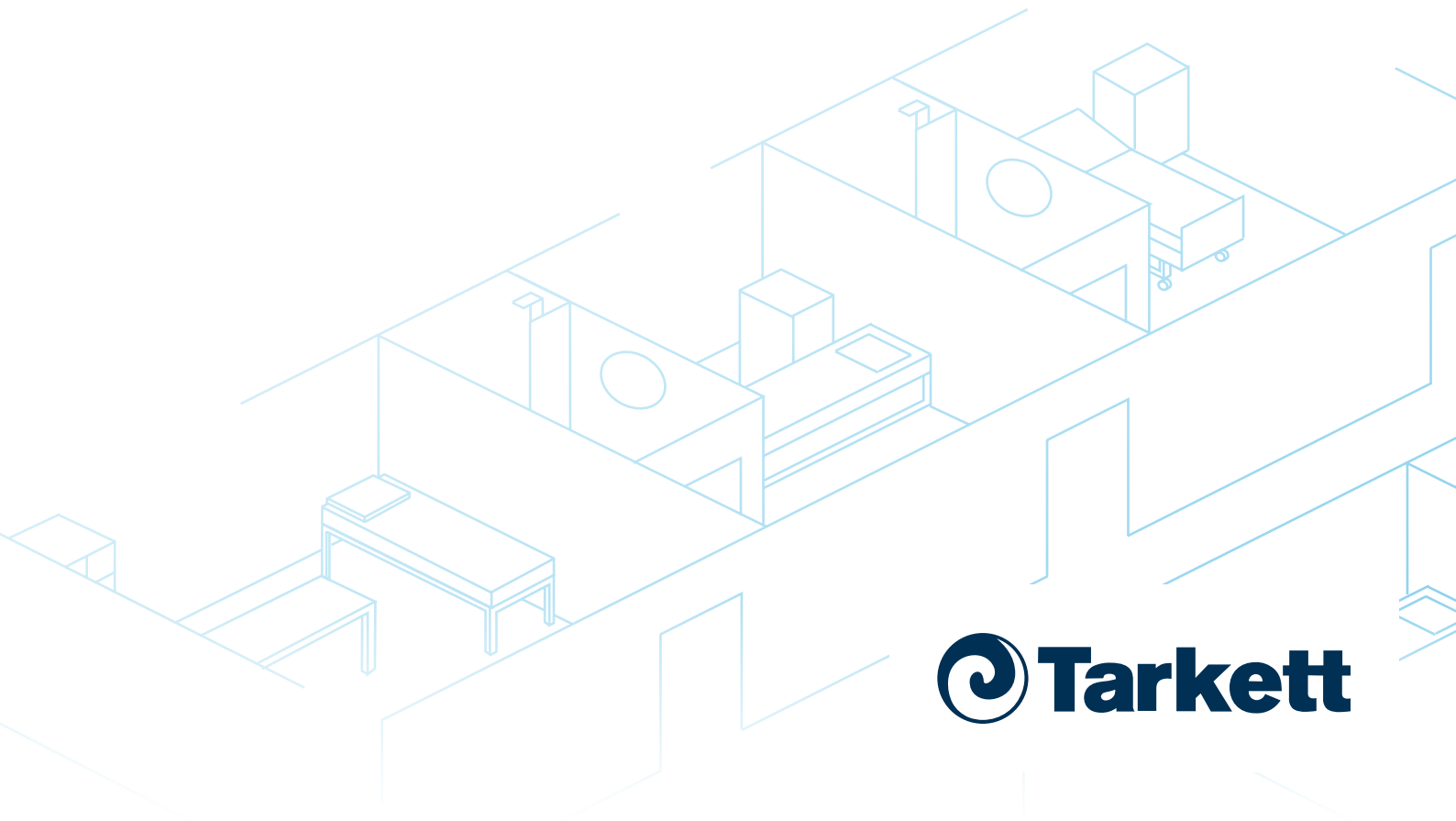


The Hospital of the Future: Challenges and Stakes

Tarkett, Supporting the Healthcare Community



Introduction

The COVID-19 pandemic is disrupting our healthcare systems, economies and societies. The extreme impact of the crisis on healthcare infrastructure is revealing every weakness and every seam in healthcare systems around the world.

SARS-CoV-2 has brought to light the challenges created by handling a surge of new patients while maintaining continuity of care for everyone else. It is also revealing the disparities between different healthcare systems around the world, in the strategies

adopted to tackle the pandemic, or the measures deployed to address exceptional patient and staff needs.

The burden of the COVID crisis is massive and multifaceted. With ageing populations, an increase in chronic conditions, environmental stresses, evolving tech and add to this evolving patient expectations, maybe it's time for hospitals to evolve too.

10%

In 2050: 10% of the population will be 80 or over ¹

68%

Chronic diseases are responsible for 68% of deaths worldwide²

1/3

of people over 50 years old live with 2 or more chronic diseases³

1 in 10

Adults in OECD countries are deemed unhealthy or in poor health.⁴

¹ OECD Historical Population Data and Projections Database, 2015

² WHO. Global Status Report on non communicable diseases

³ OECD. Health at a Glance 2019. Chronic disease morbidity. 2019

⁴ OECD. Health at a Glance 2019. OECD indicators. 2019

What kind of hospital might we want, in light of everything we are learning now? How can we reinvent our healthcare systems so that they can handle the many threats we face, while also providing care for increasingly common chronic ailments? What roles might the future hospital play, medically of course, but also socially, societally, environmentally? What technical and logistical solutions can we bring to the very human challenges of healthcare?

The present document is not intended as an in-depth analysis of the impacts of the COVID-19 crisis on our healthcare systems. It attempts to gather in one place the learnings of this past year, the conclusions of institutional reports, and opinions of

A reflection carried out in collaboration with various experts including sociologists, healthcare workers, hospital directors, architects, and hospital engineers.

experts in relevant fields, on what should define the hospital of the future.

It aims to define the stakes and challenges: human, technical and logistical, which

hospitals of the future will need to address. It also aims to spotlight some of the unacknowledged needs of patients and staff, and to propose some approaches that might lead us to practicable solutions.

Bringing together the many facets of this issue is essential if

the hospital of the future is to address the major health and social challenges that face us: the global circulation of pathogens, ageing populations, the surge of chronic illnesses, and to do so in an ecologically and financially sustainable manner.

The Hospital of the Future: Challenges and Stakes

1 THE HUMAN ASPECT

1.1 IMPROVING ACCESS TO CARE

1. Inequalities are exacerbated by resource shortages
2. Digitalisation puts the patient at the heart of the system
3. Intra-hospital mobility enables access to care

1.2 EMPOWERING PATIENTS AND PERSONNEL

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2. Involving the patient reveals overlooked needs
3. Remote care improves in-house patient journeys

1.3 CREATING QUALITY OF LIFE IN MEDICAL FACILITIES

1. Integrating the emotional aspect improves outcomes
2. Control of the healing environment empowers the patient
3. Rest and respite help medical staff to cope

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3. Sustainable patient journeys make sustainable hospitals

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1. How do you see the hospital of the future?
2. How can we make hospital infrastructure more flexible?
3. How can we build a more human centric patient journey?
4. How can hospitals reduce their environmental footprint?
5. Are there better ways of working with partners and providers?



1.
**The Human
aspect**

What if the driving factor was
patient experience?

What if the driving factor was patient experience?

Healthcare is currently structured around pathologies and medical practice.

21st century healthcare will require a high standard of treatment of course, but also a reduction of costs and environmental impact.

This implies a transition from traditional models to a more “human centric” approach, one based on the needs and expectations of the people involved at each stage.

This approach places the patient as the foundation of the healthcare system.

How to enable “positive patient experience”?

The patient experience is the sum of all the interactions that influence the patient perceptions across the continuum of care, that is, the patient journey¹. It involves the patient themselves, but also their friends and family, and the medical personnel.

The patient experience rests on three primary pillars:

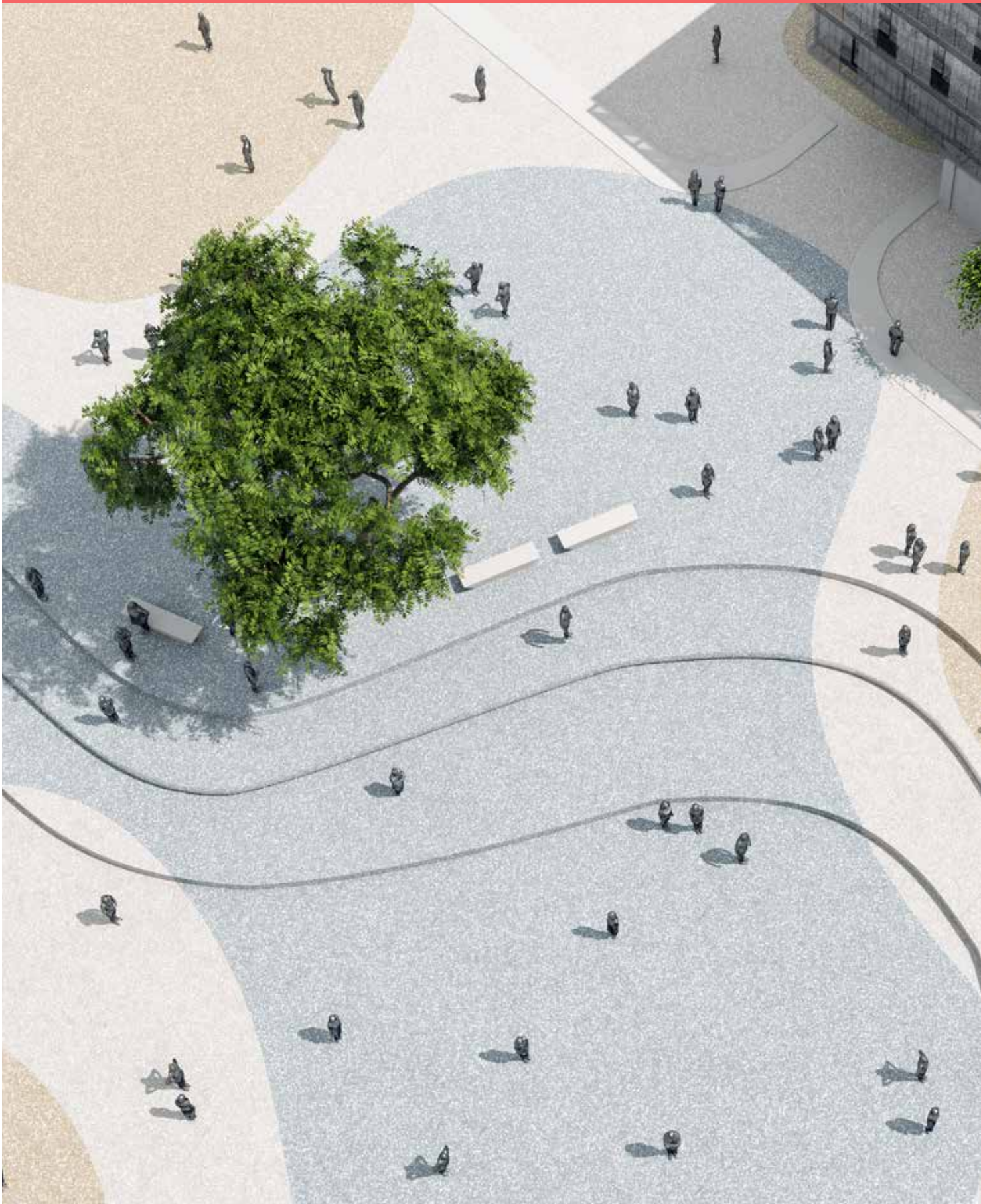
- **Optimising organisation of the patient journey**
- **Empowering patients**, families and medical personnel
- Designing the environment for **quality of life** for both patients and personnel

The pillars of the patient experience



¹ Definition adapted from The Beryl Institute

1.1 Improving access to care



1.1 Improving access to care

As populations age and become more sedentary, chronic conditions are becoming more widespread than ever. There is an increase in demand for healthcare services but recruiting qualified medical staff has never been so hard.

This context weighs on the system, all the more so during the COVID crisis, which has highlighted the difficulty of providing continuity of service while also dealing with the demands of the emergency.

Access to care measures the healthcare system's capacity to make its services available to the entire population, without exceptions or derogations. It is a determining factor in the general health and life expectancy of the population, and therefore on reducing healthcare inequalities.

It is one of the first steps in the *patient journey* and impacts every step that follows, going far beyond literal access to treatment, to tie into the socio-demographic context.

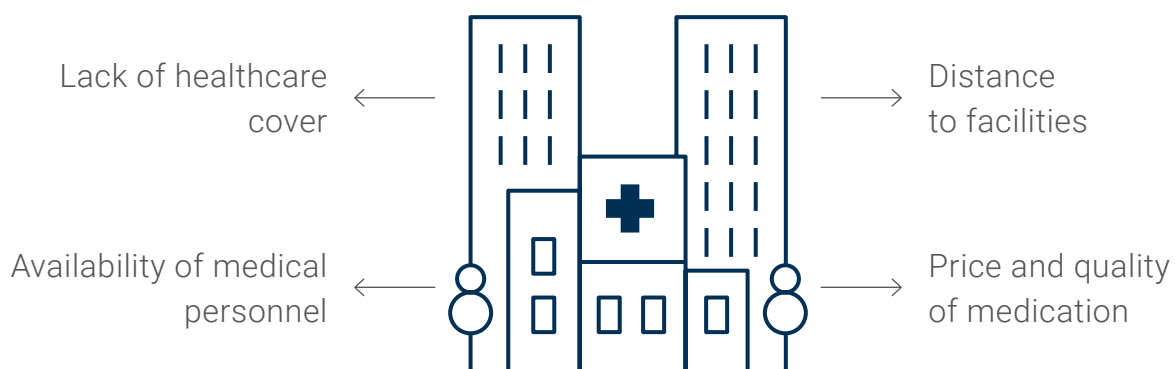
1.1.1 Inequalities are exacerbated by resource shortages

While many European countries endeavour to provide healthcare to all citizens, some social groups may find it harder to access than others. This can be for a number of reasons, one of which is the availability of qualified staff.

The pandemic has highlighted a growing lack of resources in the developed world.

