67 %	20 %	7.14 %	NN



Other skills

In addition to the three themes of skills in communication, leadership and proactivity, interviewees pointed to the need for more and/or future training on regulatory areas of sustainability, sustainability monitoring, life-cycle assessments, health economics, and the recent challenges of climate change on people's health.

Concluding points

- There is an expressed willingness and motivation in the healthcare sector to engage in new training material and increase professional competencies in sustainable healthcare.
- Successfully narrowing green skills gaps in the healthcare sector appears tied to developing skills in communication, leadership, and proactivity. Such skills could in turn help overcome challenges like budget constraints, lacking engagement, and time deficits.
- Even healthcare organisations that are relatively proficient in sustainability education concerning for example waste management, recycling or energy saving procedures would likely benefit from improving and expanding their training material.
- Healthcare organisations are expected to find value in embracing diversity when it comes to skills and to more clearly defining roles; identifying what parts of the organisation that need more specialised knowledge, and what parts could profit from a more basic understanding of sustainability issues.
- When designing future sustainable healthcare trainings, collaboration across different disciplines and sectors should be promoted as well as integrated into the education process – to fill the knowledge gaps and avoid reinventing the wheel.



Good practices

The following good practices should be seen as references to current and workable cases of Sustainable Healthcare, as well as inspirations for future topics in education and training. Collected by partners in the DesHealth project, the good practices are categorised into *Products*, *Health providers* and *Research & other initiatives*.

Products

GAF (GLYOXAL, ACID FREE) FIXATIVE SOLUTION



TARGET GROUPS

Patients

Healthcare
workers

AIMS TO REDUCE THE USE AND DISPOSAL OF A TOXIC PRODUCT LIKE FORMALDEHYDE

GAF is a non-toxic and non-carcinogenic fixative solution, acting as a replacement to Formalin with comparable histological efficacy. The solution addresses health concerns of both patients and healthcare workers. Furthermore, GAF targets environmental protection by minimising the usage and disposal of toxic Formaldehyde.

Results: GAF has been validated and has received the CE and FDA approvals. The product is on the market.



SOLVAY: E-PTFE PROJECT



TARGET GROUPS

Hospitals

Local health
authorities

The general
public

AIMS TO ALLOW FILTER REUSE IN SURGICAL MASKS

Introducing reusable membranes for surgical masks, the project e-PTFE aims to address the high demand for surgical masks during the COVID-19 pandemic by developing a new polymer for mask filters. Due to the exponential market demand, the commonly used material PP-Melt Brown faced a severe shortage.

In collaboration with Polytechnic University of Milan, Md, the company developed an expanded PTFE (e-PTFE) membrane as a replacement for filter membranes. This solution meets the requirements of EN 14683, providing high breathability and filtration efficiency.

Additionally, the e-PTFE membrane allows for filter reuse, offering a sustainable solution to the market. The goal of the project is to create an autonomous supply chain in Italy, and possibly Europe, that can produce a



