

THE WORLD IN 2030

The Hospital of the Future





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As physical and virtual trends align with digital delivery and early prevention, there will be more change in hospitals by 2030 than has occurred in the last 30 years.

Share of global population without access to healthcare (2020) **50%**

Shortage of physicians, nurses and midwives globally by 2030 **9.9m**

As healthcare needs and systems around the world evolve, the role and design of hospitals are also changing to redefine the shape of the hospital as we know it. With a continually increasing and ageing patient population, tighter budgets, fewer doctors and higher patient expectations, many envisage that there could be significant challenges ahead. Equally, with more technology, better use of more data and some innovative new business models, there could also be some substantial opportunities to improve both the efficiency and the quality of delivering care.

This is an assessment of some of the associated shifts that may occur by 2030 and is designed to stimulate further debate. Insights have been gathered from over 40 expert workshops and additional discussions around the world with researchers, regulators, doctors, healthcare

professionals (HCPs), providers and payers, as well as health system leaders and public health specialists. In some areas there is strong alignment of views, in others there is notable variation.

This article shares some of the pivotal emerging trends that may impact the future of hospital design globally. For context, we begin by outlining the macro healthcare shifts and then, in more detail, explore future hospital design trends. It is the start of further open dialogue over the next year which we hope will provide a useful additional lens on the important changes ahead. We thank all those who have already shared their personal outlooks as part of this project.



Part One: Macro Healthcare Shifts



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From recent global feedback on a shared provocation, there is widespread agreement about the primary macro drivers for the future – technology development, the desire for more efficient, less-expensive systems as well as the consequences of the COVID-19 pandemic. Notably, most now consider that for much of the future innovation, alongside the US, Europe will increasingly be leading change - but not as much as Asia, and especially China which, for many focused on the advances in digital healthcare, is now very much in the driving seat.

Significant improvement in healthcare is seen to be occurring regionally, while some is also being stimulated and coordinated globally. For example, in 2019, the UN adopted a Political Declaration on Universal Health Coverage that includes financial risk protection, access to quality healthcare services and the provision of essential, effective and affordable medicines and vaccines for all. This is a bold, global ambition which many bodies are endorsing, but not

all see that it will necessarily occur equitably nor concurrently in all regions. Change will take longer in some systems than others: the impetus is greater in several pivotal locations and so momentum may vary from one nation to another.

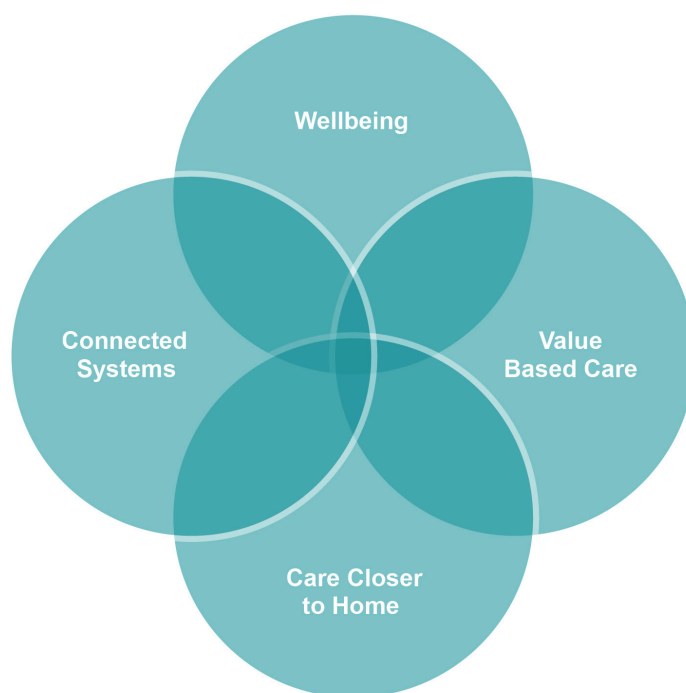
Common Drivers for Change

Today there are several ambitions that are driving how global healthcare systems are being reconfigured. Healthcare innovations are now providing the opportunity to link the two ends of the spectrum - increased personalisation of healthcare and advancements in population health management. Against this backdrop, healthcare systems around the world are increasingly focus on patient-centred care to improve the patient experience across the healthcare journey. These seek to deliver the best health outcomes for the population while containing the expanding cost of healthcare.