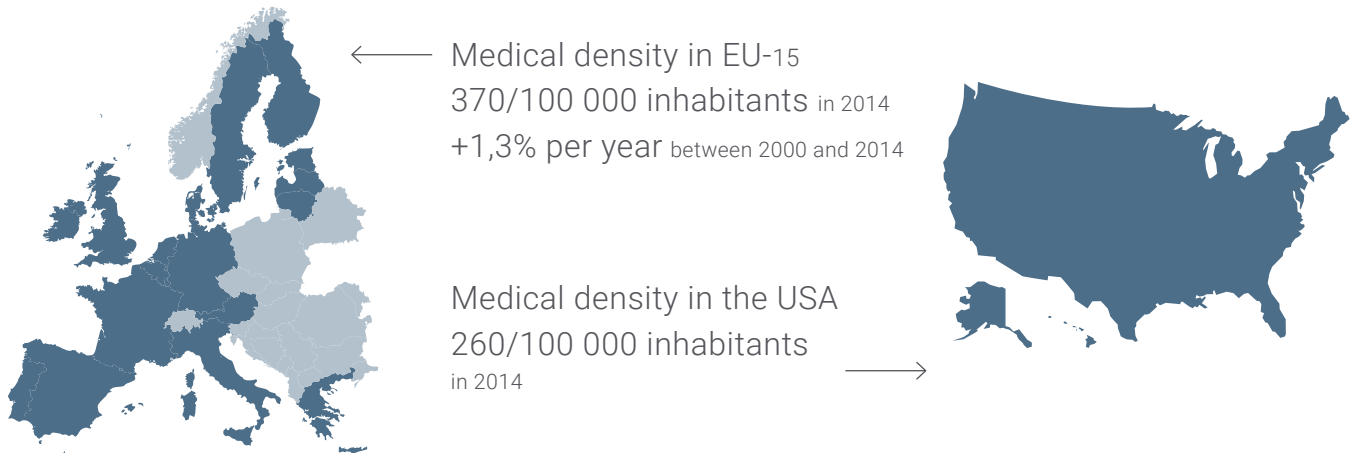
In the EU, USA, Canada and Japan, the number of doctors per 100,000 inhabitants has been increasing rapidly for 40 years, but this increase has slowed since the 1990s².

Main obstacles to access to care²



² Drees. *Health expenditure in 2015. International comparison of doctors. 2016*

Medical density in the EU-15 and the USA in 2014²



The coming years are expected to see an increasing demand for services without a matching increase in medical staff. This will place the system under stress.

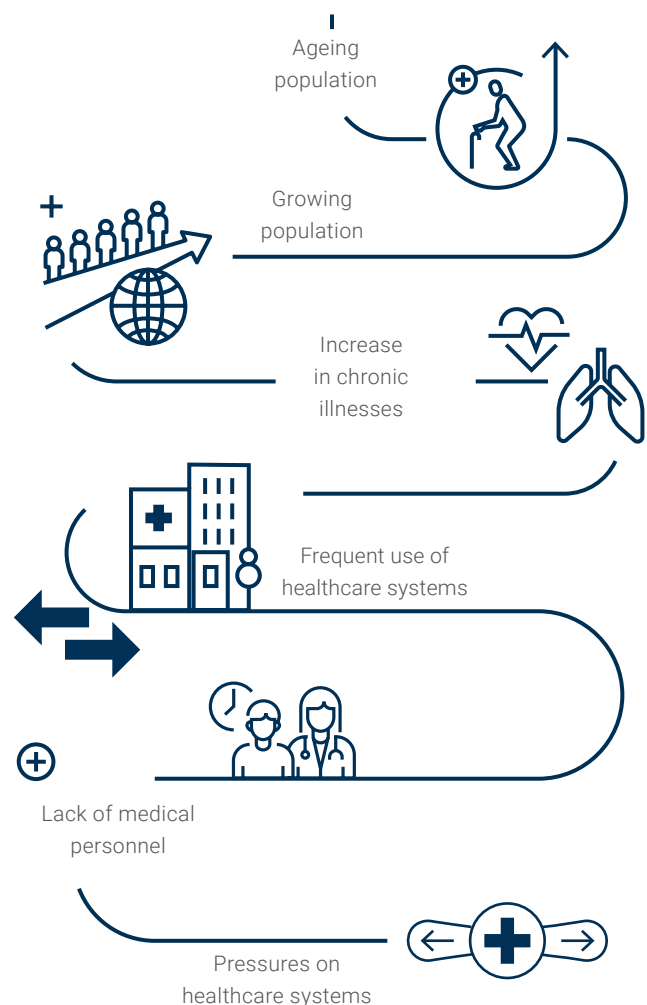
A concrete example of this stress is medical time, which is one of the key factors in the improvement of patient experience. In the USA, nurses only spend 37% of their time with patients³.

The digital transformation, already significant in healthcare, has seen an acceleration during the current health crisis. It is expected to improve access to care on the one hand and transparency in the organisation of the patient journey on the other.

“ More than medical demographics, the real challenge is the availability of competencies and medical time to treat patients

A. Kouevi, Founder of the French Patient Experience Institute

Demographic context and pressures on healthcare systems



² Drees. Health expenditure in 2015. International comparison of doctors. 2016

³ Westbrook et al. BMC Health Services Research 2011, 11:319

1.1.2 Digitalisation puts the patient at the heart of the system

Digitalisation presents an opportunity to place patient experience at the heart of healthcare.

Digitalisation is already transforming healthcare. Key areas of digital transformation are new tools such as shared medical files, auto-diagnostic tools, and the use of artificial intelligence in analysis and diagnostics.

These innovations help focus the healthcare system on patient experience, give insight into needs, make it easier to meet expectations, and assist medical personnel.

Digital twins are a concrete example. Commonly used in aeronautics and defence engineering, digital twins are being applied in healthcare now too. A digital twin is a virtual copy of, for example, a process, a system, a molecule, an organ. Healthcare professionals can use these copies to understand, analyse or test virtually, providing insights and predictions that would have been impossible otherwise. Applications include predicting the efficacy

of a drug to practicing a complex surgical intervention.

By speeding up clinical trials and increasing surgeons' competence, **digital twins are an accelerating factor for access to care.**

Another case in point is the rise of telemedicine. Cost optimisation is leading hospitals to close certain specialist services, leading to a thinning of medical coverage. The recent **surge in telemedicine** is helping overcome the geographical limitations. By enabling remote access to medical services, digitalisation is also reducing territorial inequalities. It also helps address the lack of medical cover in remote areas, the distance between place of residence and place of treatment, and transport saturation.

Telemedicine also plays a role in remote treatment monitoring. Intelligent technology built into medical devices such as pacemakers allow precise remote monitoring of a patient's condition, and thus help anticipate medical issues and avoid unnecessary readmissions.



Pre-anaesthetic teleconsultation tools also facilitate patient care prior to surgery and simplify the care pathway.

A. Kouevi, Founder of the French Patient Experience Institute

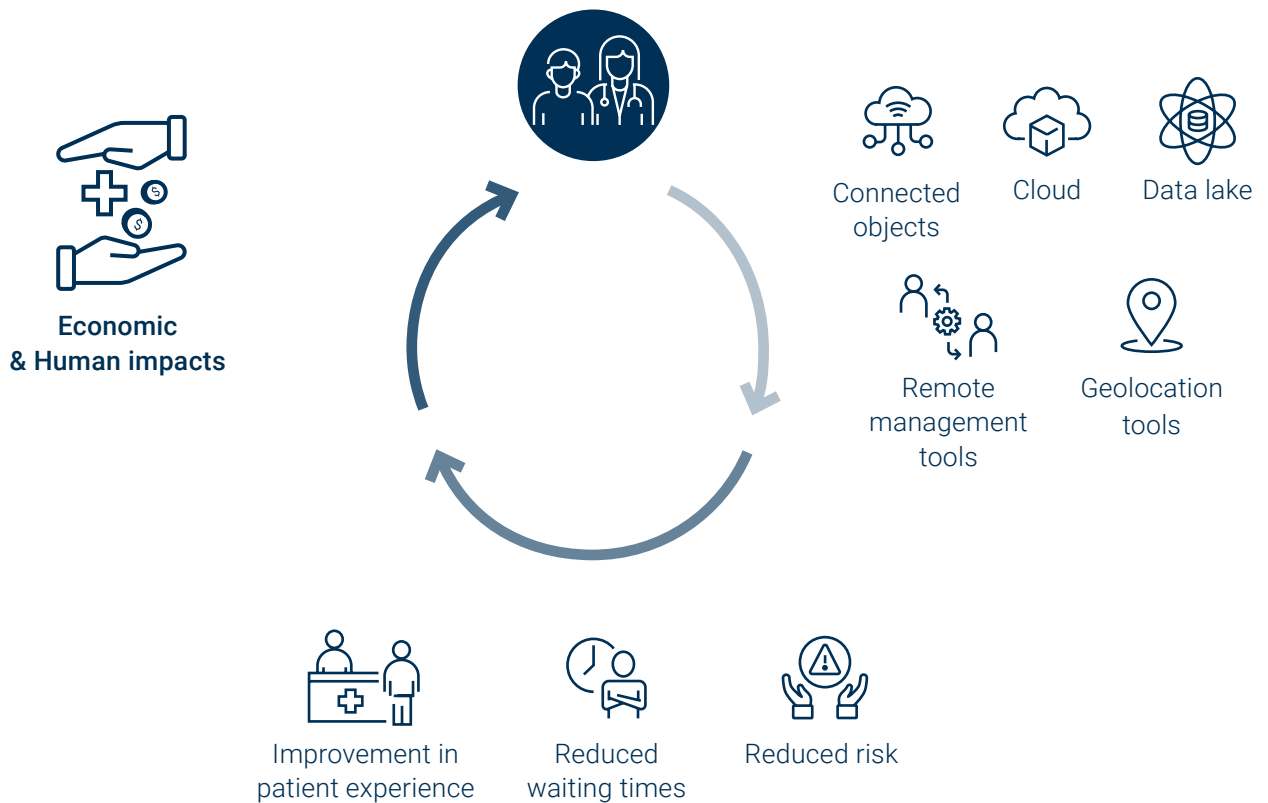
In coming years, the main digital opportunities in tackling access inequality will be to generalise these digital services across future networks such as 5G and to facilitate securely sharing patients' information between relevant medical professionals.

However, physical distance between place of residence and place of treatment is not the only obstacle to healthcare access. Movements within hospitals are a key component in organising the patient journey.

63.4%

The telemedicine market is expected to explode by 63,4% per annum⁴

The “virtuous circle” of digital access



⁴ Figures: Frost & Sullivan

1.1.3 Intra-hospital mobility enables access to care

Healthcare facilities are often housed in sprawling, complex buildings. They can be difficult to navigate, particularly on a first visit.

Medical personnel want to be able to get around quickly and safely. Patients in emergency situations need to get to treatment locations with minimal transit and wait time. Visitors want to be able to visit their loved ones in a congenial space without getting lost on the way. As for patients with more autonomy, they want to make use of the hospital’s services, with easy access to shops, cafeterias, etc...

However, when there is a disconnect between these stakeholders' expectations and the facilities at their disposal this can impede the work of medical staff and negatively impact patients’ quality of life or even prognosis. On the other hand, when layout and movements are optimised, mobility contributes to the healing process. **Mobility within medical facilities must also be adapted to the people who use them, and so must adapt to the ageing of the population.**

The 4 pillars of intrahospital mobility

Signage Design

which plays a role in improving orientation within buildings and reduces patient stress.

Floor plan readability

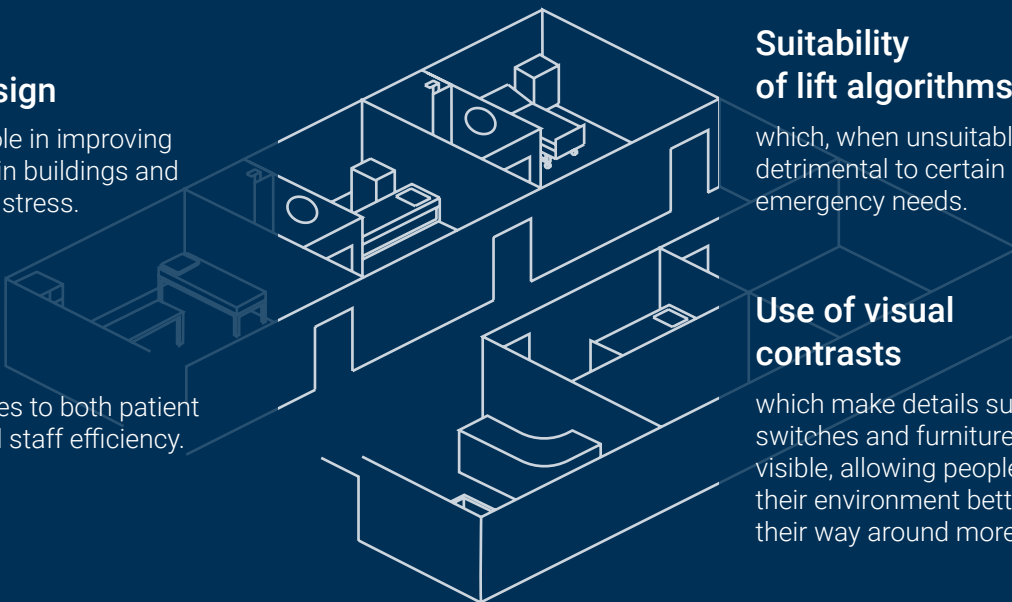
which contributes to both patient satisfaction and staff efficiency.

Suitability of lift algorithms

which, when unsuitable, can be detrimental to certain transfers and emergency needs.

Use of visual contrasts

which make details such as doors, switches and furniture handles more visible, allowing people to understand their environment better and find their way around more easily.