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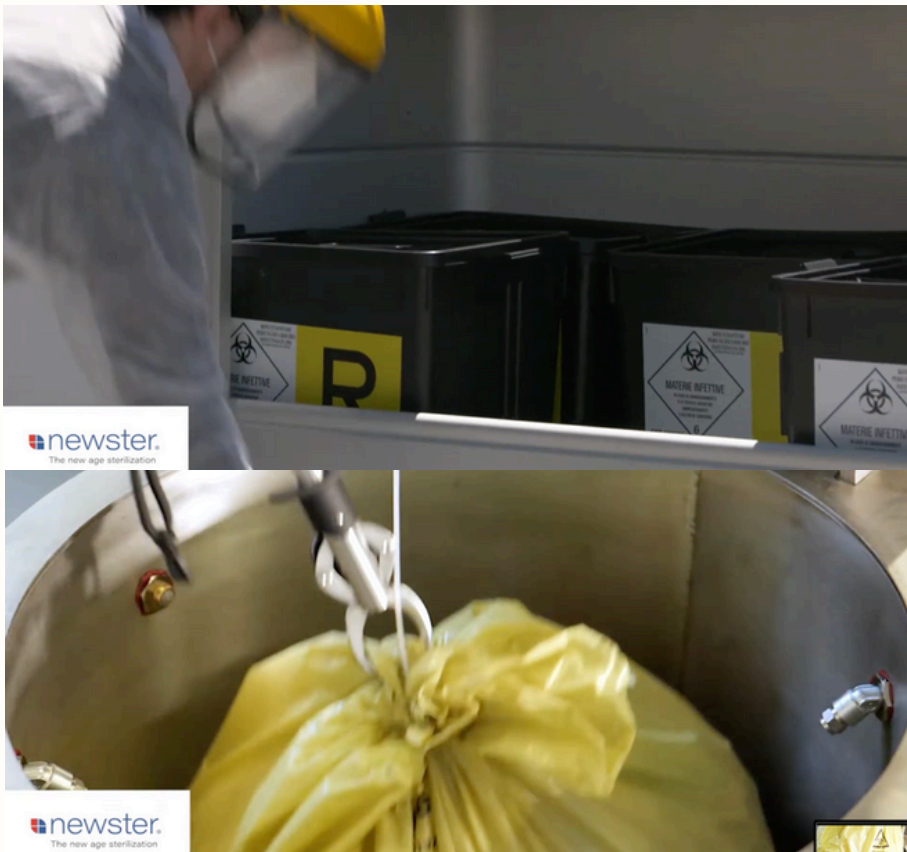
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2023-1-IT02-KA220-HED-000157600

minimum of 1 billion surgical masks per month during periods of high need. By introducing reusable membranes, customers can contribute to sustainable practices in the mask industry.

To scale: Conditions needed include access to groundwater, sun hours, organisation, tax system, grants and so on.

STERILTECH: ON-SITE STERILISATION



TARGET GROUP

Hospitals

- AIMS TO REDUCE HAZARDOUS WASTE
- AIMS TO ENHANCE WASTE QUALITY
- AIMS TO REDUCE ENVIRONMENTAL AND ECONOMIC COSTS OF WASTE TRANSPORTATION



Steriltech, part of Newster Group, offers sustainable on-site hospital waste sterilisation, cutting costs by over 50 %, reducing emissions, and ensuring safety and regulatory compliance.

On-site sterilisation in hospitals refers to the disinfection and sterilisation of medical instruments and devices within the facility, offering sustainability benefits like CO2 emission reduction, energy efficiency, less chemical use, waste reduction, resource management, and cost savings.

Steriltech Waste Company, a Newster Group entity, champions this approach for solid hospital waste management, ensuring over 50 % in annual savings. The company covers the entire process from ward collection to on-site sterilisation, eliminating the need for off-site transport and storage, enhancing operator safety, upholding high healthcare standards, and reducing environmental impact.

Quick staff training and comprehensive support ensure safety and regulatory compliance. The sterilized waste qualifies as municipal waste, cutting biological risks and the need for daily transport to disposal facilities. Steriltech also offers guidance on Italy's National Transition Plan 4.0 tax incentives.

