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The Future of Healthcare Architecture and the Battle Against COVID-19 and Climate Change

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The COVID-19 pandemic presented a major challenge to healthcare systems across the globe. As the world continues to fight this battle during the fourth wave, HealthManagement.org spoke to Daniela Pedrini, President of the International Federation of Health Engineering (IFHE), on healthcare's response to COVID-19, changes healthcare systems need to make to be better prepared for such challenges in future, how healthcare architecture will take shape in the years to come and why the world needs to focus on two key challenges - the pandemic and climate change.

Healthcare systems around the world have experienced a significant jolt because of the COVID-19 pandemic. Why do you think healthcare was so unprepared to handle such a crisis?

It is impossible to give a comprehensive answer to such a complex issue. The striking aspects are the rapidity of the COVID-19 pandemic diffusion, the duration of its impact, the global similarity of its effects, and the continuous development of variants.

For technical people like me, who have spent a great part of their professional life working side by side with the medical staff of hospitals and researchers, the first reaction was to ask "expert colleagues" why we were so unprepared and what could be done to make a fast and efficient comeback.

The difficult questions led me to search for a better understanding of studies and scientific publications. My first surprise was finding many publications in the recent past that highlighted the risk of the upsurge of a "new" pandemic. Hence, it is important to underline that there already was a scientific awareness of the great danger. Furthermore, some of the alerts were specifically addressed to the highest levels of governments and institutions in charge of the common wellbeing and safety of citizens.

As an example, in the July/August 2005 issue of the Journal of Foreign Affairs, Professor Michael T. Osterholm, of the

University of Minnesota, Director of the Center for Infectious Disease Research and Policy, and now nominated as one of the scientists working in the team created by President Biden, alerted global governments to get prepared for a pandemic that would hit many countries in a few years. Before that, in May of the same year, Prof Osterholm had sent the same message to his colleagues in the article "Preparing for a new pandemic" published in the New England Journal of Medicine.

He was not the only one sending those warnings, but I mention him because he was among those who did not keep their perspectives only in the inner scientific circles. He went as far as to also alert global leaders.

I believe the answer to the question you have posed should be searched in global terms in the mechanisms that almost universally transfer/filter/interpret reality and real needs into government programmes and actions, with obvious differences and shades, all over the world. Differences and shades that, needless to say, account for the gravity of the impact with which COVID-19 has marked its presence in different parts of the world and among different nations.

To this general view, I would like to add something specific to the Italian situation. The unpreparedness in my nation has especially been the result of decades of basically playing down the multifaceted importance of the health sector. Health services and supporting infrastructures were considered

as an economic burden. Allocations of funds to the sector were progressively reduced or at least not increased in proportion to the demand for healthcare. Hence, when the pandemic hit our nation, we were not only surprised, but we also had to make all kinds of efforts to adapt and/or produce the necessary territorial infrastructures that were never created to fulfill the needs or were ironically dismissed. The total dedication of medical and technical staff in hospitals was mitigated against what would have been an even worse hit of the pandemic.

In your opinion, which areas in healthcare need to be prioritised and undergo a significant overhaul based on this recent experience?

Among the scientific communities, the concern of possible new pandemics is largely diffused. My evaluation is that there is more than one need to be prioritised in terms of timing and coordination, and correlation. There is no doubt that the architecture of the health facilities, starting with hospitals, will need to be properly examined, and comparative evaluations among different hospitals should be done. Some requirements have already been identified: accurate redundancy, flexibility, increased oxygen distribution, materials and details not previously considered, more advanced digitalisation, etc.

The focus on hospital changes, however, should not be the only priority. In Italy, it has been understood that greater attention has to be also given to the “territorial health infrastructure”, which should be at the forefront when evaluating primary care.

Improving hospitals’ resilience and creating a territorial network of care are interventions that will have to receive financial support from European and national levels and then be realised at the most appropriate government level, with high local collaboration.

Planning for mitigating the hit of a future pandemic must be on the agenda of every public health agency, school board, manufacturing plant, investment firm, state legislature, food production and distribution.

We need to stress immediately, however, that although this is a necessary factor, it is not sufficient. Healthcare leaders and managers need to understand the basic lesson of the pandemic: to fight the diffusion of a possible new one needs to go hand-in-hand with the battle against climate change, air pollution and all the factors responsible for the destruction of our planet and its biodiversity.