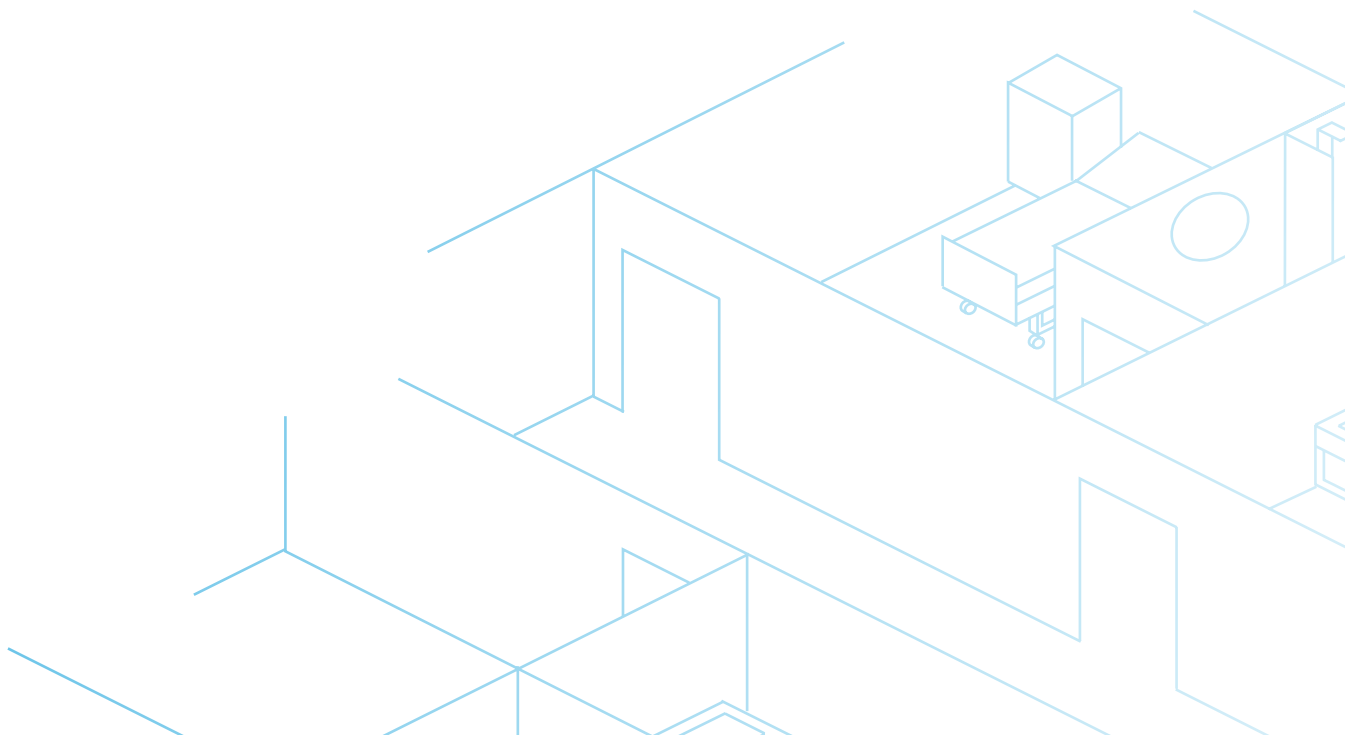
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Optimising mobility within the hospital, managing waiting lines at some treatment facilities, improving stretcher access, these are essential challenges for the hospital of the future.

Pr. Philippe Gabriel STEG - Head of the Cardiology Department

Key Facts

- 1.** Ageing, population growth and chronic diseases are putting pressure on health care systems
- 2.** The current pandemic has highlighted dysfunctions in health care systems
- 3.** Access to care is a challenge for the coming years
- 4.** Pandemic-related acceleration of digitalisation may facilitate access to care
- 5.** Intra-hospital mobility and the built environment are key factors for access to care



1.2 Empowering patients and personnel



1.2 Empowering patients and personnel

In Europe and North America there is a shift in patient mentality, from *passive* to *active*. Little by little, patients are being treated less as someone who needs to be told what to do and more like a participant in his or her journey, that is, someone who chooses.

Patients no longer come to the healthcare system as mere supplicants. Now well informed, patients expect to be involved in the decision-making about their pathology and their patient journey. They also expect to be in control when it comes to their stay in hospital: to have visibility and clarity regarding the stages in their journey, therapeutic choices, post-op management, access to services such as libraries and cafes, and contact with loved ones.

“

Patients really want transparency around their care. To know what the steps will be, how they are connected, when and how it will end, or whether they will need post-hospitalisation check-ups, these are the key factors in a successful patient journey.

Lucile Hervouët, Health Sociologist

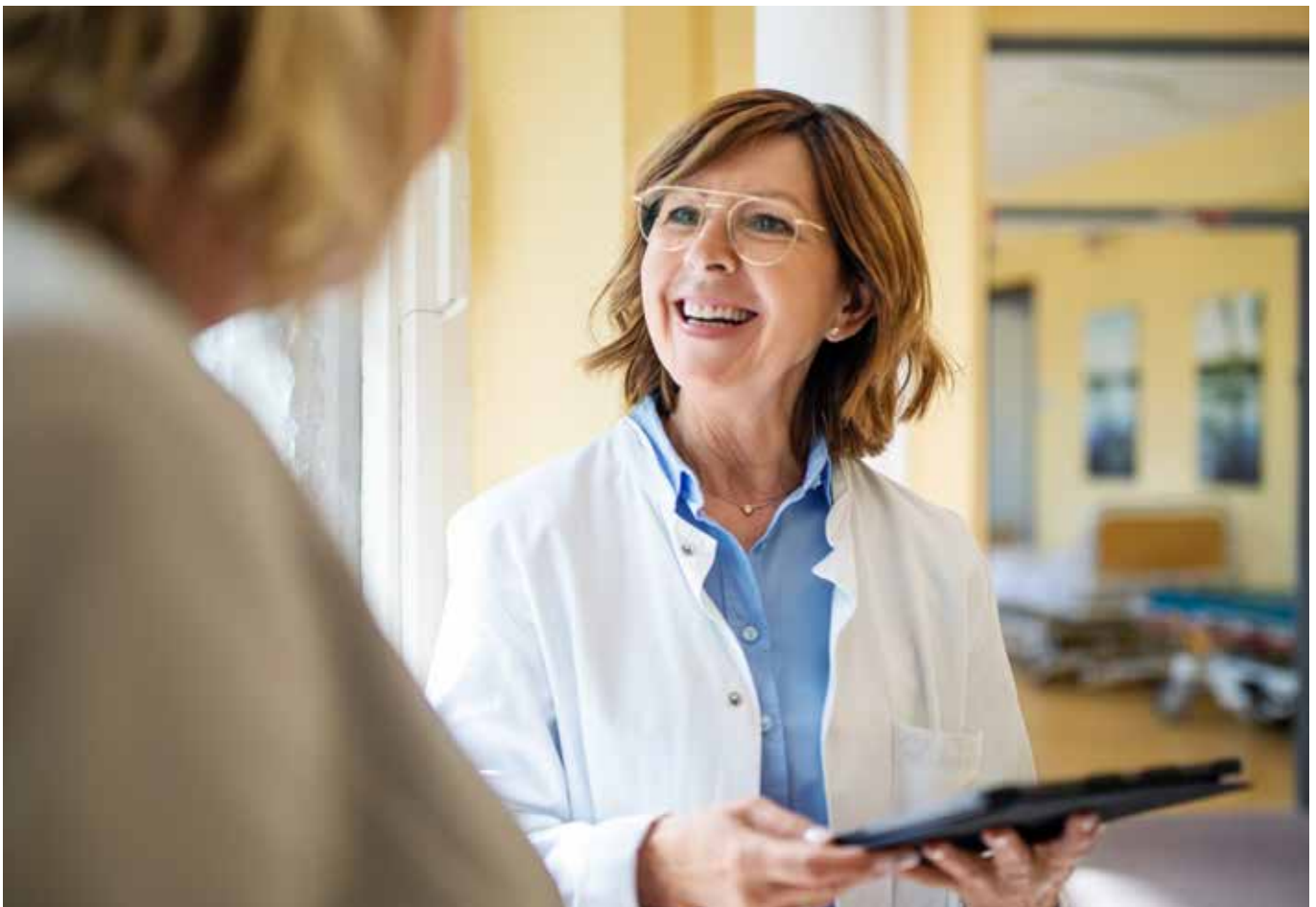
1.2.1 Staff-patient communication promotes transparency

Getting people's buy-in before they become patients is another key factor in building a positive patient experience. Hospitals must become a place where the public is informed and educated about public health issues, chronic illnesses, the effects of ageing and so on.

By providing quality information and including family members, preventative care and early detection can be improved, helping to make the entry point of the patient journey more natural. Thus, a broader, more holistic approach and better understanding of the

patient's ecosystem can help them make more informed decisions about their care.

Ensuring patients and their families are fully informed and establishing clear lines of communication between the various medical specialties expected to be involved in a patient's treatment, before and during the hospital stay, helps reduce patient anxiety and see that they understand what awaits them in their patient journey. Simply put, better communication between everyone involved will improve engagement, compliance and therefore outcomes.



1.2.2 Involving the patient reveals overlooked needs

As the sector moves from “cure” to “care”, patients’ part in decision-making is increasing. Today, patients have access to devices and tools that allow them to take a more active role in their patient journey and interact more efficiently with their medical team.

However, this desire to interact and be involved, to co-construct their experience, only makes sense as part of a set process requiring:

- Clear communication between patient and medical staff, in an established framework
- An instructional approach with dedicated educational spaces

This process goes beyond what has become known as “patient advocacy”, which aims to ensure patients’ rights are respected. Here, the patients are involved in elaborating their

health plan as well as medical decisions. They are placed at the very centre of decision-making, organisational and care coordination systems, so that none of their needs are ever overlooked

1.2.3 Remote care improves in-house patient journeys

Telemedicine, home care and outpatient interventions are increasingly part of the patient journey. Some institutions rate them highly as they allow patients to shorten their hospital stay or even avoid it altogether, while maintaining the same treatment quality and safety.

They help free up valuable hospital resources and have a direct structural impact on hospitals through the creation of dedicated spaces.

Key Facts

1. Patients, family members and medical personnel have to co-create the patient journey
2. For many patients, transparency of their patient journey is essential
3. Patient-Caregiver communication is a pillar of transparent patient journeys
4. Telemedicine, home care and ambulatory care are becoming increasingly important in patient journeys

1.3 Creating quality of life in medical facilities



1.3 Creating quality of life in medical facilities

A hospital stay can be intensely stressful, even traumatic, both physically and psychologically. Both patients and medical staff are sometimes exposed to situations of extreme vulnerability. For this reason, both work and stay conditions must be irreproachable.

- Patients need to have complete faith in the handling of their medical situation, in terms of both quality and safety
- Medical staff need to know their work environment was designed with due consideration for their personal and professional needs

For both patients and staff, there are both tangible and intangible aspects to improving quality of life.

“

Workplace quality of life for Medical staff is indissociable from successful patient experience, when the patients are satisfied, so are those caring for them.

Pr. Philippe Gabriel STEG - Head of the Cardiology Department



1.3.1 Prioritising the emotional aspect improves outcomes

Whether it's medical secrecy, nursing, administering treatment or daily hygiene, it is essential that procedures respect the intimacy of both patient and attendant medical staff.

The patient journey passes through a number of potentially anxiety-provoking steps: announcing the pathology, explaining the stages of the treatment, setting up the treatment itself, and evaluating treatment effectiveness. **Each of these steps requires patience, kindness, and a willingness to explain. For the best patient experience, these steps must take place in a dedicated space, designed to encourage calm and serenity.**

Though it may seem paradoxical, patients' intimacy is preserved by maintaining the link with family and the outside world.

This is in fact, one of the aspects the COVID-19 crisis has really brought to light: ensuring hospitals remain open to the outside world by preserving patients' connection to family and friends, whether physical or digital, and setting up secondary services dedicated to well-being.

“**When patients experience lack of privacy in care facilities, it can be harmful because it contributes to depersonalisation.**

Lucile Hervouët, Health Sociologist.

“**The first phase of the COVID crisis helped us understand how important it is to maintain the link with family and friends. To minimise the risk of transmission of the virus access of relatives was limited. In some cases, this had a negative emotional impact on patients. In addition, relatives can act as a bridge between patients and the care teams. It is important to be able to count on them.**

Lucile Hervouët, Health Sociologist.

Respite



“

We need to rethink the spaces dedicated to the medical staff quality of life.

Pr. Philippe Gabriel STEG - Head of the Cardiology Department

1.3.2 Control of the healing environment empowers the patient

Too many patients express discomfort with the clinical feel and sense of depersonalisation of hospital environments, whether on the ward or in common areas. This discomfort can sometimes have a significant impact on stress levels and mental well-being. It is therefore important to minimise the feeling of diminishment associated with the hospital stay.

This need can be addressed in several ways:

- **Calm, clear spaces that respect natural biorhythms**, close to nature, where one's needs and expectations are not ignored
- **Control over environmental conditions** such as lighting, temperature, noise.

1.3.3 Rest and respite help medical staff to cope

Moments of respite are an important factor in emotional stability for everyone involved in delivering healthcare.

Medical staff frequently highlight the “right to respite”, and the need for private spaces dedicated not just to work, but also to rest.

Therefore, addressing staff quality of life means not only attending to the need for physical, but also psychological comfort, for example providing emotional and psychological support services.

“

Hospital environments are very demanding. During a pandemic, conditions can be particularly difficult, even violent. It is important for medical staff to be able to get away from it and recover their strength in an environment where they'll find their personal effects and be able to reflect and revitalise.

Pr. Philippe Gabriel STEG - Head of the Cardiology Department

The levers of patient expectations



Alongside these human concerns and the focus areas that give us insight into them, the transformation of healthcare centres will also require overcoming technical and logistical challenges.

The patient-institution paradigm is shifting away from the vertical silo model toward a more horizontal, or even matrix model.

This evolution will also have consequences on the built environment and the layout of health spaces, which will need to be adapted to these new approaches to the patient’s journey back to health, and its co-construction by patient and medical staff.

1.

Involve patients in large scale projects

Involve patients in focus groups during the pre-design phase for large scale projects such as hospitals and other medical facilities.

2.

Create spaces dedicated to sharing information

Places for patients and caregivers to communicate.

3.