There are also regional challenges that are variously impacting the healthcare models in different nations. Some of the most common ones mentioned are overcoming workforce shortages, improving remote access to healthcare, simplifying complex processes, and reducing variation in healthcare delivery. Collectively, these are all having impact

as leaders seek to define the new models for healthcare delivery.

Cutting across these, there are however four additional, underlying systemic trends that are driving healthcare transformation. In many systems they present the potential for paradigm shifts.



1. Wellbeing - Focusing on prevention, wellbeing and encouraging the shift from sick-care to healthcare;

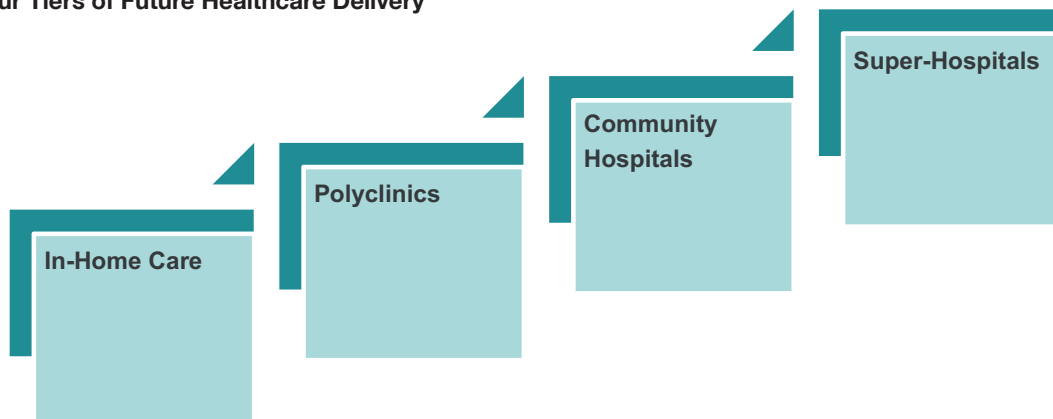
2. Value Based Care - Changing pricing models from 'cost-plus' to being value-based and progressively driven by social impact assessments;

3. Care Closer to Home - Providing more services outside hospitals to offer more convenient, localised healthcare support where people live; and

4. Connected Systems - Smarter, integrated infrastructure linking healthcare systems to the social determinants of health

These align with the global priorities and have varied impact across different healthcare systems and regions.

Four Tiers of Future Healthcare Delivery



In seeking to address these opportunity areas, globally many regularly agree that four models for healthcare delivery are gaining momentum as potentially common solutions. These are influenced by the ambition of pushing as much of the less-complex healthcare support out of major hospitals and into the local community and so concentrating the expensive activities in increasingly specialised centres of excellence. The four model tiers of healthcare delivery are:

In-Home Care

The availability of better, cheaper, remote diagnostics and monitoring via smartphones and sensors enabling far more care in the home. This is being facilitated by both more telemedicine support from HCPs and more virtual consultations – something which has been accelerated by the COVID-19 pandemic. Equally there is increased use at scale of multiple online platforms such as Good Doctor in China and Babylon Health in the UK and Rwanda.

Polyclinics

Where primary face-to-face care is needed, there is a common ambition in many countries that the vast majority of this can be delivered through walk-in centres. Ambulatory out-patient primary care is very much at the fore in many nations' health strategies and examples are increasingly evident. For instance, walk-in facilities can be found in convenient locations such as transport hubs across Europe as

well as in shopping malls in Singapore. In addition, several networks are gradually linking polyclinics together to provide virtual and video consultations with experts in other locations.

Community Hospitals

Where more intervention is required, there is a move to ensure that much of this can be provided by the community hospitals found in most towns and urban districts. Standard procedures such as maternity care, hip and knee operations as well step-down support after more complex surgery are progressively being undertaken in such facilities, many of which have shared resources across networks. Moreover, as demonstrated in some plans for UK locations, these outpatient services may well be provided via separate access and facilities to ER / A&E amenities.

Super-Hospitals

Where complex, technology-intensive and, frequently, expensive surgery is required, many healthcare providers are seeking to focus these on regional centres of excellence, often linked to universities. Super-hospitals, such as those being opened in Denmark, provide major trauma centres with extensive ICU facilities, staffed with leading-edge surgical teams. In some locations, there has been an additional ambition to ensure the concentration of high volumes of complex procedures in single hospitals. With a speciality in cardiac surgery Narayana Healthcare in India has been one of the pioneers in this area.