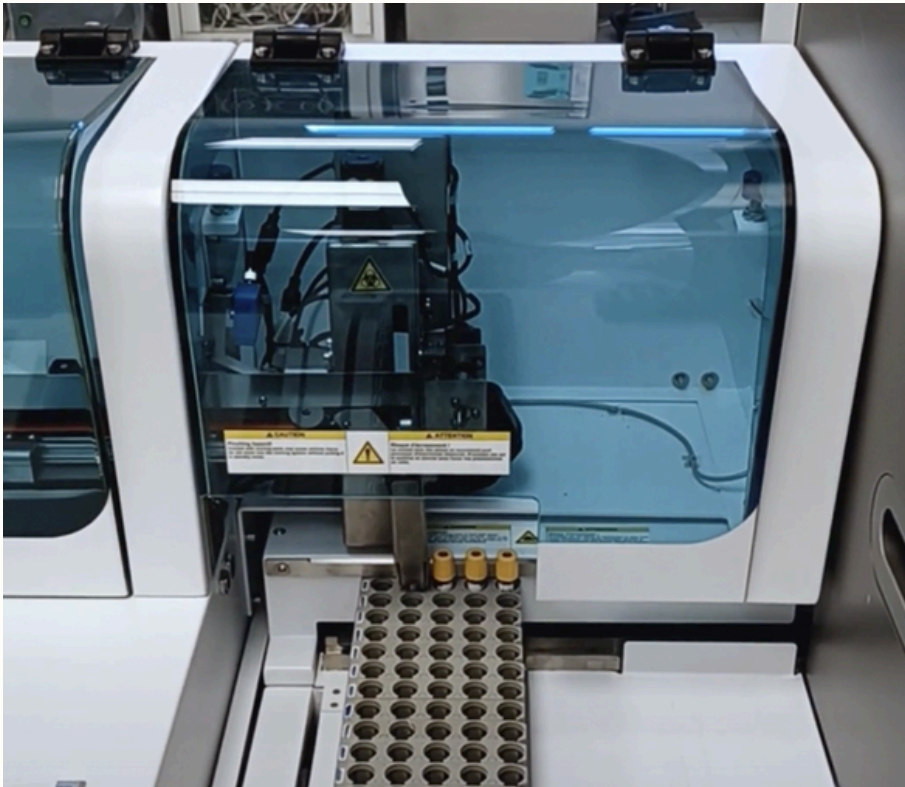
Results: Reduced impacts of hazardous waste management from an economic, management and environmental point of view.

To scale: Condition needed includes investment in the waste management technology.

Potential for learning: Health hazardous waste, if managed and sterilised on site, can be disposed of with municipal waste.



AUXOLOGICO: PLASTIC REDUCTION INITIATIVES



TARGET GROUPS

Patients

Healthcare
workers

AIMS TO REDUCE PLASTIC USE AND CO2 EMISSIONS, TO INCREASE CLINICAL EFFICIENCY

The Auxologico Laboratory has redesigned its clinical laboratories introducing new technologies – restructuring the computer and instrumental systems – achieving a 30 % reduction in the use of plastic tubes from 3,000 to 2,400 daily. This technological automation, aimed at enhancing efficiency, also positively impacts the environment, workplace safety, patient benefits, and cost savings.

By cutting plastic tube use by 30 %, Auxologico has prevented the production and disposal of 37 kg of CO₂ per day, leading to an annual reduction of 11 tons of CO₂. This reduction not only means less blood drawn from patients and a decreased risk of cross-contamination for workers – it also means lower costs. Auxologico has launched several plastic reduction initiatives, including installing water dispensers to eliminate plastic bottles and automated detergent dispensing systems – with the Laboratory's reduction in plastic tube



use underscoring the positive environmental and safety outcomes.

Results:

- Prevented the production of 37 kg of CO2 per day
- Reduced the use of plastic collection tube by 30 %

To scale: Conditions needed include investment in redesigning the clinical laboratory and purchasing new equipment.

Potential for learning:

- Plastics use in clinical processes can be reduced through new technologies.
- Plastics in healthcare is a cross-cutting problem that needs to be addressed on clinical, logistical, and behavioural levels.

BIOBASED CLINICAL WASTE/SHARPS BIN



TARGET GROUP

Healthcare
workers

AIMS TO DELIVER SUBSTANTIAL REDUCTION IN CO2 EMISSIONS

WoodSafe, a biobased clinical waste/sharps bin, can decrease CO2 emissions



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with 66 % for every fossil-based clinical waste bin shifted. This is an instant climate impact for a product group with a fast turnover and a constant need for new products into the consumption loop.

Results: The aggregated impact on a small-sized country with approximately 10 M inhabitants will be CO2 savings of up to 15 000 metric tonnes.