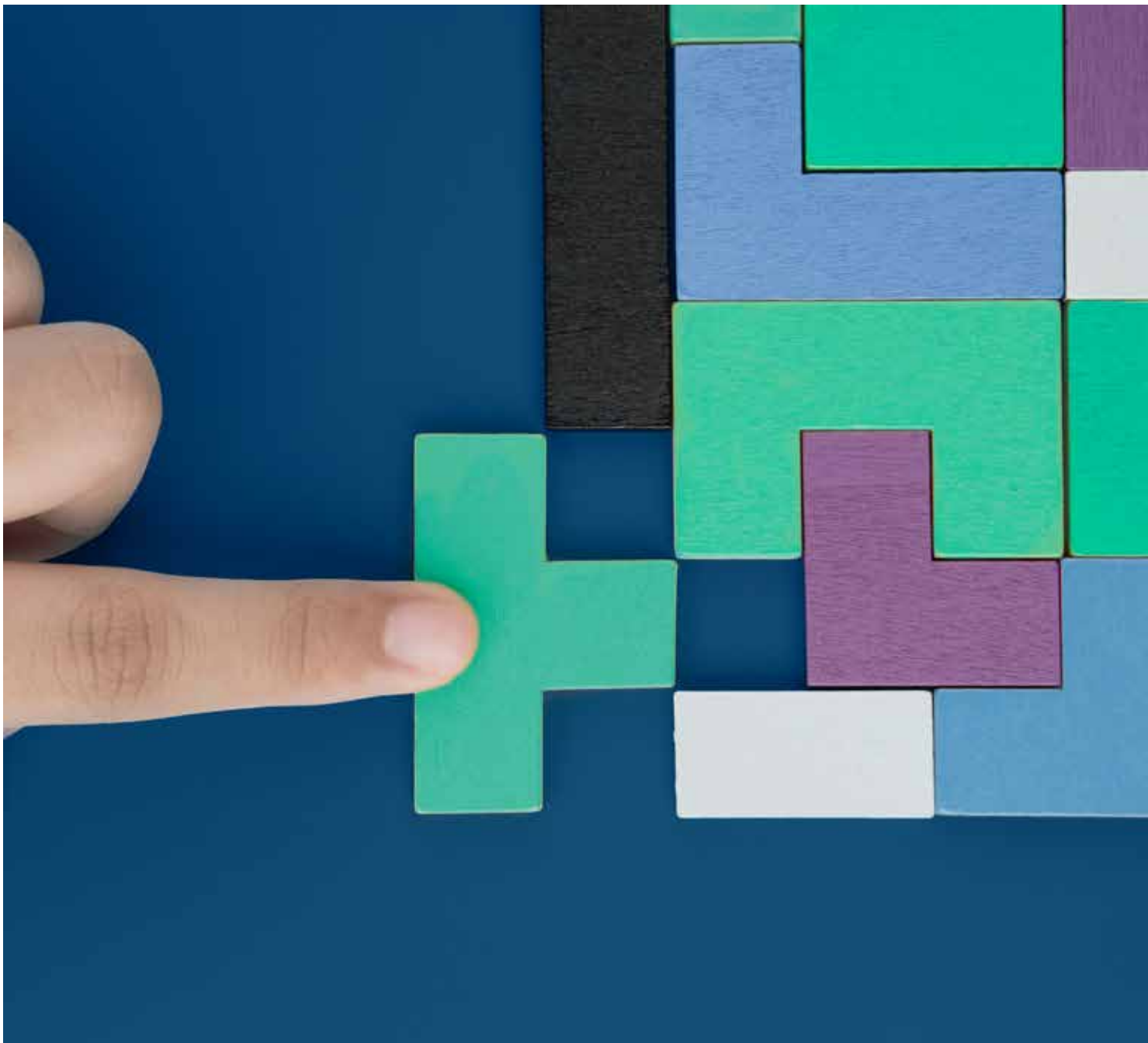
Create spaces dedicated to well-being

Taking into account the needs of both patients and medical staff.

Indeed, the hospital’s built environment will need to do more than just receive patients and enable the delivery of treatments. It will need to become an integral part of the healthcare system, contributing actively or intelligently to the patient experience.

Key Facts

- 1.** Emotional issues and control of the healing environment are determinants of the quality of life in healthcare facilities
- 2.** Caregivers’ availability and quality of work life can impact patients experience
- 3.** Caregiver respite is important and has to be taken into account



2. Technical & logisticals challenges

As with COVID-19, preparing for future health threats means preparing for situations with many unknowns. We need to get ready for future challenges without knowing what they are. To do this, we will need healthcare spaces that can provide continuity of service regardless of the technical and logistical challenges.

2.1 Ensuring continuity of service whatever the context



2.1 Ensuring continuity of service whatever the context

One of the key takeaways from this situation is that the healthcare ecosystem needs to be able to fulfil its mission whatever the situation. For healthcare facilities, this means not only being able to absorb a sudden and massive influx of patients, but also being able, if needed, to provide beds for these patients for a sustained period of time. To accomplish this, hospital space needs to be reallocated.

The crisis that struck in 2020 toppled existing models with new imperatives on a scale healthcare systems were unprepared for:

- The volume of demand for emergency care tied to the pandemic
- The need to maintain continuity of care for patients suffering from chronic illnesses or emergencies unrelated to the pandemic

Answering these imperatives so that medical facilities can carry out their mission of care requires preparation and flexibility, so as to maintain existing standards of care and safety for both patients and staff.

“ Unexpected events such as the health crisis we are going through at the moment are rare. Planning our facilities so they can tackle such event when they arise is not necessarily the answer. But we can be prepared for these situations, particularly by putting more flexibility in the built environment.

A. Kouevi, Founder of the French Patient Experience Institute

2.1.1 Infection control can help contain the contagion

Managing and containing contagious threats is a key challenge for all healthcare facilities. In truth, infections contracted during visits to healthcare facilities, or even developing within a healthcare facility, are considered a major public health threat. Protocols to manage and prevent the risk of healthcare-associated infections, and the reported number of infections contracted on-site, are part of a particular facility quality indicators.

4 Million

Infections contracted during a course of treatment or in hospital affect 4 million people each year in Europe and are associated with an additional cost of €7 billion.⁵

For patients around the world, the risk of contracting an infection is an unwanted risk all too often associated with visiting healthcare facilities. Hospitals have included infectious risk containment in their quality metrics for some time, but those risks have become all the more tangible during the COVID-19 crisis by high infections rates and deaths among hospital and staff.

There is a clear need to plan and organise hospital spaces to better manage

⁵ European center for disease prevention and control

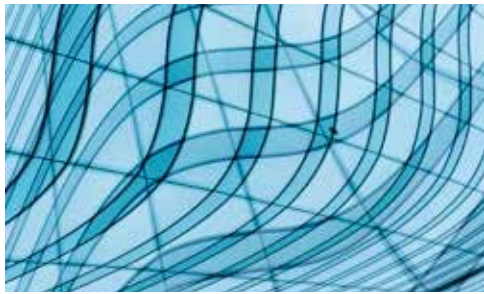
the infection risk. Effective responses to this key challenge depend on:

- Spatial organisation allowing for clear and effective separation between contagious and non-contagious patients
- Use of suitable materials: smooth, waterproof, easy to clean
- Setting up anti-contamination equipment and spaces:
 - Decontamination airlocks
 - Dedicated space for getting changed
 - Sufficient supply of appropriate PPE
- Securing and managing indoor air quality, ventilation and water management systems
- Thorough application of safety instructions

“ Medical staff are trained and know what precautions to take against the risk of infection.

Prof. G. Steg,
Head of the Cardiology Department

Flexibility



“

I see that in the future flexibility, adaptability, and optimisation are going to be key in how we organise care spaces.

Steve Batson - Director for Healthcare for Stephen George + Partners (Architect)

2.1.2 Flexible infrastructure can adapt to emergencies

Infrastructural flexibility is essential to a hospital ability to adapt to emergency needs while ensuring the quality of non-emergency care.

A rethink of a hospital's 'default' layout, in particular the disposition of the various departments and facilities, can create much needed flexibility in times of crisis. Taking flexibility into consideration from the start means it can be built into the structure of the hospital, whether that means modular spaces that can be repurposed if necessary, or re-engineering spaces in order to optimise their capacity to receive and treat patients.

While flexibility is not a new concept in hospitals, a recent study by CADRE* (*Centre for Advanced Design Research and Evaluation) proposes a framework called FlexX⁶, which organises hospital flexibility into four main attributes: **versatility, modifiability, convertibility, scalability.**

The full paper is available for consultation on the group's website:
<https://www.cadreresearch.org/>

Flexibility is treated as the ability, in case of massive urgent need, to increase a hospital capacity to handle patients, or optimise facilities related to relaxation or safety. It turns out to also be a solution for supply and logistical issues.

Indeed, one impact of the COVID-19 crisis has been the disruption of various supply chains, particularly for hospital and therapeutic consumables. Thus supply and storage control are another key factor in adapting to the unexpected.

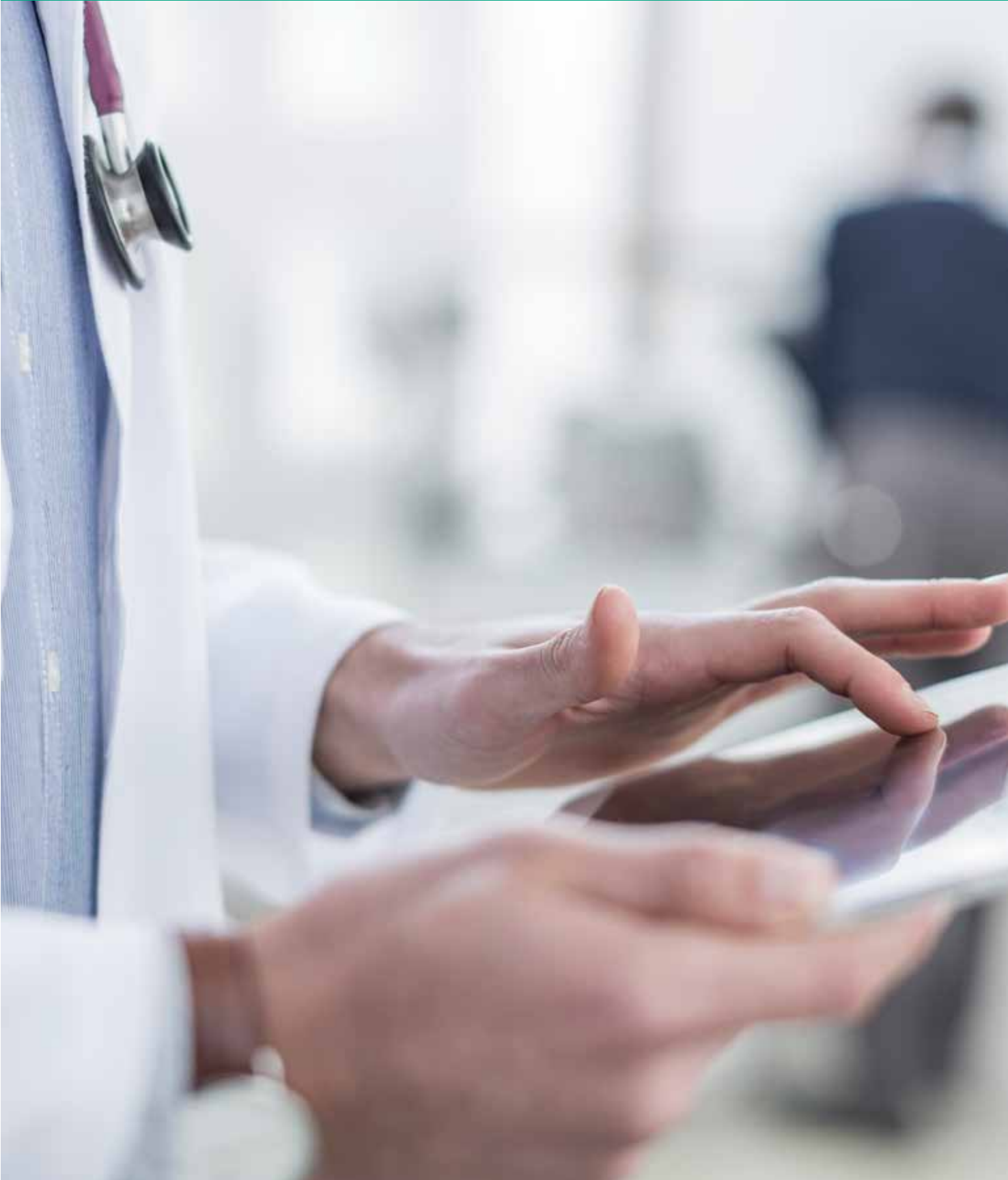
Whether at an individual, local or regional level, it is essential to thoroughly evaluate both processes and spaces required for provisioning and storing medical supplies.

Key Facts

1. Continuity of care is a key success factor in the patient experience
2. Infection prevention and control is a major challenge for healthcare facilities
3. Flexibility of healthcare facilities seems to be the best way to prepare for emergency needs

⁶ Flexx concept. Available on <https://www.cadreresearch.org/>

2.2 Improving efficiency through digital transformation



2.2 Improving efficiency through digital transformation

Technological innovations in the domain of construction and spatial planning are contributing to the improvement of patient experience and work-life quality for staff.

They occur in a context where increased efficiencies and cost control are core concerns of the healthcare ecosystem.

2.2.1 Digitalisation mobilises the built environment

The digitalisation of the built environment creates new opportunities for healthcare facilities to optimise, not just in delivering care, but across the entire range of their activities.

- It contributes to the **fluidity of processes**
- It **improves efficiency and transparency** of patient admission and monitoring
- It allows personnel to **focus on the human aspects** of their work, by **standardising and speeding up day-to-day tasks**

It allows the building to play a greater role in delivering care by lightening the load for

medical personnel, so they can concentrate on caring for and treating the patients.

As with flexibility, digitalisation is a relatively new factor in healthcare and still in its infancy.

However, the integration of new technologies in healthcare buildings can add fluidity to procedures up- and downstream of patient care, reducing the administrative burden and improving the productivity of medical personnel and other staff by speeding up standard tasks such as searching for patient data.

“ Digitalisation adds fluidity to procedures up- and downstream of patient care, reducing the administrative burden of the registration process.

A. Kouevi, Founder of the French Patient Experience Institute

2.2.2 A Digital Twin (BIM) optimises building maintenance

The Digital Twin allows maintenance operations to be optimised, with targeted actions where and when they are needed. This helps keep operating costs and energy consumption down, reducing the facilities environmental footprint at the same time.

While this Digital Twin is worked in from the start in new buildings, it is not as straightforward to apply to existing structures, which make up most of the healthcare network at this time. It is however a good example of what digitalisation can bring to the built environment of healthcare, as new technologies integrated into buildings can easily provide timely alerts on:

- The need to replace used or worn-out equipment
- Changes in air quality
- Degradation of certain materials, particularly in high-risk areas
- Buildings' energy consumption

Beyond these service opportunities, the digitalisation of the built environment can also help control and contain health facilities' environmental footprint.