These are all pointing towards greater community-based care, other locations providing fast-track standardised support and more specialised services for complex cases. Across the range of options, the role and design of hospital and care facilities are correspondingly set to change.

However, the above are not the only trends influencing future design considerations. Adding yet further complexity are four more shifts that are variously challenging how we will think about future healthcare delivery, and how new hospitals can become more effective as part the mix. These are:

1. New Patient Journeys

Most agree that the future hospital experience should be better configured around the patient: new patient journeys for different needs are in development worldwide. Some involve incremental change; others are more radical. In our most recent research, the advent of more patient centric hospitals was considered as one of the top high impact changes in the future mix.

2. Complex Ageing Populations

At the same time, given the population shifts underway, the challenge of effectively supporting the needs of an increasingly elderly population with more comorbidity is introducing greater complexity and cost. As demographics evolve, and populations around the world all age - although at dissimilar rates in different regions - hospitals will need to cater for more holistic treatment of the elderly.

3. More Patient Data

The adoption of rapidly improving electronic health records capturing clinical information, more personal health data as well as the wider availability of proxy data are, together, providing access to more and better patient information. As well as enabling more targeted, personalised diagnosis and care, this will also drive greater transparency on the impact of interaction at home, in the community and within hospitals.

4. Evidence-Informed Practice

Multiple digital innovations and a vast array of start-ups are focused on gaining better insight into health. Together with the increasing ability to use emerging evidence of what achieves good health outcomes, new technologies, and especially artificial intelligence, are driving a change in the way clinical services are organised. Many of these are focused on greater sub-specialisation.

Taken together, this lengthy list of changes that are either underway or on the horizon point a major transition now proceeding in healthcare. As such, each have multiple implications across the varied health systems facilities in place or being proposed for the future. Many of the associated implications on how hospitals will be designed in the years ahead are now becoming correspondingly evident.



Part Two: Emerging Hospital Design Trends

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If the preceding pages have outlined some of the many shifts taking place across healthcare that will influence future system thinking, what are the specific implications for the hospital experience and explicit design considerations? Some consider that we are quickly entering into a world with a new healthcare philosophy and more rapid change. Indeed, many of the experts we have engaged with around the world see that by the end of the decade we may be experiencing a new approach to healthcare - with significant innovation in hospital business models and design. In fact, as physical and virtual trends align with digital delivery and early prevention, several foresee more change in hospitals by 2030 than has occurred in the last 30 years. From the multiple discussions with leaders in the field, we see a number of potential areas for 10-year shifts that will impact future hospital design thinking. We have grouped these into five areas.

Lasting Pandemic Impact

Front of mind for many at the moment, the COVID-19 pandemic is accelerating several emerging trends, halting others and even questioning whether there will be wider reinvention of healthcare in the years ahead. Some consider that the past twelve months have, for example, seen a leap forward of around a decade in what was expected for the adoption of telemedicine and virtual consultation. Having made such advances, few expect to retreat back to the old approaches as the new ones have now been proven and adopted widely. In the wake of COVID-19, the balance between public and private healthcare is also being challenged in many nations. The **post-COVID hospital** may well therefore be seen through a different lens than previous systems. Some, for example, see a long-term shift in funding priorities for public hospitals.

The benefits and risks of building high-rise facilities are also being hotly debated. Requiring a consideration of the balance between access, cost, footprint, colocation and contagion risk, high-rise hospitals may well lose their appeal in some cities that have been impacted most. Moreover, going forward, access to many health facilities will increasingly be driven by a combination of digital identity and verification of zero infection that will all be automatically validated prior to building entry.

At a more macro scale, some consider that there will be greater **distinction between check-in and check-out**. Post-COVID-19 there may also be a separation of hospital admission and discharge as well as theatre entry and exit. Taking lessons from airports, these lead to the redesign of many patient journeys within hospitals as well as key HCP workflows. Lastly, several consider that we may also see more rapid adoption of more **self-cleaning materials**. Aware of the rising risks from contagion, designers may well specify smarter materials that are increasingly self-monitoring and automatically clean when needed.