Health providers

FSM – A NET ZERO CENTER



TARGET GROUPS

Organisations

People

Targeted
stakeholders

- AIMS TO INTEGRATE GREEN CULTURE INTO THE HEALTHCARE ORGANISATION
- AIMS TO DESIGN A HOSPITAL WITH THE LEAST POSSIBLE ENVIRONMENTAL AND VISUAL IMPACT, BLENDING INTO THE TERRAIN'S TOPOGRAPHY AS WELL AS ADAPTING THE BUILDING TO ITS SURROUNDINGS WITH GREEN ROOFS AND LANDSCAPED COURTYARDS



- **AIMS TO PROGRESSIVELY REDUCE A HOSPITAL'S ACTIVITY IMPACT ON THE ENVIRONMENT AND THE HOSPITAL'S CARBON FOOTPRINT**

FSM's (Hospital Universitari Mollet) journey to Net Zero involves renewable energy, sustainable facilities, zero-emission transport, and waste management, driven by strong governance and staff commitment.

Through initiatives like sourcing 100 % electricity from renewables, sustainable building practices including geothermal energy and photovoltaic installations, zero-emission transport with electric vehicles, and sustainable food sourcing, FSM is significantly reducing its carbon footprint.

Key to this effort is strong governance and staff commitment, evident in a sustainability survey where 57 % of hospital workers participated, demonstrating high engagement with the climate agenda and the Green Hospital program.

FSM recognises the inseparable link between human health and environmental health, aligning its strategy with WHO's acknowledgment of climate change as a health crisis. This commitment underscores the importance of integrating green culture and climate resilience across all institutional areas, ensuring a sustainable future.

Results:

1. Professionals surveyed showed high commitment to sustainability (57 % participation). Significant ratings include:
 - Climate change emergency: 9.44
 - Environment-health link: 9.42
 - FSM's zero emissions challenge: 8.72

44 % have knowledge of heatwave and tropical disease programs; 43 % use tech to reduce patient travel.

2. Net zero in direct emissions achieved, with an 85 % reduction.



15 % offset through Catalan Climate Change Office's Voluntary Compensation Program.

3. The Green Hospital project led to an 84.53 % reduction in direct emissions in 11 years. Despite activity increase, electricity use decreased by 26.37 % and water use by 36.36 %, through resource management improvements.

To scale: Conditions needed depend on factors such as regional climate, resource availability, organisational support, tax incentives, grants, and regulatory frameworks. Adaptation to local settings is crucial for successful implementation.

Potential for learning:

- Integration of sustainability philosophy into operations
- Emphasis on the inseparable link between human and environmental health
- Urgent need to address climate issues as health crises
- Importance of defining a Net Zero roadmap and coherent planning for impactful actions
- Call for widespread knowledge and integration of green culture and climate strategies
- Ensuring governance and professional understanding
- Integration across all institutional areas



SUSTAINABLE HOSPITAL APPAREL RECOVERY



TARGET GROUPS

Waste
managers

Healthcare
institutions &
professionals

Environmental
organisations

- AIMS TO REDUCE THE ENVIRONMENTAL IMPACT OF THE HEALTHCARE SECTOR THROUGH THE RECOVERY AND REUSE OF HOSPITAL APPAREL
- AIMS TO PROMOTE AWARENESS ABOUT SUSTAINABILITY IN HOSPITAL SETTINGS
- AIMS TO ESTABLISH SUSTAINABLE PRACTICES IN WASTE AND RESOURCE MANAGEMENT WITHIN HOSPITAL ENVIRONMENTS

Hospital Clínic de Barcelona recovers and reuses hospital apparel through the project “Sustainable Hospital Apparel Recovery”, reducing environmental impact and promoting sustainability in the sector.

By salvaging damaged uniforms and repurposing textiles for other uses, the goal is to minimise waste generation and foster sustainable practices within the healthcare sector. Additionally, internal awareness campaigns are implemented to educate about the importance of sustainability in hospital settings.



2023-1-IT02-KA220-HED-000157600

Results:

- Recovery of 37 % of damaged uniforms in 2022, avoiding the emission of 3,300 kg of CO₂
- Reuse of textiles for manufacturing products such as cloth bags and surgical curtains
- Internal awareness campaigns to preserve the quality of hospital apparel

To scale: Conditions needed include availability of waste management resources, collaboration with textile providers, and institutional support.