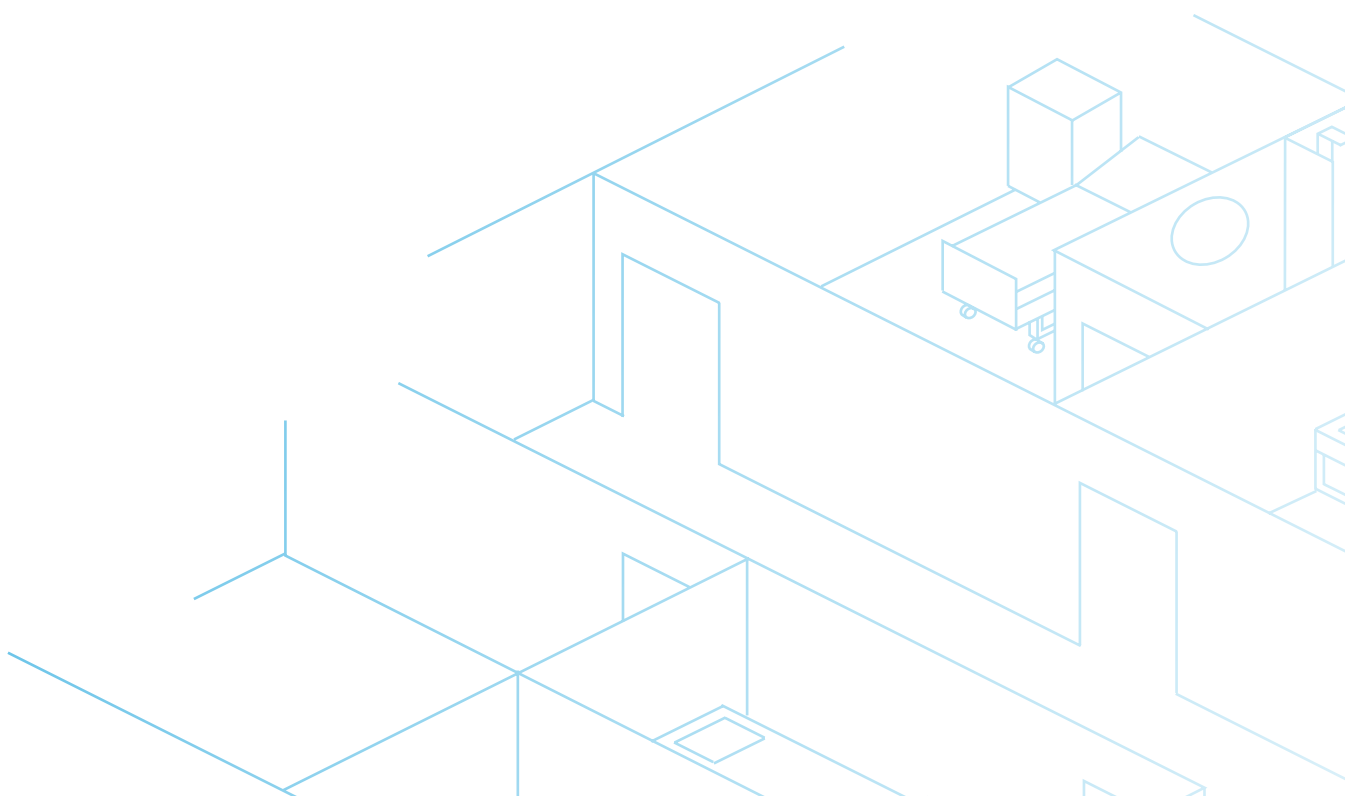
“ Building new technologies into the hospital’s physical environment lets us optimise maintenance operations, just as they do in the aeronautic industry.

Steve Batson – Director for Healthcare for Stephen George + Partners (Architect)

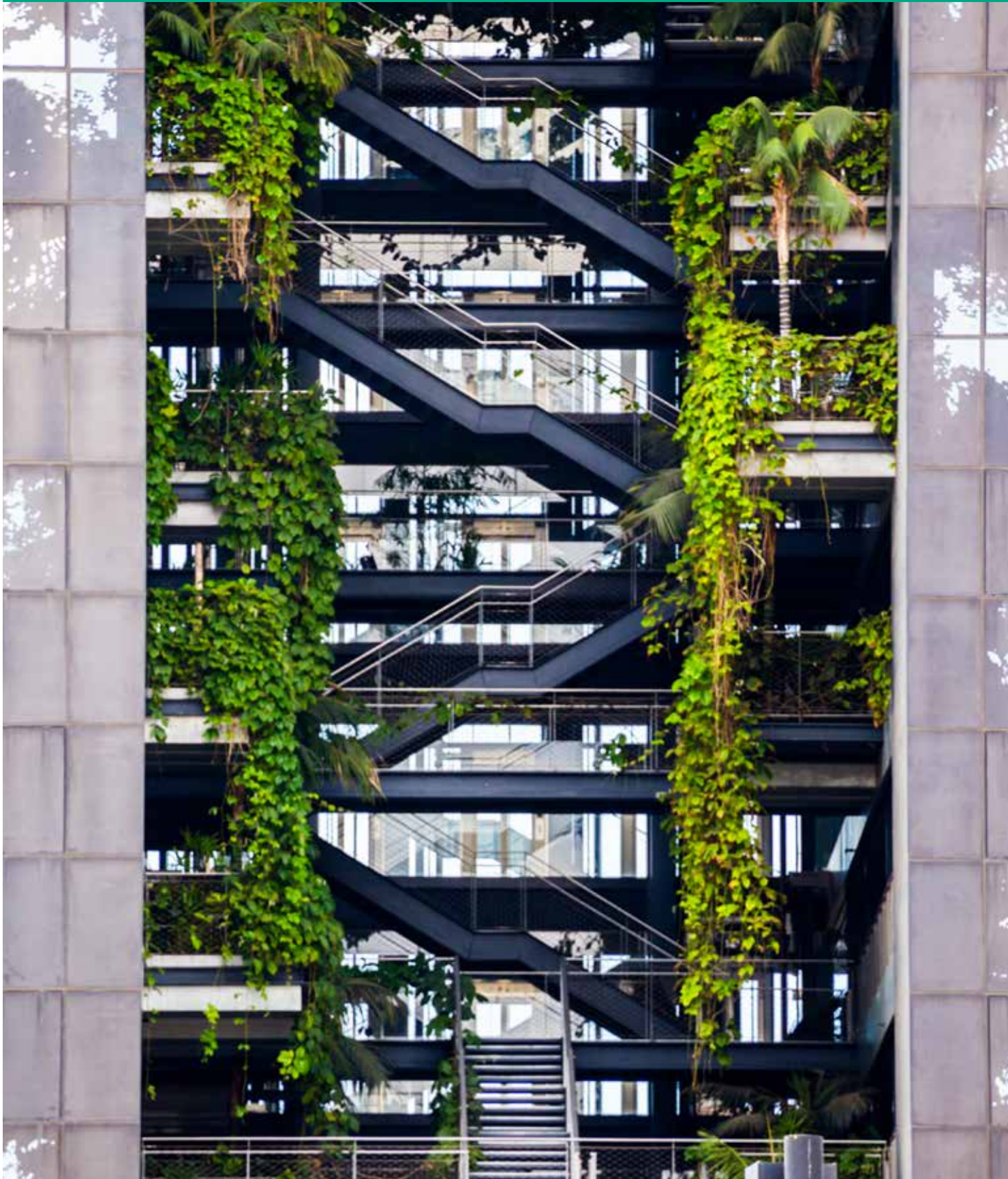


Key Facts

- 1.** A smart building environment could improve patient journeys
- 2.** BIM is a real asset for easier maintenance of the built environment and improving patient experience
- 3.** The digitalisation of the built environment contributes to sustainability



2.3 Sustainable development in healthcare



2.3 Sustainable development in healthcare

The World Health Organisation's multisectoral approach to tackling global health challenges, dubbed "One Health", underlines the close connection between human health and environmental health. There is no doubt anymore that manmade climate change will have detrimental consequences for human health across the globe, including regions with the lowest greenhouse gas emissions.

The healthcare sector is fully aware of the critical importance of environmental issues for its infrastructure. Yet health professionals and other stakeholders in the healthcare ecosystem have been slower than others to initiate their environmental transition.

Transitioning healthcare facilities to sustainable practices can have a lasting impact on a number of domains.

By contributing to a healthier environment, these facilities improve their public image and community perceptions, thus strengthening their societal role.

Further, healthcare facilities can have a dual effect on climate change:

- A direct effect, by reducing their own environmental footprint
- An indirect effect, by encouraging partners, suppliers, colleagues and patients, etc.

Thus healthcare facilities can contribute to saving community resources such as water and energy, while also reducing pollution. This approach also improves the patient experience by bettering the hospital environment and improving its profile with eco-conscious patients.

Healthcare facilities contribute significantly to greenhouse gas emissions and the consumption of natural resources. 4.4% of global greenhouse gas emissions are attributed to health-related activities.⁷

Another concrete example: in the United Kingdom, the CO₂ emissions of NHS hospitals are greater than the combined emissions of all flights out of Heathrow airport⁸. The health industry in the United Kingdom produces 18 million tonnes of CO₂ annually, which is 3.2% of all CO₂ emissions for the UK⁹.

In France, public and private healthcare facilities have a combined surface area of 70 million m², and consume 21.5 TWh of electricity per annum, amounting to 2% of the national energy consumption.

There are three types of environmental initiative that should be considered: improving processes, influencing partners and optimising patient journeys.

60%

Heating and air conditioning alone account for approximately 60% of the total energy consumption of hospitals and clinics¹⁰

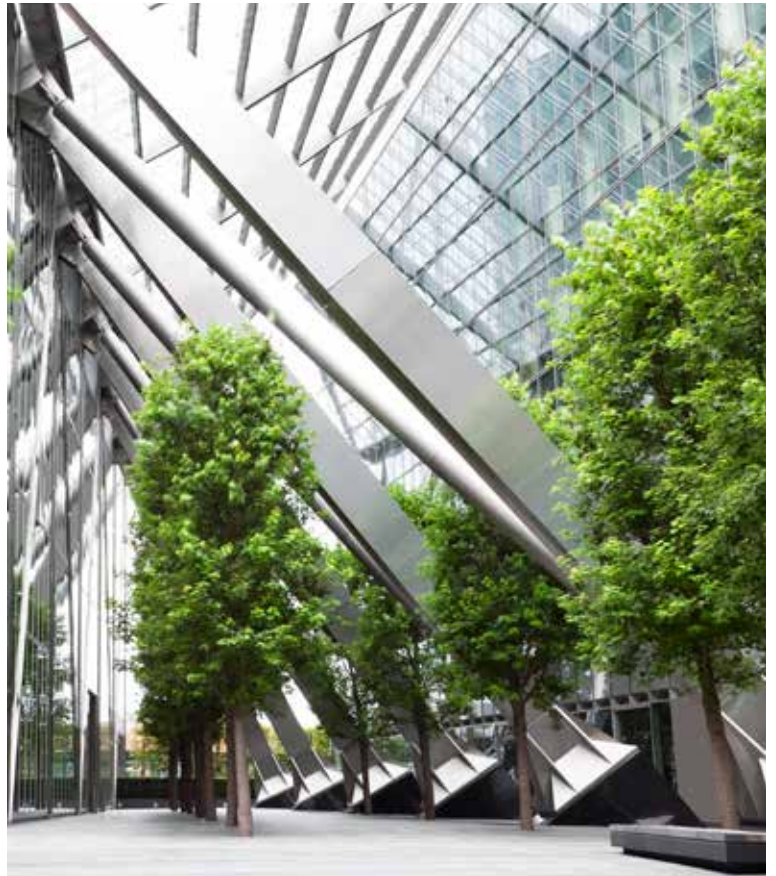
⁷ Healthcare without Harm: reference. Available on <https://noharm-europe.org/>

⁸ Naylor C, Appleby J. Sustainable health and social care: connecting environmental and financial performance. London: King's Fund, 2012.

⁹ Thomson C. Reducing the carbon footprint of hospital-based care. *Future Hosp J*. 2015 Feb; 2(1): 57–62

¹⁰ Chiffres ADEME. <https://www.ademe.fr/entreprises-monde-agricole/performance-energetique-energies-renouvelables/dossier/energie-hopitaux-cliniques/saviez>

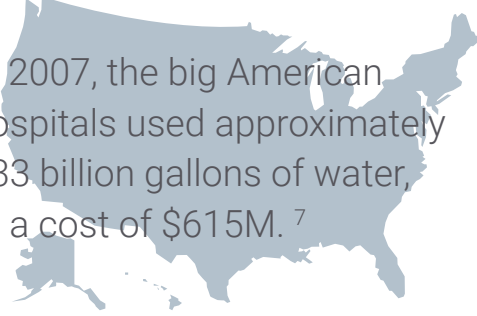
Biophilia



2.3.1 Better processes reduce the carbon footprint

The most obvious way to act on the environmental footprint of healthcare facilities is the **conservation of natural resources**.

- Reducing energy usage by acting on insulation, heating and lighting
- Carrying out regular energy audits of existing buildings
- Building environmental quality criteria (LEED, BREEAM, WELL, HQE) into new buildings
- Favouring biophilic design where suitable
- Encouraging hospital staff to use active modes of transport (cycling, public transport...)
- Limiting professional travel in favour of remote solutions such as tele- or videoconferencing
- Improving water circuit management



In 2007, the big American hospitals used approximately 133 billion gallons of water, at a cost of \$615M. ⁷

* Waste for which there is no specific disposal process

Waste management is another effective lever for reducing the carbon footprint. The majority of products purchased by healthcare institutions end up as waste, much of which is unregulated, general waste.*

Regulated medical and chemical waste are a smaller share of waste materials.



80%

of hospital waste is unregulated waste.⁷

An in-depth analysis of material consumption and waste production is required. Particular attention should be paid to opportunities around **reducing packaging** and **bring-back waste sorting**, which was one of the procedural casualties of the COVID-19 crisis, as well as reducing **food waste**. Such undertakings will have a positive impact on the environment of course, but also on waste handling and elimination costs, and the safety of patients and personnel.

These two major levers from a 'virtuous cycle' are essential to building a **circular economy**: reduce waste to save energy / save energy to reduce waste, with direct impact on the institution's environmental footprint.

⁷ Healthcare without Harm: reference. Available on <https://noharm-europe.org/>

Clear opportunities exist:

- Recycling offcuts of materials such as PVC and hospital waste
- Choosing partners that can turn them into quality recycled products
- Re-use of PVCs left over from disposable medical products is a good example of circular initiatives worth setting up.

2.3.2 Influencing partners can favour eco-responsibility

The acquisition of medical and pharmaceutical products contributes significantly to a facility's carbon footprint. The same goes for food products used in catering. Working on these supply chains and establishing eco-responsible purchase policies can impact the carbon footprint indirectly.

22% Pharmaceuticals account for around 22 per cent of the overall NHS carbon footprint.⁸

For example:

- Monitoring the environmental footprint of consumables used in medical treatments
- Developing innovative logistics solutions that burn less fossil fuels
- Monitoring medical supply chains for waste-reduction opportunities
- Developing or selecting medical devices that combine patient benefits with a reduced environmental footprint
- As with building, where possible, choose materials that are easy to reuse or recycle

⁸ Naylor C, Appleby J. *Sustainable health and social care: connecting environmental and financial performance*. London: King's Fund, 2012.

Hospitals also have a real influence over their suppliers and partners and can use it to encourage environment- and climate-friendly practices. The same applies for staff, medical or not, and patients: they can be encouraged to adopt eco-responsible habits while they are on site, ideally leading to a more complete shift in attitudes and behaviours.

2.3.3 Sustainable patient journeys make sustainable hospitals

A hospital's ecological transition cannot stop at turning off lights and setting up waste sorting or recycling. Another way to really impact the facility's ecological footprint whilst also keeping down costs, is to reduce unnecessary or unnecessarily long hospital stays.



60%

In the United Kingdom, 60% of hospitalised patients did not need to be admitted.⁸

Avoiding wasteful or unnecessary stays is of course preferable for patients. It also frees up resources and avoids wasteful use of energy and consumables.