What healthcare innovations have you seen in your region, or which ones do you foresee that could

improve healthcare’s response in future?

Italy has been heavily hit by COVID-19 and, like other countries, is reflecting and preparing for the most efficient and effective use of European and national public funding and the contribution of private investments.

In addition to investment in safety and sustainability for hospitals, the recently made and approved National Plan for Recovery and Resilience (PNRR in Italian), by the EU, is introducing two relatively new infrastructures in healthcare: the “Case della Salute (Homes of Health)” and “Community Hospitals”. The latter is present among other nations in Europe. Italy is also accelerating the process of digitalisation and study for the use of Artificial Intelligence (AI). This had already started before the pandemic hit but is now getting more attention and funds from the PNRR.

Technology is undoubtedly an integral component of healthcare. How do you see healthcare architecture and Health IT evolving in the years to come?

There is no doubt technology is important for the advancement of healthcare. Big Data is certainly a great support for IT-connected tools to make good use of them.

However, there are aspects that are not sufficiently addressed:

1. Technology is a tool, and it will not be the saviour for the healthcare systems as well as for the climate change dramatic issues.
2. A new understanding of complexity is the basic issue to confront. In other words, we live in a world increasingly characterised by interconnection and interdependence. We need to substitute our linear approach - “action A will produce effect B” - with a systemic approach, and understand that health systems are, in effect, sub-systems of a more complex one that encompasses individuals, communities, nationalities and planet life.
3. Healthcare architecture has to find a way to express that hospitals represent a temporary place for patients and should be shaped to facilitate patient-centred care. Digitalisation and AI should be the catalyst of those changes.

As President of the International Federation of Healthcare Engineering and the Italian Society of Architecture and Engineering for Healthcare, what is your vision for 2021 and onwards?

Healthcare engineering is undergoing changes coming from experiences and internal reflections that are symbolically represented by a change in our name from “International

Federation of **Hospital** Engineering” to “International Federation of **Healthcare** Engineering”. This was not simply a change of name. In January 2021, we celebrated the 50th anniversary of its foundation, which happened in Rome in 1970. Due to COVID-19, we had to organise a digital event, our first virtual congress. On that occasion, the Italian Society of Architecture and Engineering for Healthcare (S.I.A.I.S.) presented the “*Charter of Rome*” that indicates a new vision of healthcare engineering. The four pillars of our vision in defining the evolution of our role are:

- Healthcare respectful of our planet
- Healthcare for a different globalisation
- Healthcare for social responsibility
- Healthcare and complexity

Our commitment is to solidify this aim in our 27th Congress in Toronto in 2022 - “*Unleashing Innovation: Healthcare Engineering Excellence*”. Awards were announced already in the last Congress (IFHE2020) for studies and concrete realisation to tackle that important issue: Energy and climate change and the contribution of the healthcare sector.

The “Environmental Sustainability Policy” document has been updated and approved by IFHE (<https://www.ifhe.info/news/enviromental-sustainability-policy>). IFHE and IFHE-EU contributed to drafting a best practice guide for Healthcare Estates “A healthcare engineering roadmap for delivering net-zero carbon” (<https://www.ifhe.info/news/a-healthcare-engineering-roadmap-for-delivering-net-zero-carbon>). The roadmap outlined in this document, if diligently applied, and will form a significant part of the required changes as they apply to the NHS and public sector estate.

IFHE has launched the first-ever Energy Awards programme to honour and recognise healthcare facilities for reducing their energy use. Winners will be announced at IFHE Toronto in 2022 (<https://www.ifhe.info/news/global-energy-healthcare-awards>).

As current President, our work and purpose at IFHE is to promote and share knowledge within the healthcare community and build and develop relationships. We are represented worldwide, not only by engineers and architects but also by all health technicians and experts. At the moment, we are expanding our networks and improving our member experience through a new communication strategy.

IFHE encourages and facilitates the exchange of information and experience in hospital and healthcare facility design, construction, and engineering. With so much advancement in technology and the rapid

growth in digital health and AI, how do you see this integrated with hospital design and construction in the future?