Potential for learning:

- Replicable model for other hospitals and healthcare facilities
- Insights into sustainable waste management in hospital environments
- Promotion of awareness about sustainability in the healthcare sector

WHITE GOWNS AGAINST CLIMATE CHANGE



TARGET GROUPS

Patients

Public health
authorities &
researchers

Healthcare
professionals



- AIMS TO EQUIP DOCTORS WITH PRACTICAL TOOLS TO ADDRESS CLIMATE CHANGE IN CLINICAL PRACTICES AND PATIENT COMMUNICATION
- AIMS TO ENHANCE CLINICAL AND HEALTHCARE PRACTICES BASED ON EVIDENCE OF HEAT IMPACT ON PREVELANT CHRONIC DISEASES
- AIMS TO RAISE AWARENESS ABOUT THE INTERSECTION OF HEALTH AND CLIMATE CHANGE, AS WELL AS TO PROMOTE MITIGATION AND ADAPTATION ACTIONS

The project "Prescriptors: the authority of white gowns at the service of the fight against Climate Change," led by Mútua Terrassa, recognises healthcare professionals' influence in combating climate change. This is a multidisciplinary approach empowering the professionals to lead climate action, integrating sustainability in clinical practices and patient communication.

Through training, research, and effective communication, the project aims to transform clinical practices and raise awareness about the health-climate relationship.

Results:

- Launch of digital communication actions with patients on sustainable mobility
- Initiation of the Green Pharma project for sustainable prescription guidelines
- Ongoing research on the impact of climate change on prevalent diseases

To scale: Conditions needed include access to research resources, collaboration with universities, staff commitment, and institutional support.

Potential for learning:

- Replicable model for integrating sustainability into healthcare
- Lessons on effective climate change communication for healthcare professionals
- Research strategies applied to climate change adaptation and mitigation in health



HOSPITAL WITH NATURAL SURROUNDINGS



TARGET GROUPS

Hospitals &
healthcare
facilities

Local
communities &
environmental
agencies

Waste
management
organisations

- AIMS TO REDUCE GREENHOUSE GAS EMISSIONS AND WASTE GENERATION IN HOSPITAL OPERATIONS
- AIMS TO ENHANCE BIODIVERSITY CONSERVATION AND ENVIRONMENTAL SUSTAINABILITY WITHIN HOSPITAL PREMISES
- AIMS TO PROMOTE AWARENESS AND ADOPTION OF SUSTAINABLE PRACTICES AMONG STAFF AND VISITORS

Embracing its natural setting, the Institut Guttmann hospital implements sustainability measures, reducing emissions and fostering biodiversity conservation.

The Institut Guttmann hospital is committed to minimizing its environmental footprint. With a total area of 42,100 m², including 10,451 m² of gardens, the hospital integrates nature into its facilities. Efforts focus on reducing emissions from energy consumption, waste generation, and transportation. Through



meticulous waste management, the hospital ensures proper disposal of hazardous and non-hazardous waste. Awareness campaigns promote sustainable mobility and environmental responsibility among staff and visitors.

By adhering to stringent environmental standards, the hospital aims to operate sustainably and preserve its natural surroundings.

The Institut Guttmann Foundation is a monographic and highly specialised Neurorehabilitation centre that attends patients from all over the world.

Results:

- Reduced greenhouse gas emissions, totalling 28,856.68 t CO₂ eq
- Efficient waste management, with no significant accidental spills in 2022
- Adoption of sustainable transportation practices, promoting the use of public transit

To scale: Conditions needed include regional regulations, waste management infrastructure, and staff engagement.

Potential for learning:

- Transferable model for integrating hospitals into natural environments
- Lessons on effective waste management and emission reduction strategies
- Insights into promoting sustainable practices in healthcare facilities



INSTALLATION FOR NITROUS OXIDE DESTRUCTION



TARGET GROUPS

Patients

Healthcare
workers

AIMS TO ELIMINATE CLIMATE IMPACT FROM LEAKAGE OF N₂O

In September 2014, the first nitrous oxide (N₂O) purification in Region Jönköping was installed at Ryhov maternity ward. The region has now installed N₂O destruction systems in all emergency hospitals in the region: Ryhov, Eksjö and Värnamo. In addition to this, Region Jönköping has a couple of mobile destruction systems that are used in smaller healthcare operations.