Some of the focus areas that could support this transition:

- Favour at home treatment where possible
- Only hospitalise patients in real need of emergency care or who are suffering from a serious pathology
- Resort to telemedicine to cut down on travel and optimise the treatment of chronic conditions
- Empower patient with therapeutic education to help patients understand and manage their symptoms and the evolution of their pathology
- Humanise end-of-life care by allowing terminal patients to return home
- Reform fee schedules based on face-to-face contact to encourage other sources of remuneration such as remote consultations

Developing a sustainable healthcare system depends on the levers mentioned above. At this point, the inevitable "multidisciplinarity" of hospital of the future should be plain to see.

⁸ Naylor C, Appleby J. *Sustainable health and social care: connecting environmental and financial performance*. London: King's Fund, 2012.

Key Facts

- 1.** Healthcare facilities are responsible of significant carbon emissions
- 2.** Reducing energy use and improving waste management are direct actions that help control healthcare facilities' carbon footprint
- 3.** Reduction of pharmaceutical use and sustainable procurement are examples of indirect actions to reduce greenhouse gas emissions
- 4.** Sustainable care pathways could have a significant impact on greenhouse gas emissions



The current pandemic has highlighted the importance of accelerating the transformation of our healthcare systems, toward a more human-centric approach, for which we will need a solid grasp of the human, logistical and technical challenges.

As with dispensing treatments, this approach is **multidimensional and multidisciplinary**. By rethinking hospital spaces to make them more compatible with patients' needs and expectations, we can leverage the built environment to facilitate this transition from a technocentric model to one based on positive, successful patient experiences.

This transition will rely on an array of recommendations, action plans, roadmaps, and perhaps a shared quality standards system developed with the help of health sector experts and designed to address the needs of both patients and medical staff.





3. Expert round table

To examine the aspects, and convinced that the right approach will be multidisciplinary, we brought together 12 international experts from different fields of healthcare, to discuss their vision of the hospital of tomorrow.

Introduction

To tackle the human, technical and logistical challenges facing the hospital of the future, we will need to consider and combine multiple facets: quality of care, treatment, cost control and environment impact.

To examine the aspects, and convinced that the right approach will be multidisciplinary, we brought together 12 international experts from different fields of healthcare, to discuss their vision of the hospital of tomorrow.

10 of the experts chose to participate in this discussion under their own names.

A Hospital Engineer and a Facility Director elected to participate anonymously and will be quoted here under the respective pseudonyms Pascal Jacquin and Agathe Munier.

We are grateful for all the time they were able to put into this endeavour.



Roger ALBERTIJN

Technical Director & IFHE Board Member (International Federation of Healthcare Engineering)
Belgium

Roger Albertijn is technical director of a network of healthcare institutions in the Antwerp region, as well as IFHE Europ board member (IFHE EU) and ZORG.tech board member. IFHE Europ and Zorg.tech are two networks that contribute to the improvement of healthcare facilities through the built environment.



Steve BATSON

Director for Healthcare for Stephen George + Partners (Architect)
United Kingdom

Steve Batson is an architect and Director for Healthcare for Stephen George + Partners. He works primarily on the design of high-end healthcare facilities, integrating new technologies into the built environment, and applying new technologies to improve the patient experience. He is currently representing the Institute of Healthcare Engineering and Estate Management (IHEEM) as chair of the BIM4Health – Digital Estate Group, working with the UK Department of Health, the NHS, and private sector partners on an integrated model for health data.



Leilani BARKAN

Interior Designer
Cleveland – USA

Leilani Barkan has been with the design team at the Cleveland Clinic for 10 years. Leilani and her team set the design standards for the clinic. They take part in planning and organising medical services by optimising the layout of equipment and furniture, and working on the reallocation of common areas, inpatient areas and outpatient areas.



Lucile HERVOUËT

Health Sociologist
France

Lucile Hervouët is a health sociologist and researcher trained at the Ecole des Hautes Etudes en Sciences Sociales (EHESS). Her work relates to the organisation of the health system and care pathways. She is particularly interested in the relations between health professionals, patients, and the patients' loved ones, both in hospital and at home, for serious and chronic illnesses.



Amah KOUEVI

Founder of the French Patient Experience Institute France

Graduate of Imperial College of London and the Ecole des Hautes études en Santé Publique, public health expert Amah Kouevi has contributed to the improvement of the quality and safety of hospital care for more than 15 years. Through the Institut Français de l'Expérience Patient, inspired by the Beryl Institute, he works to make patient experience a lever for change in the French health system.



Tonny KRUSE

Flooring Consultant in an independent floor consulting company Denmark

Tonny Kruse is an independent consultant and flooring specialist. He assists health facilities with choosing and laying suitable floor coverings. His work considers many factors including infection risks, sustainability and the ecological impact of materials.



Annika KRONQVIST

Interior Architect Sweden

Annika Kronqvist is an architect and designer, with an M.F.A. in interior design and a PhD in Lighting Design and has been working as a researcher at the University of Jönköping. She currently works at an engineering and architectural firm specialising in healthcare facilities. Her concept of the built environment combines functional, aesthetic and environmental aspects. Her projects aim to foster well-being through architecture and light.



Mark MAFFEY

Architect/Project Manager England

Mark Maffey is an architect. He is also a Senior Healthcare Project Manager. His two areas of expertise led him to create his company, Studio Mode Limited in 2006, which has worked for a number of NHS trusts in the south of England. He manages renovation and construction projects, from concept to delivery, acting as point of connection between the many stakeholders across many NHS projects.

**Prof. Philippe Gabriel STEG**

Head of the Cardiology
Department
France

Prof. Philippe Gabriel STEG is Chief of Cardiology at Bichat hospital, university professor at Université de Paris and Director of research team n°5 “Atherothrombotic Disease in Heart and Brain” INSERM U-1148. He is also Vice President in charge of research at AP-HP (Assistance Publique – Hôpitaux de Paris, greater Paris University Hospitals). Very concerned about quality of life at work of medical staff, he is also involved in the “Protège Ton Soignant” (Protect your caregiver) collective.

**Dr.-Ing Wolfgang SUNDER**

Architect
Germany

Photo credit: Stefan Großjohann

Dr Sunder is an Architect and researcher at the Institute for Constructive Design, Industrial and Healthcare Construction (IKE) at Braunschweig Technical University (Germany). His team works primarily on infrastructural infection prevention. Dr Sunder’s focus is on the hospital room of the future.



**How do you see the hospital
of the future?**

How do you see the hospital of the future?

R.A (Technical Director & IFHE Board):

Socially, a hospital will be the spearhead of high-technology research. Web applications will make home diagnosis and self-scanning possible. Tele diagnosis with a central helpdesk should therefore be introduced. The current COVID pandemic has already shown that due to the overcrowding of hospitals, other forms of diagnosis and treatment need to be developed.

M.M (Architect/Project Manager):

Hospitals must be able to anticipate societal changes and flex accordingly. Public health/hospitals will need to major on prevention (based on education) and education generally (better awareness of illnesses). Hospitals will find themselves dealing with acute specialist conditions, and becoming technological 'hubs' as they manage incoming data from technologies based in people's homes.

Am.K (Founder French Institute of Patient Experience):

It is true that in the hospital of the future, facilities will be hyperspecialized, with increasingly advanced technical units.

A.K (Interior Architect):

Where I live, our hospital is located in several towns nearby, you can get medical advice on the phone and internet, and children's care and not so serious ailments are treated at local care stations. This I believe is a common system with some variations.

M.M (Architect/Project Manager):

Hospitals are and have to continue to be a key player in society both socially and economically. They will need to become "centres of excellence", both as high performing research units and a place of care and healing.

T.K (Flooring Consultant):

I believe that hospitals in general will remain more for patients that need operations or are so sick and they can only be treated in hospitals. I'm convinced that we will move prevention and rehabilitation to communes (municipalities), that is, in decentralised places.

W.S (Architect):

A hospital is a very important part of the city. It is a place of care and healing, but it has to be also an attractive employer. Make the access to care easier also means being an attractive employer for high-potential caregivers.

Indeed, patients will not be inclined to go back to a hospital that does not meet their expectations and a hospital with poor working conditions will find it difficult to retain qualified and competent personnel.

For a hospital to reach this state of excellence, the first step is reducing the pressure on the hospital's departments. Hospital departments need to be able to rely on an effective primary care system that can keep people generally healthy of course, but can also treat simple cases.

This change to the role hospitals play in society requires a rethink of how the healthcare system is organised, how hospital buildings are structured, and how certain spaces are used.

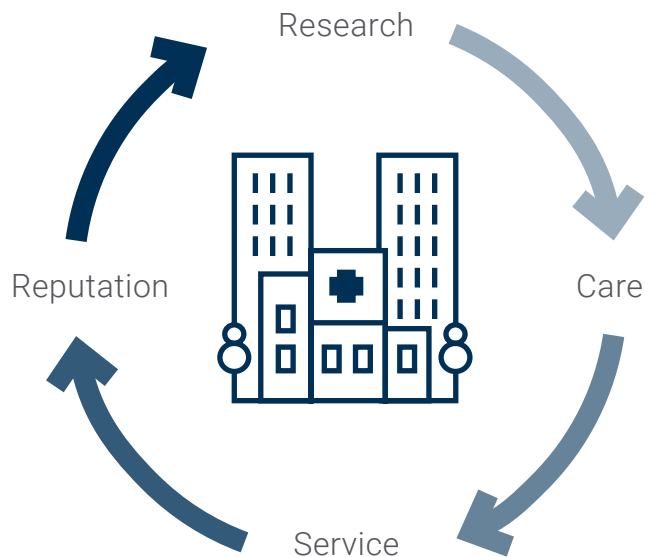
S.B (Architect):

Is a hospital always the right place for the provision of care or advice? During the national lockdowns there has been a significant increase in the use of technology that has resulted in a clear uptake of remote and digital services by patients.

G.S (Head of the Cardiology Department):

In France, resorting to outpatient treatment helps reduce the pressure on hospitals, and optimise patient experience. For us, the APHP's cardiolounge, set up in 2019, is a case in point. It is an interventional cardiology unit that makes it possible to carry out routine operations in a friendly setting. The response of patients treated at this unit are very positive, as are those of the medical staff. The simplification of the patient journey reduces patient stress and improves medical staff's quality of life at work.

The virtuous circle of hospital excellence



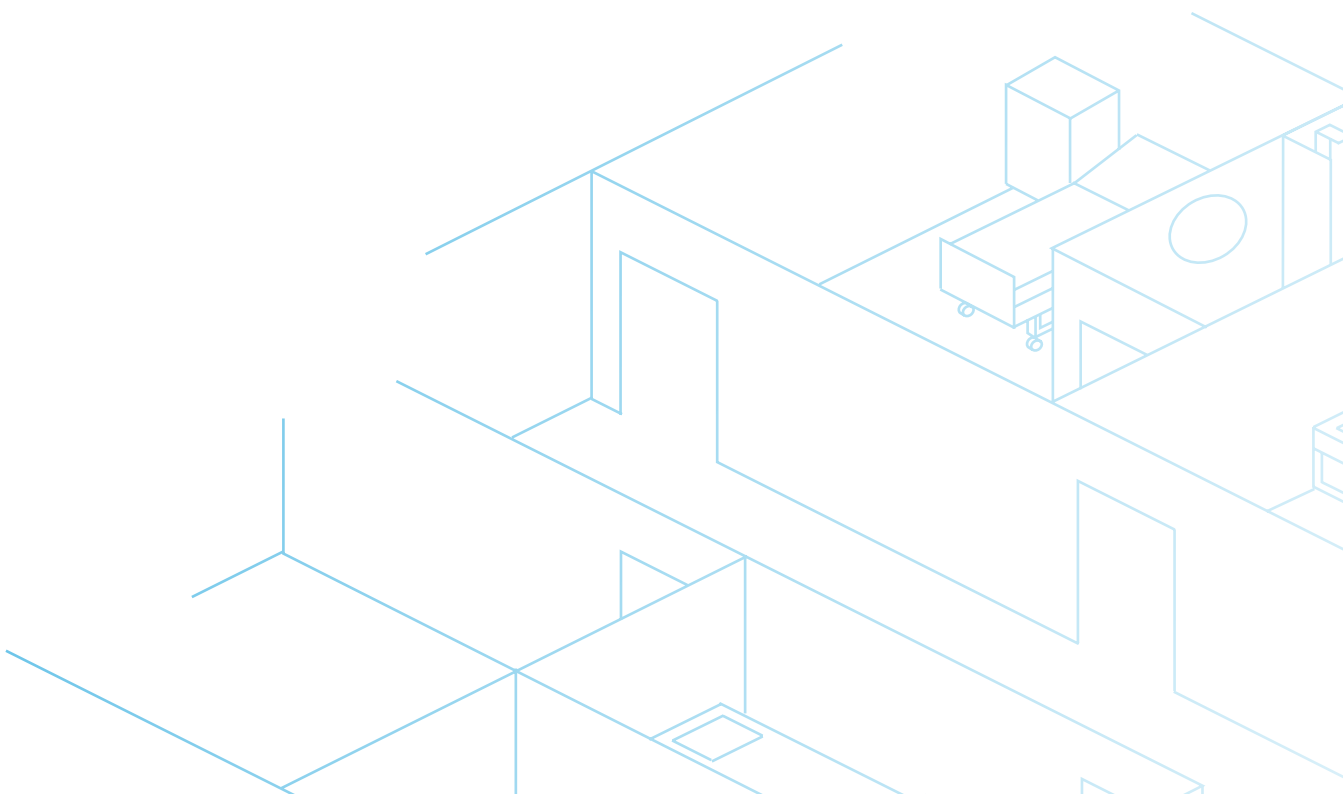
Setting up specialised units, sometimes off hospital grounds, improving the off-site and in-hospital treatment and facilitates home care, has a number of advantages including reducing pressure on hospitals and keeping the patient in a familiar, reassuring environment, which helps reduce their stress.