Hospitals and the Wider Ecosystem

An issue with significant future impact is considered to be the shift to **more connected hospitals**. Next generation facilities will all be part of a connected community health ecosystem. Enabled by the pervasive 5G networks that are being rolled out globally, everything that can have a smart connection will do and, as the IoT transformation develops, many essential elements will be integrated and so interoperable.

At the same time, as urban areas become more intelligent and reconsidered for people rather than cars, it is clear to some that **hospitals will become more integrated within the city ecosystem**.

With ambitions increasingly focused on prevention, hospitals and smaller health care facilities will be better incorporated with other urban activities such as transport, education, leisure and the workplace. In some regions, such as India, successful adoption of **hub and spoke ecosystems** are also provoking others to rethink the structure and interconnection between different hospital assets.

Climate Resilient Facilities

The challenge of climate change is more evident globally. All organisations will seek to be better prepared for future impacts, as well as to reduce their own contribution of global warming. As a pivotal part of wider sustainability ambitions, with more leading cities all aiming to be **net zero by 2050**, hospitals will increasingly be designed to achieve a radical reduction in carbon and water footprints as well as lower overall energy use. However, this may not be enough. As the world seeks to adapt to climate change as well as mitigate its impact, **more resilient hospitals** will be called for. Resilience to storms, frequent flooding, extreme temperatures and wildfires is a priority in a growing range of locations. As such, the core design of critical infrastructure including hospital locations is now being rethought.

Flexible Systems

Also, of growing significance in terms of opportunities for innovation, is the concept of more **adaptable and flexible estates**. To accommodate possible changing future demands, many consider that more flexible approaches to hospital facility layout, structure and use will be essential. Within buildings, several propose that greater flexibility will be apparent with more **distinct but flexible zoning**: Increased separation of patient admission, treatment and automated ancillary activities will define more discrete zones which can be flexed as need. In addition, some suggest that there will also be more **flexible supervision** designed into the system: Networks of connected nursing stations with real-time monitoring allow flexible, overnight stay supervision to become the norm.

The Patient at the Centre

Much of these changes are, it is believed, likely to be accelerated by the desire for more **patient-centric hospitals**. Including patients and other key stakeholders in the design of new hospitals and the wider ecosystem will therefore be a priority in creating a more human-oriented environment. Suggested changes here include **new room thresholds** where there is a focus on separating patient, family and nursing access so that healthcare professionals can support patients without personal compromise. In addition, some see a move to having **patient pods not wards** where the implementation of more flexible spaces enables patient assessment, diagnosis and even treatment to become more personalised, relaxed and convenient. Lastly, considering the management of the exit of patients from hospitals several are calling for ideas for more **accelerated recovery**. One option here to reduce expensive time beyond the ICU, is for patient recovery to be migrated outside the core facility as a more rapid step-down. Potentially this may be back into community hospitals or, as was suggested in one discussion in Boston, into local hotels where rooms are cheaper and, with minor modification, can be supported by remote supervision and diagnosis.

Digital Technology

Finally, while all of these physical design changes are likely to be increasingly mainstream, it is clear that a pivotal enabling issue for many will be the use of new technology and especially digital tech. Many experts advocate a **digital-first approach** to future hospital design where, in order to integrate technology across the full hospital lifecycle, preparation for emerging digital technologies is included up-front in the initial planning of hospital design. For a good number, a key focus is the arrival of new **digital operating theatres** where an increase in technology-enabled surgery adds to theatre complexity but also drives a growing dependency of input and supervision from a larger