The purification systems break down and purifies 99 % of the N₂O passing through the installation, eliminating the climate impact from leakage of N₂O.

Results: Measurements made in 2019 show a reduction in the total amount of N₂O emissions in the region from 3901 kg of N₂O to 876 kg per year. This means that the CO₂ emissions has lowered from 1162 tCO₂ equivalents to 262 tCO₂ equivalents per year, a reduction of around 77 %.



CARBON FOOTPRINT OF ERASMUS MC



TARGET GROUP

Healthcare
facilities

- AIMS TO CALCULATE ERASMUS MC'S SCOPE 3 GHG EMISSIONS FOR THE BASE YEAR 2021, IN ACCORDANCE WITH THE GREENHOUSE GAS PROTOCOL (GHG PROTOCOL)
- AIMS TO CALCULATE ERASMUS MC'S TOTAL SCOPE 1, 2 AND 3 GHG EMISSIONS, OR "CARBON FOOTPRINT" IN 2021 FOR SBTI REPORTING
- AIMS TO PROVIDE INSIGHTS INTO CARBON FOOTPRINT HOTSPOTS WITHIN ERASMUS MC'S OPERATIONS AND OPPORTUNITIES FOR CARBON FOOTPRINT REDUCTION, BASED ON THE 2021 GHG INVENTORY

The main objective of this study has been to get a complete overview of Erasmus MC's organization-wide carbon footprint, in order to locate carbon footprint hotspots throughout the organization and prepare for effective reduction measures.

A FRONT RUNNER IN SUSTAINABILITY

Erasmus MC has the ambition to take the lead in sustainable healthcare and establish wider collaborations. Some of Erasmus MC's aspirations to take forward the sustainability transition include, but are not limited to:

1. The publication of their environmental impact assessments.
2. Linking environmental sustainability to value-based healthcare.



3. Working towards the establishment of a national healthcare (impact) database.

ERASMUS MC CONTINUES TO WORK ON SUSTAINABILITY

This project is a continuation of the work on sustainability that Erasmus MC has started previously. In 2020, Metabolic carried out an assessment of circularity for the intensive care unit and in 2021, Erasmus MC collaborated with Royal HaskoningDHV to calculate their 2021 GHG emissions within scope 1 and scope 2. Thereafter, Erasmus MC commissioned Metabolic to complete their 2021 GHG inventory by calculating its scope 3 emissions and support them in setting Science-Based Targets (SBTs).

Results: The calculated carbon footprint for Erasmus MC in 2021 is 209.5 kilotonnes (kt) CO₂-eq. The largest contribution to the footprint is by indirect scope 3 emissions (72.1 %), followed by indirect scope 2 emissions from the generation of acquired electricity, heating and cooling (23.1 %) and direct scope 1 emissions (4.8 %). This distribution of emissions across scopes, with scope 3 emissions accounting for over 70 % of the total, is in line with the carbon footprint of the Dutch healthcare sector as a whole. The top three categories with the largest carbon footprint for Erasmus MC are:

1. Category 3.1 Purchased goods and services (59.7 % of total, 125.1 kt CO₂-eq), which covers the indirect emissions related to all purchased goods and services. Within this category, emissions are largely driven by the purchase of medicines, medical products, prostheses and construction investments.
2. Category 2.1 Purchased electricity (20.1 % of total, 42.1 kt CO₂-eq), which covers the indirect emissions from the generation of purchased electricity.
3. Category 3.5 Waste generated in operations (6.2 % of total, 12.9 kt CO₂-eq), which covers the indirect emissions from processing of generated hospital waste.

To scale: Conditions needed include expertise not in-house. Hospitals would need to partner up with external organisations in order to get their scope 1, 2 and 3 calculated.



Potential for learning: The study focuses on mapping the carbon footprint organization-wide, to be able to target organizational entities that have the most reduction potential. Such a high-level overview allows Erasmus MC to zoom in per organizational entity and develop tailored, effective emission reduction strategies.

Carbon footprint results of organizations highly depend on available data. To calculate Erasmus MC's organization-wide carbon footprint is an ambitious task, because Erasmus MC is a vast and complex organization. Erasmus MC entails a plethora of organizational entities, for which it is an ongoing challenge to streamline and optimize data management and availability.