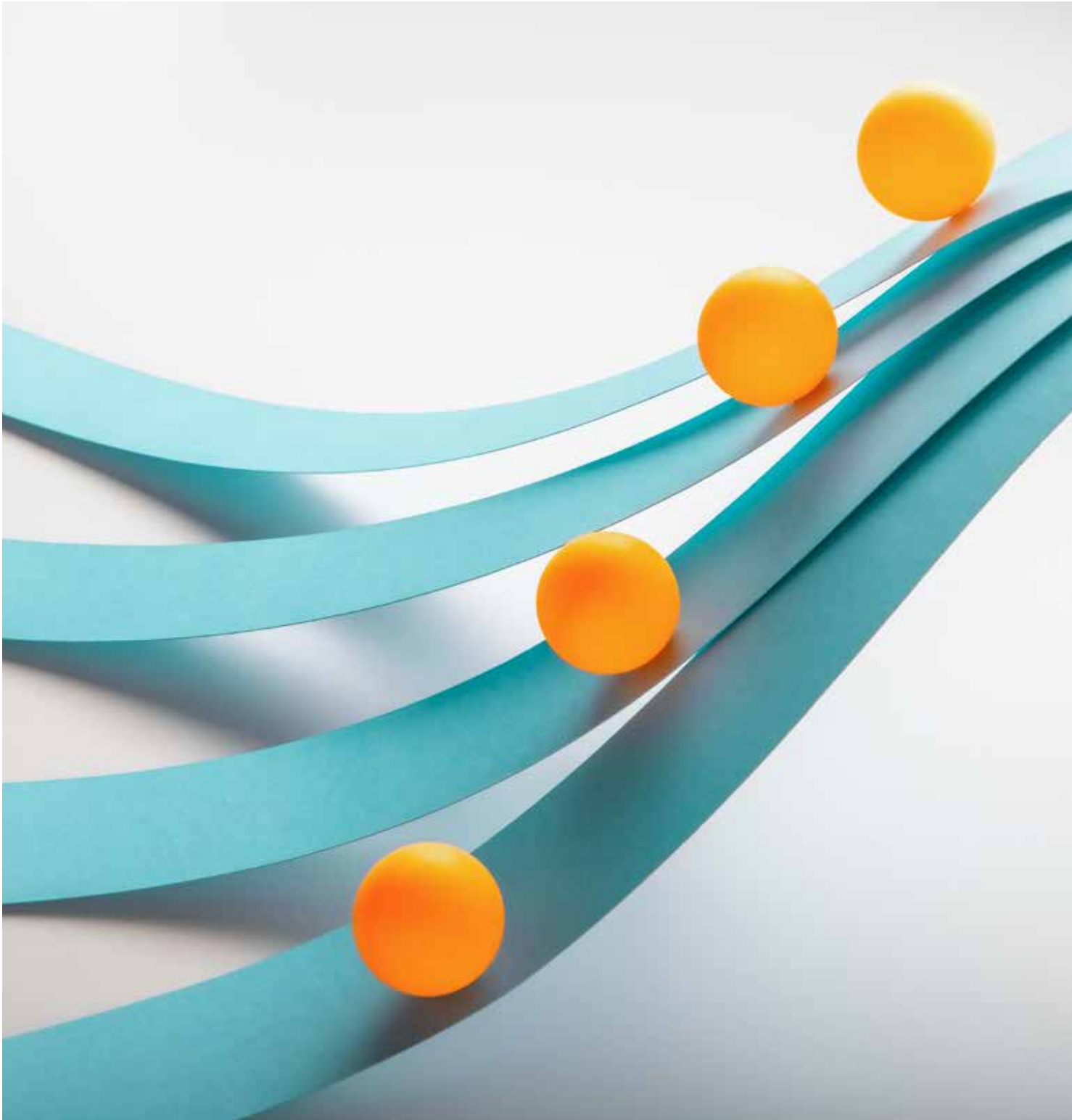
This modular, or "à la carte" approach would improve patient experience but also make hospitals better able to handle acute health emergency.

Under these conditions, the reduced pressure on hospitals also serves as a pro-adaptive factor when faced with health emergencies, and therefore an element of flexibility – a flexibility which has proven insufficient in the current crisis.

Key Facts

- 1.** The hospital of the future will have to be a flagship for research
- 2.** New technologies will enable remote monitoring of patients, with only the most severe patients taken into care onsite at the hospital
- 3.** The reduction of pressure on hospitals is one of the key steps to improving hospital effectiveness.
- 4.** To achieve this, hospitals will need to rely on a capable primary care system that can handle less severe illnesses and monitoring of chronically ill
- 5.** This decentralisation of medical interventions toward a more modular care format will significantly improve patient experience





How can we make hospital infrastructure more flexible?

How can we make hospital infrastructure more flexible?

Ensuring the continuity and safety of care for chronic patients and maintaining “classic” emergency care, while taking on a massive influx of potentially contagious patient may require a reorganisation of medical spaces.

Questioned about the difficulties that some facilities experienced when attempting to quickly rearrange their space and cater to the emergent needs triggered by the pandemic, the experts discussed several different approaches to making medical facilities more flexible.

S.B (Architect):

The current pandemic has starkly highlighted the most important area we should focus on is a better understanding of our patient journey around a Modular Modality of Care (MMC); to deliver the occurrence of healthcare service in the Right Place, in the Right Space at the Right Point in Time. Healthcare planning around people, for people and that is affordable and sustainable ensuring equality of accessible health and care for all people.

M.M (Architect/Project Manager):

Single bed / en suite accommodation is one of the simplest ways to control infection. Looking forward, OPD settings should be designed to be capable of rapid conversion into inpatient units. Multi-bed wards that can be subdivided

quickly into single room accommodation would offer the clinical teams a range of measures for combatting very infectious diseases.

W.S (Architect):

Focus on the twin room in normal care ward (as much private space as possible, good working stations for staff, good processes for avoiding infections, good material and surfaces for cleaning...). Focus on single rooms in ICU (less chance of infections spreading, transparency of control, high technical and digital standards, provide enough space for patients while keeping the distance staff have to travel to a minimum).

Am.K (Founder French Institute of Patient Experience) :

I don't think that pre-emptively structuring healthcare facilities to handle specific sanitary crises is the solution. Rather, we should be prepared for all health emergencies through dedicated entrances to the buildings, and more transparent patient journeys.

P.J (Hospital Engineer):

To be better prepared, we could equip all rooms with medical gas fittings. That way it would be easier to convert beds on standard wards into resuscitation beds for example.

Swift reallocation of spaces in case of need is also facilitated by the choice of materials in the rooms. The experts agreed that choosing materials that are easy to clean and can withstand frequent cleaning also helps with space reallocation, by making it easier to relocate patients.

P.J (Hospital Engineer):

Today there are recommendations we can use as a basis to create a more flexible built environment, but we can also take an empirical, iterative approach. We have learnt from experience that during a pandemic, having an oculus in doors makes it possible to carry out visual checks on patients without having to enter the room. This type of monitoring is impossible to set up with full doors. Putting in oculi means you can increase checks without having to change into protective equipment, which is not simple without dedicated airlocks and when there are shortages of protective equipment.

Though there was a consensus around the idea of improving the equipment in single rooms, the same cannot be said for the American model of specialised buildings.

Indeed, the “one building, one specialty” model appears to be the preferred approach in the United States to structuring the built environment. It does have the advantage of making it easier to separate patient flows and limit access to specific areas, and thus

contain the risk of contagion in case of an infectious threat.

This ultra-specialisation can seem attractive as it is well suited to maintaining continuity of care in periods of intense demand for acute care, such as during a pandemic. However...

P.J (Hospital Engineer):

This arrangement can be useful because it lets you channel different patient flows, however it can turn out to be ill-suited in some countries where it is common practice to move patients around between departments.

Another asset for flexibility is understanding the interactions between built environment, patients and medical staff. With the integration of new technologies into the very structure of the buildings, managing flows and optimising space, transforming common areas into care areas, are all made easier. Little by little, the building itself is becoming a part of the patient journey. It contributes actively to the patient experience and makes it possible to put the human back at the centre of things.

S.B (Architect):

I see that in the future, flexibility, adaptability and optimisation are going to be key in how we organise care spaces. With a digital twin, from a macro to micro level, which we can interact with, a modular approach to the design of hospitals and other health and care buildings, we could easily adapt hospital spaces to cover emergency needs. For example we would be able to change patient flows and air flow requirements if required. This would be a perfect healthcare environment, one we would love to see and to experience. This is exactly what we find in the aviation sector, so why not in the healthcare sector or hospital of tomorrow?

Flexibility is therefore an asset which makes it possible to address healthcare needs generally, while also optimising the patient experience on an individual level. That is, it favours the transition from current models towards models centred on the people and their needs.

Key Facts

- 1.** Flexibility is a major asset that enables a rapid response to emergency requirements
- 2.** Integrating new technologies into the built environment is a key factor in creating flexibility
- 3.** The digital twin (BIM) is a crucial element in creating flexibility
- 4.** A broader availability of single rooms is an asset for flexibility
- 5.** We can work from set recommendations, but applying experience and an iterative process can also help build flexibility into the environment



How can we build a more
Human-Centric patient journey?

How can we build a more Human-Centric patient journey?

The Human-Centric approach does not affect only patients. As we have highlighted above, patients but also medical and other staff will interact with the built environment as they would with a fully-fledged individual.

S.B (Architect):

Humans should be at the heart of what we do. The built environment and clinical issues are symbiotic. If we develop our knowledge of these interactions then we can continue to build a great healing environment.

T.K (Flooring Consultant):

Making patients, caregivers and staff feel safe and confident. The patients' experience should be a good experience.

S.B (Architect):

In the future we could create intelligent hospitals and interactive wards, where humans are not lost in the system, we can better navigate their patient experience, ensure their safety and get away from blame claim culture towards an assurance mode of care.

L.H (Health sociologist)

Transparency in the patient journey and preserving the connection with loved ones are essential.

Am.K (Founder French Institute of Patient Experience) :

Including patient experience in hospital quality indicators seems to me the key to a more human-centred approach.

For all of our experts, the patient journey needs to be co-constructed by patient and medical staff. They agree that the built environment can contribute by providing clarity.

P.J (Hospital Engineer):

The presence of markers and reference points is essential. An effective signage system helps user orientation, clear delimitation of spaces by colour coding, and makes mobility more secure. This last point is important for optimising transfers between departments by reducing the risk of falls and increasing users' sense of safety.

A.K (Interior Architect):

A priority area for improving the patient experience is to provide a sense of control; through wayfinding, information given and taken, views of interior and exterior.

R.A (Technical Director & IFHE Board):

Through an individual approach of the human being, one will feel directly involved and helped: all possible barriers will fall away

Questioning and auditing with communication of the results will create patient confidence: this will ensure that comments made are taken into account.

M.M (Architect/Project Manager):

In addition, building integrated technologies can make access to diagnostic data easier and allow communication between patients and caregivers, particularly with regard to therapeutic education. Smart buildings will contribute to the increase in patients' safety, confidence and well-being.

R.A (Technical Director & IFHE Board):

The caregiver will also have to be well informed by the management. Atmosphere, satisfaction, working environment, team building, promote this well-being.

As we have seen, improving quality of life within healthcare institutions is one of the major challenges for the hospital of the future.

On this point, all the experts we spoke with concur: the quality of the built environment has a significant impact on patient recovery.

L.B (Interior Designer):

Creating an environment in which the patient can have control over his healing conditions (temperature, luminosity, noise ...) is a major asset in a design-for-care approach.

Numerous advances in patient comfort have been made in recent years. However, one of the key points for the coming years will be the improvement of the working conditions of caregivers and hospital staff.

Indeed, quality of life at work is a notion that has been widely developed in businesses in the 21st century. It remains underdeveloped in healthcare facilities however, where working conditions can be very difficult at times.

L.B (Interior Designer):

The COVID-19 crisis highlighted a lack of equipment for caregivers: airlocks to put on protective wear, spaces dedicated to respite and privacy, spaces dedicated to dialogue with families and better managing sometimes extreme reactions.

Paradoxically, in a society where "a great place to work" is a strong indicator, quality of life at work for medical staff still does not receive much consideration.

P.G.S (Head of the Cardiology Department):

We need to rethink the spaces dedicated to the medical staff's quality of life, changing rooms where they can shower or get changed with a little privacy... Open-space culture for example is not suited to our field, we need to have spaces that preserve confidentiality when we talk with patients or their families. Similarly, staff rest spaces must be a priority. Too often a simple on call room, these need to be calm, safe spaces where personnel can get some alone time.

Further, our experts remind us that technical and financial constraints often impede efforts to create more Human-Conscious infrastructure.

A.K (Interior Architect):

I sometimes find myself unable to use certain colours that aren't compatible with the constraints of sanitary safety, and particularly infectious risk prevention. Some decisionmakers' preferences can also be a limiting factor when you want to use certain solutions that would optimise the users' experience.

The priority for improving the patient experience should be providing a sense of control, over their own mobility and orientation, over the information they share or receive, over what they see, inside and out.

L.B (Interior Designer):

In addition, all surfaces must be easy to clean and allow visual inspection. This limits the use of certain colours where dirt is less easily identified or materials not resistant enough to repeated cleaning.

Another significant obstacle: financial constraints. Our experts all highlighted a budgetary approach dubbed "cost-killing" which in recent years has determined design choices in hospitals all over the world.

A.K (Interior Architect):

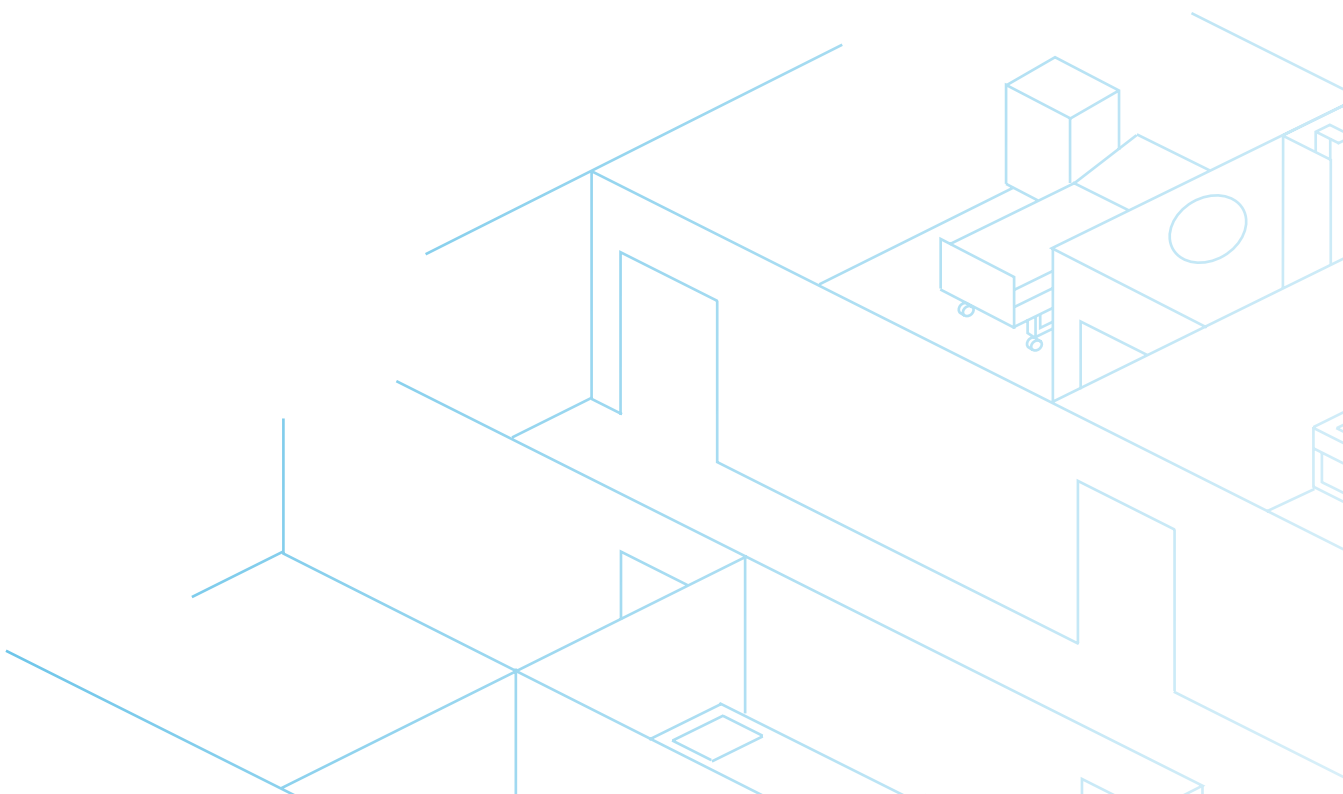
The purely economic approach and the pressure of costs can sometimes orient decision-making toward "more affordable" options, in which comfort and quality of life are not prevalent criteria. In such conditions it can be difficult at times to come up with solutions that meet users' needs and expectations 100%. Sometimes we have to compromise.