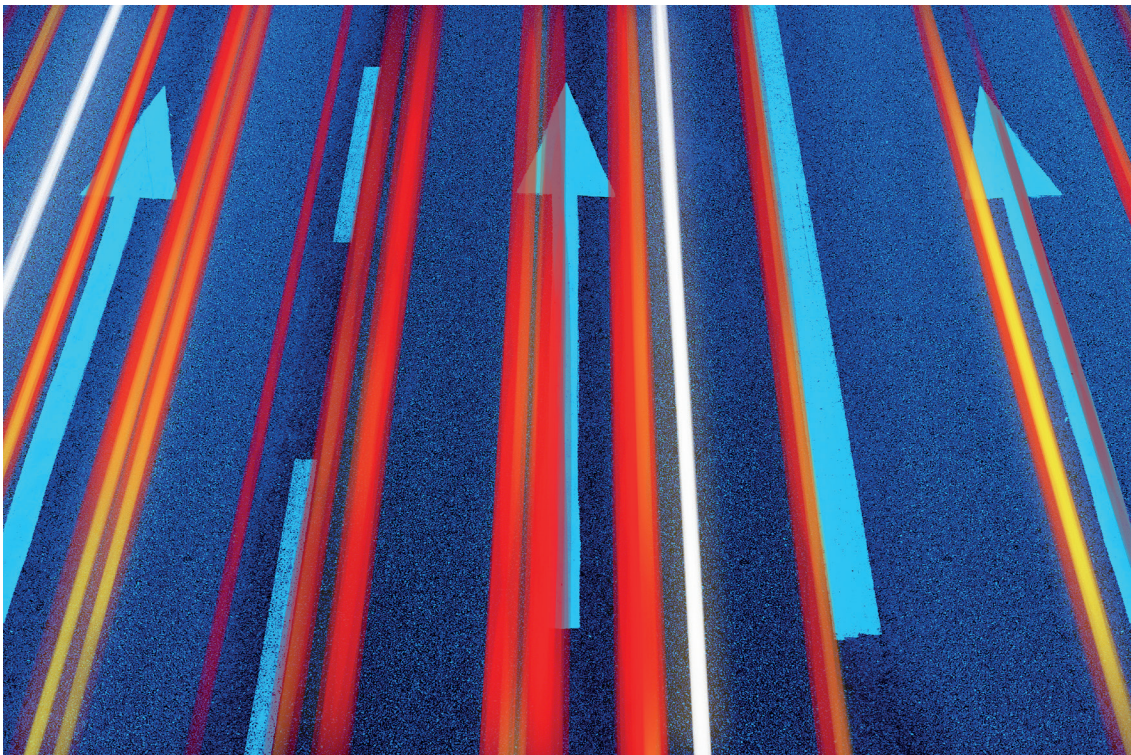
extended team – either physically or virtually. Within this context, the use of robots for high precision, repetitive surgery will improve efficiency but also impacts cleaning standards, remote supervision as well as the required levels of human support. And potentially of greatest impact by 2030, as **self-learning artificial intelligence** systems develop, the ability to deal with unstructured data will deliver major improvements in diagnosis: AI will be embedded into many clinical decisions and so interconnectivity of patient, HCP and hospital data will be essential.



Looking Ahead

As many around the world seek to address these and other issues and so design better, more effective, more efficient and more patient-centric hospitals, we will be tracking which of the trends have greatest impact. As well as peer to peer, expert dialogue we also welcome wider input. So, as we build a more detailed, informed global view on the future trends for hospital design, we value your perspective on three key questions.

- **Impact** - Which of these trends will have greatest impact on hospital design by 2030?
- **Innovation** - Which areas will see the most innovation and change and why?
- **Gaps** - What else will drive significant change in future hospital design?



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This is one of 50 global foresights from Future Agenda's World in 2030 Open Foresight programme, an initiative which gains and shares views on some of the major issues facing society over the next decade. It is based on multiple expert discussions across all continents and covers a wide range of topics. We do not presume to cover every change that will take place over the next decade however we hope to have identified the key areas of significance. Each foresight provides a comprehensive 10-year view drawn from in-depth expert discussions. All foresights are on <https://www.futureagenda.org/the-world-in-2030/>

About Future Agenda

Future Agenda is an open source think tank and advisory firm. It runs the world's leading Open Foresight programme, helping organisations to identify emerging opportunities, and make more informed decisions. Future Agenda also supports leading organisations on strategy, growth and innovation.

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About Mott MacDonald

We're a global engineering, management and development consultancy focused on improving society by considering social outcomes in all we do. Our purpose is to improve society by considering social outcomes in everything we do, relentlessly focusing on excellence and digital innovation, transforming our clients' businesses, our communities and employee opportunities.

With our clients and partners, we are committed to making a positive difference. How big a difference is up to all of us. That is why we want to talk about the future we can create, together.

Over the coming months we will be regularly sharing new visions and describing the steps we see as being necessary to realise them. By doing so, we aim to fuel imagination, start discussion and kindle ambition. We hope to forge alliances to explore and solve problems, share best practices, innovate, and above all, take practical action.

We want to know if you share our vision – and what is yours?

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