To calculate a sound carbon footprint, data needs to be as complete and precise as possible for all organizational entities. Moreover, remaining gaps and imprecisions in available data requires transparent decision-making on data processing methods to make the data fit for use.

The carbon footprint of organizations is based on a chosen reference year. For setting Science-Based Targets, the appropriate year is the most recent year for which the organization's operational data is up to date and complete. In the case of Erasmus MC, the reference year is 2021.



AUTOMATING THE DOSING OF MEDICATION



The image has no direct connection to the example.

TARGET GROUPS

Patients

Healthcare
workers

AIMS TO ENSURE SAFER MEDICATION PROCESS, GENERATE LESS WASTE AND ALLEVIATE WORK PRESSURE

By automating the dosing of medication for patients, Erasmus MC wants, among other things, to cope with the increasing shortage of nurses. The robot composes the medication based on the prescription of the prescribing doctor or nurse, which gives the healthcare worker more time at the patient's bedside. In addition, there is less chance of medication errors.

These are the advantages of medication robot PillPick, which selects and doses medications for all patients at Erasmus MC.

How does it work?

The medicines arrive at the pharmacy in normal packaging (blisters). The robot cuts the blisters and packs the pills individually.

The pills are then stored in the robot's warehouse. In the department, the doctor writes a prescription for a patient and enters it in the electronic patient file. The robot receives a command to compile the prescription, pulls the



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relevant pills from the magazine and bundles them on a ring. The ring, including barcode and patient data, is taken to the department, where the nurse checks the ring and provides the medication to the patient.

Results:

- Unused medication can be returned
- Saves 1 FTE
- Fewer medication errors

To scale: Conditions needed include electricity, space and a semi-constant flow of the same medications.

Potential for learning:

- System can be used more; vials and so on are currently not done at Erasmus MC
- System packages medication in primary packaging; in the future this is possible without, which further decreases waste production

Research & other initiatives

BIOAIR S.P.A.



The image has no direct connection to the example.

TARGET GROUP

ATMP
manufacturers

AIMS TO OBTAIN A MORE SUSTAINABLE WAY FOR ATMP PRODUCTION



BioAir has produced a study on the manufacturing advanced therapy medicinal products (ATMPs). The study demonstrates the benefits of using closed system isolators for ATMP manufacturing in terms of sustainability.

By measuring greenhouse gas emissions to assess the environmental impact, the research suggests that closed systems with isolators offer advantages over traditional clean rooms. Here is why:

- Reduced energy consumption: Closed systems might be more energy-efficient due to their enclosed design. Traditional clean rooms likely require a higher amount of energy to maintain sterile conditions throughout a larger space. Lower energy use translates to fewer greenhouse gas emissions.
- Improved efficiency: Isolators within the closed systems may create a more targeted sterile environment, potentially reducing overall energy use for maintaining sterility.

Results: Adoption of the solution in general hospitals.



RENEWABLE ENERGY & SUSTAINABILITY INITIATIVE



TARGET GROUPS

Hospitals &
healthcare
institutions

Renewable
energy
providers

Environmental
organisations

- AIMS TO REDUCE CARBON EMISSIONS AND ENERGY DEPENDENCE THROUGH THE INSTALLATION OF SOLAR PANELS IN HEALTHCARE FACILITIES
- AIMS TO PROMOTE SUSTAINABILITY AND ENVIRONMENTAL CONSCIOUSNESS WITHIN THE INSTITUTION AND THE BROADER COMMUNITY
- AIMS TO ACHIEVE COST SAVINGS AND LONG-TERM ENERGY EFFICIENCY THROUGH RENEWABLE ENERGY INITIATIVES

Althaia implements photovoltaic solar panel installations across healthcare facilities to reduce CO2 emissions and enhance sustainability.

The Althaia Foundation has installed such panels at three of its buildings. These installations generate renewable electricity for self-consumption, significantly reducing greenhouse gas emissions and energy dependence. This initiative aligns with Althaia's commitment to renewable energy, energy



savings, and sustainability under the Althaia Sustainable project. With a total of 726 solar panels and 278.87 kWp installed capacity, the project is estimated to save 100 tons of CO₂ emissions annually.