The question is very political: how much should we as a society invest in our hospitals? What kind of care do we want? Is regulation the right answer?

This finance-driven logic can also have an impact on another key challenge: the hospital's ecological footprint.

Key Facts

- 1.** The Human Centric design concept must consider the needs and expectations of patients but also staff
- 2.** Good design helps optimise patient experience
- 3.** A Human Centric approach must consider many constraints: transparency in the patient journey, as well as human, infectious and economic factors
- 4.** A Human Centric approach facilitates interaction between all participants in the patient journey
- 5.** By contributing to quality of life at work, a better built environment also helps medical facilities attract and retain the best professional talent.





How can hospitals reduce their environmental footprint?

How can hospitals reduce their environmental footprint?

Reducing the environmental footprint of hospitals is part of the global effort to create a sustainable society.

S.B (Architect):

We forget our planet is a living thing, we are intrinsically tied to it and the harm we do to it will affect us too. The better the environment we create the better off we will be.

W.S (Architect):

Initiating a sustainable development approach within the establishments is the beginning of a virtuous circle that meets the same major principles as a global approach: Reuse of energy, recycling materials, less use of energy and water...

In hospitals, environmental efforts, while a response to global directives, are typically regional or even local initiatives. Though the general guidelines might be known, to date there are no broadly accepted recommendations specific to hospitals.

M.A (Hospital Managing Director):

Note that even if there are no international guidelines specific to hospitals, setting up an initiative for ISO 14001 certification lays the foundations of a commitment to sustainability, enabling improvements to water, air, and energy management, to hygiene on the premises, and to waste management. This certification provides a solid foundation, and

is a suitable indicator for all types of facilities, including healthcare facilities.

R.A (Technical Director & IFHE Board):

With sustainability, it is very important to determine which building one has at one's disposal: old or new. With new buildings, one can immediately take this into account when designing (insulation, ventilation, recyclability, cradle to cradle, ...). In existing buildings this is more difficult. Top priority is dealing with the available resources and respect for them: proper use, good maintenance, expert personnel, order, ... When choosing the purchase, it is important to take into account the employee's level of education in order to optimize this.

A.K (Interior Architect):

The materials used should be possible to re-use. The building itself as it stands should be possible to re-use for other purposes.

T.K (Flooring Consultant):

We should use products that are as CO₂ neutral as possible, products that can be recycled and produced in an environmentally-friendly manner, and with as much green energy as possible.

A.K (Interior Architect):

Key priority is the environmentally friendly production of all materials used.

When it comes to materials, beyond eco-friendly production methods, their durability and repairability must also be taken into account. Selecting materials that meet many eco-friendly criteria isn't enough if the material wears down or degrades quickly and needs to be replaced frequently, as this simply adds to the already considerable amount of waste that a hospital needs to dispose of each year.

It seems clear that on each and every aspect of the hospital of the future – defining its role in society, increasing the flexibility of its infrastructure, accounting for the needs of its users, or improving its environmental sustainability – is subject to numerous constraints imposed by the expectations of various stakeholders.

M.M (Architect/Project Manager):

Performance should be measured in terms of value, not simply initial capital cost. A green, eco-responsible product that has to be constantly replaced owing to a lack of performance capability is not a sustainable product in itself and its 'green' credentials alone will not make it the product of choice.

Key Facts

1. The foundations of a viable sustainability policy are the same for hospitals as for other sectors
2. There are no international guidelines yet to provide a framework for environmental initiatives in healthcare facilities, however ISO 14001 certification provides a good reference to start with
3. Healthcare systems need to set the bar higher:
 - Establish eco-friendly purchasing policies
 - Reduce the carbon footprint as much as possible
 - Consider infrastructure throughout its lifecycle, and the durability, repairability and re-usability of materials (recycling, circular economy)



Are there better ways of working
with partners and providers?

Are there better ways of working with partners and providers?

To our experts, this approach must be collaborative. Medical care is a sensitive topic. With rising costs and increasing numbers of stakeholders, decisions often need to be made by a committee. To face emerging health crises, there is a real need for effective collaboration, to break silos and structure decision-making as a multi-disciplinary matrix instead.

T.K (Flooring Consultant):

To reach the goal, patients and staff should be interviewed. Then professional groups should be set up with the resources and expertise to work with the solutions. I am convinced that you need to find the right people and pay for their time, so you can also ask/demand for more from them...

A.K (Interior Architect):

A common language should be used, with a known vocabulary. Incentives to be declared and firmly established in all stakeholder groups.

Who is going to involve and choose partners? Is a hospital build a commercial enterprise – where criteria are decided by the entrepreneur? Already today there is a strong will to choose the right partners, but the criteria might not be clearly stated, and

the incentive for society to get “the most value for the least money” might not result in “the best health care”. To involve other partners, you need to make them want to be involved. - Better knowledge, clearly stated sustainability goals, empathy...

R.A (Technical Director & IFHE Board):

Stakeholders can work together through formal and informal means these days, which is more flexible, more agile, and means fewer long meetings. But it also means checking on what gets done and built up: this should be very concrete.

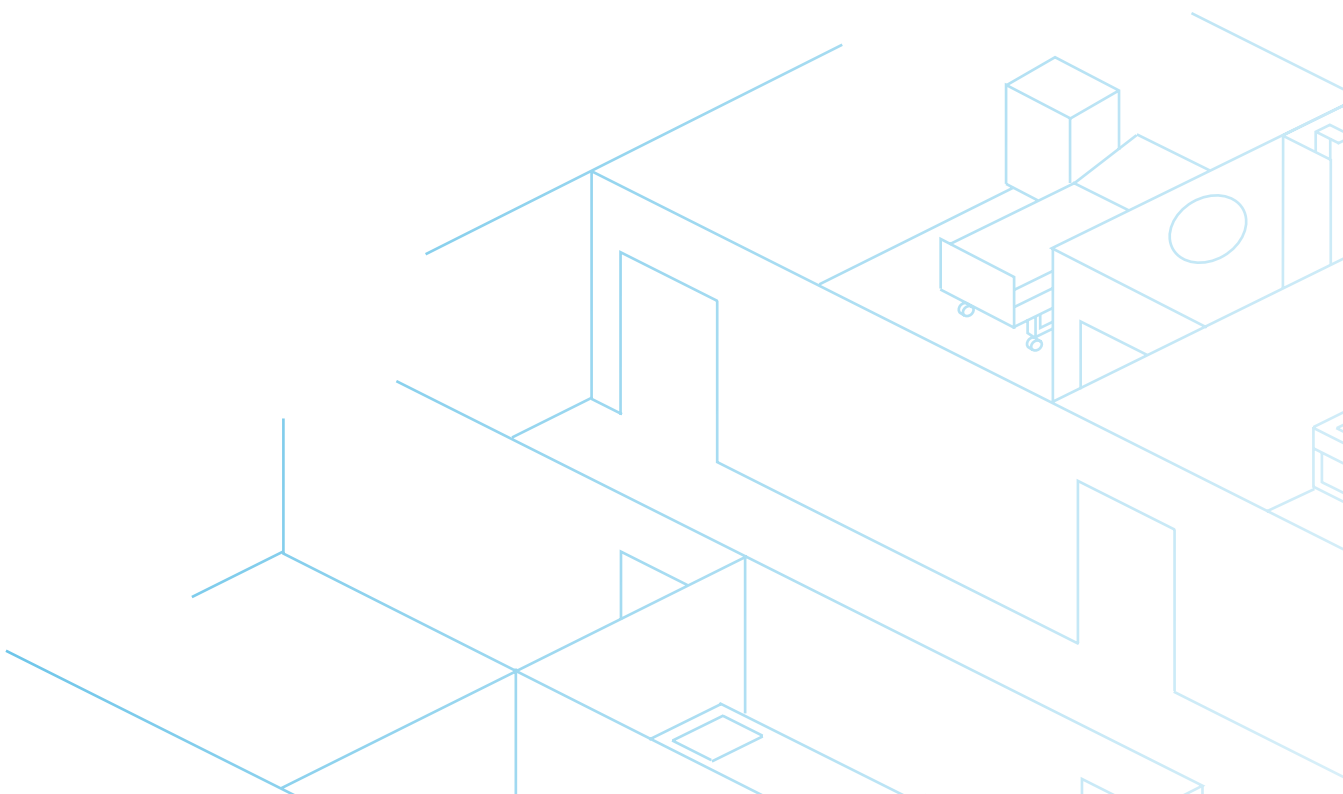
The experts pointed out the benefits of establishing a network of partners and providers, whose thinking can be stimulated through meetings, reports and guidelines. While some learned societies exist that are dedicated to the study of ‘Design for Care’, the creation of a ‘hospital of the future’ think tank could also be considered.

Objective measures can also be established, whether social, economic or environmental, to look at criteria as diverse as well-being, user peace of mind, and user journey simplicity.

The effectiveness of these practices in design terms will grow out of stakeholders’ collaboration on common projects.

Key Facts

- 1.** Creating a hospital of the future with a positive patient experience will require the collaboration of stakeholders with a variety of different backgrounds
- 2.** Some suggested collaborative tools are written guidelines and focus groups
- 3.** Objective, measurable criteria will be required in a number of domains: social, economic and environmental



The current sanitary crisis is disrupting society as a whole, and healthcare systems in particular.

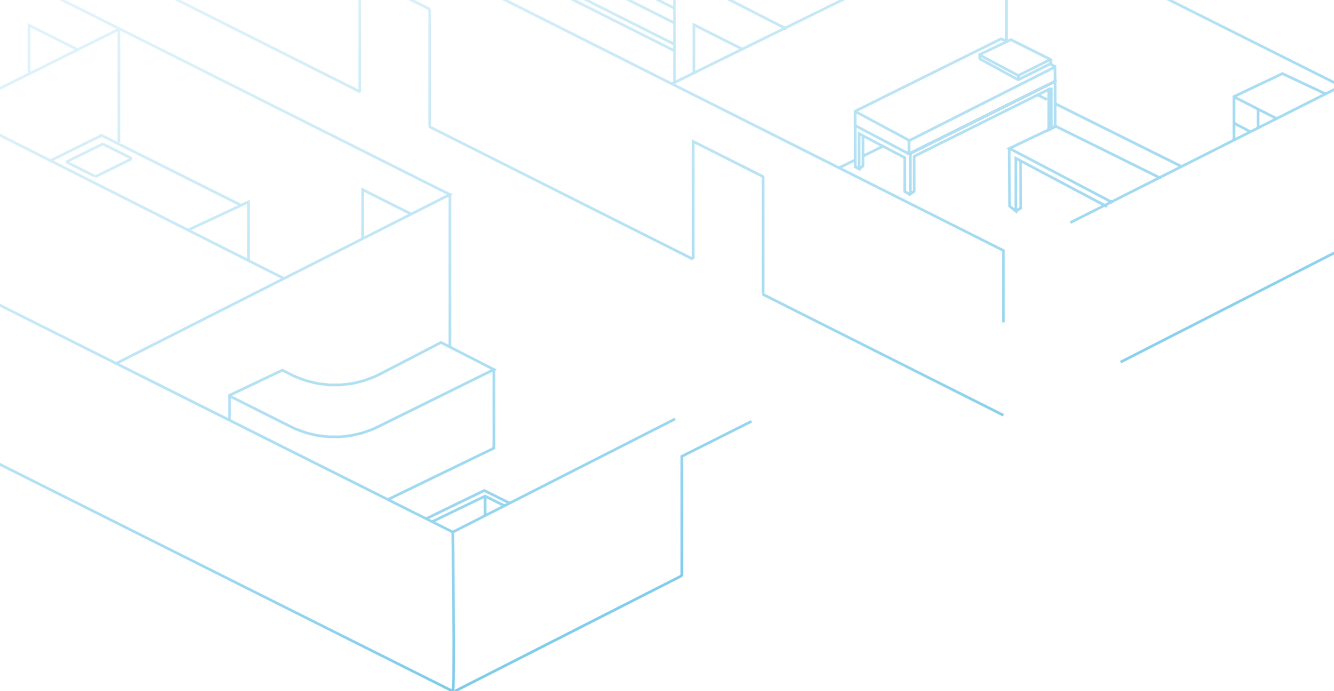
Coinciding with a sociodemographic upheaval, the crisis has brought to light the need for a human-centric approach to healthcare if we are to tackle the challenges ahead, in a society marked by ageing populations, rising chronic illnesses, and emerging health crises. To achieve this, the layout of public and medical spaces, the flexibility of buildings, the choice of materials, are the key to success for the hospital of the future – a place offering high-value, cost effective medical care, yet ready to adapt quickly and efficiently to healthcare emergencies such as pandemics.

This evolution will need to capitalise on a more sustainable healthcare offering, that takes into account the quality of life of medical staff, transparency in the patient journey, and facilities to manage care beyond hospital limits.

As our experts pointed out, this change will only be possible with a multidisciplinary approach, a collaboration between patients, medical personnel, architects, designers, hospital engineers and so on. Thanks to this collaborative approach, the hospital of the future will be able to define a new model of healthcare that answers medical, financial and environmental needs, resulting in a better healthcare experience for both patients and caregivers.

Understanding the challenges and opportunities, Tarkett is doing its part, supporting all parties to this transformation.

This is our human-conscious design™ approach.



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