We live in unprecedented times, and we share two key challenges that face our world: the pandemic and climate change. The topic of AI is important as a technology for the future and as a tool that can benefit healthcare and make healthcare accessible to more people. We have to make sure that the technology benefits the people who need it most, especially those in low-income countries or in countries where healthcare simply isn’t affordable to many.

I understand this well as we had our virtual congress here in Italy in January where we couldn’t see our friends and colleagues face to face. However, the restrictions gave us one positive thing: the digital technology to do the congress online, and we had a fantastic event. We were able to reach over 1000 people in 60 countries. This was an opportunity that we could never have had without the new online technology.

Today, we have to work with these technologies; we have to be agile in the way we work and communicate, with new working models and new engineering processes. We need to develop flexible working systems, whether it is remote working or up-skilling, to improve operational practices. But above all, we have to keep our people safe, inside and outside our healthcare system and hospitals from COVID-19 and future pandemics, and we have to do that without harming our planet and ecosystems. We also have to guarantee that we don’t compromise our fight against climate change in our preparation against pandemics. This is our greatest challenge. The topic of AI is an extension of that, and I believe it can contribute to our working methods and our social security and social fabric.

Can you tell us something about IFHE’s Global Climate Action in Pandemic Times? What does it entail, and what has been the progress so far?

The members of IFHE like S.I.A.I.S. and other organisations such as Health Care Without Harm – EU and the International Federation of Doctors for Environment activities, aim to diffuse the awareness of the connection of human and environmental health with climate change, the systemic connection among prevention – healthcare – urban conditions, and the need to change our lifestyle.

In the meantime, we are promoting what we call “science in action” with contributions and expertise addressed to all levels of public governance.

We see that climate change is not taken seriously at a global policy level. Why do you think this issue is important for the health and wellbeing of our population?

Congruent with the WHO, the IFHE believes that in the global context and alongside patient safety, environmental sustainability in Healthcare Facilities Management is the issue of most significance to be promoted. The IFHE will embrace every opportunity to positively promote improvements in Environmental Sustainability Policy to its member associations.

- Request from each member in its biennial report to Council a summary of any sustainability initiatives, activities and programs that have been undertaken;
- Establish a specific role or appoint a specialist project officer to coordinate this work on behalf of the IFHE;
- Develop technical and practical recommendations on issues of environmental sustainability in healthcare facilities.

IFHE Objectives

The International Federation of Healthcare Engineering will:

- Ensure that environmental sustainability is given appropriate coverage in its activities;
- Develop and promote publications that will draw attention to issues of environmental sustainability and will showcase projects and lessons learnt from the global experiences of its member countries. This will continue to be done through its official publication, the IFHE Digest and its associated journals and bulletins;
- Use its online presence and other social media platforms to promote awareness of environmental sustainability issues and opportunities;
- Ensure that the bi-annual IFHE Congress will always have environmental issues and sustainability as subjects for promotion, education and shared learning;
- Make and use opportunities for promotions in the appropriate public media to encourage an awareness of environmental sustainability in the healthcare sector;
- Advocate for change in areas of influence through member organisation, and globally through international bodies [e.g. World Health Organisation (WHO) and the United Nations (UN)];
- Seek, develop and maintain partnerships with other associations, research and academic institutions and experts to promote environmental sustainability;
- Support members to focus on sustainability by education, promotion and information sharing;

You have received the Italian Republic Order of Merit. Can you tell us which specific contributions resulted in this honour?

In 2006, I was awarded the Italian Republic Order of Merit medal for my contribution to the diffusion and promotion of hospital engineering, culture and innovation in Italy. In the increasingly complex world of healthcare, in order to ensure correct, safe and appropriate provision of care and to meet the expectations of patients, a multidisciplinary approach has been essential in addressing risk assessment and management, which guarantees safety and high standards and recognising that the role of technicians (engineers, architects, etc.) has become increasingly fundamental and irreplaceable. In other words, “healthcare technicians” have to guarantee construction continuity of the healthcare facility while maintaining the functionality and safety of structures, plants, technologies, ICT and medical devices to reduce clinical risk while at the same time managing costs, to make the “health” system sustainable while respecting criteria of ethics, transparency and legality. ■

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