Results:

- Installation of 726 solar panels across three buildings, generating 387,883 kWh of renewable energy annually.
- Reduction of 100 tons of CO₂ emissions annually, equivalent to the annual electricity consumption of 120 households.
- Return on investment expected within five years.

To scale: Conditions needed include regulatory approval, solar resource availability, and financial support.

Potential for learning:

- Demonstrates the feasibility and benefits of renewable energy adoption in healthcare facilities.
- Provides a model for other institutions to reduce carbon footprint and energy costs.
- Highlights the importance of sustainability initiatives in mitigating climate change impacts.



TARGET GROUPS

Health practitioners & organisations

Physicians

AIMS TO IMPROVE THE EFFECTIVENESS AND SUSTAINABILITY OF MEDICAL PRACTICES BY AVOIDING UNNECESSARY PROCEDURES

The BMJ has launched a vital campaign to combat the climate crisis by promoting sustainable healthcare practices.

In Italy, the "Choosing Wisely Italy" project, inspired by its American counterpart and led by Slow Medicine ETS, encourages dialogue among healthcare professionals, patients, and citizens to avoid unnecessary medical procedures, enable smarter prescribing for environmental and patient benefits, as well as reduce healthcare's carbon footprint.

The BMJ series provides concrete examples and studies on sustainable practices, such as the judicious prescription of iron replacement therapy and measures to cut waste and nitrous oxide emissions. These efforts aim to decrease the environmental impact of pharmaceuticals – that constitute about 25 % of healthcare's carbon footprint – and support low-carbon healthcare systems through smarter prescribing and deprescribing.

The initiative seeks to inspire healthcare workers globally to embrace



sustainable practices for the benefit of patients and the planet, highlighting the power of informed, wise choices in reducing healthcare's environmental impact.

Results: 25 % of healthcare's carbon footprint (planned).

To scale: Condition needed includes the creation of a network of organisations and professionals, who are sensitive and open to behavioural change.

Potential for learning: Eliminating unnecessary practices benefits both people's health and the sustainability of the health sector.



PARACETAMOL CHALLENGE

**GROEN IS DOEN
GA VOOR ORAAL**
PARACETAMOL DUURZAAM TOEDIENEN

GIFT: ORAAL 1 gram
2 tabletten in blister | beker | 30 ml water
 36 gram 0,07 5 gram

GIFT: VIA SONDE
etiket | orale spuit
 44 gram 0,58 13 gram

GIFT: INTRAVENEUS 1 gram
flacon glas met cap en metaal
infuussysteem (hergebruik 10x)
infuuszak 100 ml NaCl 0,9%
handschoenen | desinfectans | gaasje
 146 gram 1,89 146 gram

GIFT: RECTAAL 1 gram
1 zetpil in blister | handschoenen
 12 gram 0,57 10,5 gram

totaal gewicht gift totaal gewicht afval

Erasmus MC
SAMEN VOOR EEN DUURZAAM ERASMUS MC

TARGET GROUPS

Nurses

Doctors

Pharmacists

AIMS TO DECREASE THE IV PRESCRIPTION OF PARACETAMOL BY 25 %

Introduced by Erasmus MC, the paracetamol challenge is a challenge in which hospitals get a big, life sized model of paracetamol medication (pill). The goal is



to reduce the amount of IV (intravenous) paracetamol prescribed with 25 %, compared to the level prescribed before the challenge.

Such a reduction has many advantages; Reducing the amount of IV (intravenous) paracetamol prescribed means easier administration, time saved for the healthcare staff, less costs and many times more sustainable outcomes.

Results: All participating hospitals (currently, three hospitals have finished the challenge and more are planned) have decreased the IV use of paracetamol by more than 50 %.

To scale: Condition needed includes social media platform(s) to inform and inspire other actors to join the challenge.

Potential for learning: The idea is successful because of the playful visualisation that the big, life sized model paracetamol pill used represents – a model which extensively incentivises people.



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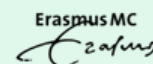
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