AI Adoption in Asia's Hospitals: Challenges and Opportunities

Introduction

The digital era of healthcare is well and truly upon us. While technologies such as Electronic Medical Records and Hospital Information Systems were already steadily increasing in popularity over the past years, the pandemic proved to be a huge catalyst for digital healthcare. Telemedicine providers around the world witnessed staggering growth over the past two years, alongside wide patient and clinician acceptance for virtual consultations amongst clinicians and patients.

> The question then is: What's next in healthcare's digital transformation?

For advanced healthcare systems, the answer often lies in **Artificial Intelligence (AI)** and **robotics**. These technologies have been shown to improve quality of care – from increasing productivity, reducing the risk of clinical errors, to enabling predictive and personalised care.

At HMA's first Connect Series - a series of conferences designed to bring healthcare executives together to discuss the top trends and issues in healthcare today - we chose to focus on AI & robotics adoption in healthcare, particularly in the Asian context.

As pointed out in a paper by National University of Singapore, Asia's healthcare faces a set of tough challenges, in terms of rapidly ageing populations and the growing prevalence of chronic diseases, alongside a global manpower crunch and rising costs. AI and robotics offer much potential in relieving pressure on healthcare systems in Asia, and also in terms of developing new innovative care solutions.

At our one-day conference on 23 March, we brought together top healthcare leaders from across the region to find out where Asian hospitals are at in terms of AI & robotics, and their thoughts on the barriers stopping hospitals from moving forward with wider adoption. We also conducted a survey with conference attendees on their attitudes towards such technologies.

Their insights and opinions are summarised in this insight paper. We hope these would be useful for you as you plan your hospital's digital roadmap.

Survey on attitudes towards AI and Robotics

Over the past few years, there have been some encouraging examples of AI applications in Asia's hospitals.

In particular, Singapore stood out for its initiatives to build a conducive environment for AI innovation and adoption, based on an analysis of AI in Asia-Pacific by the International Institute of Communications. Among several other programmes, the authors highlighted the "Grand Challenge" initiative by AI Singapore, a five-year, USD109 million investment fund for developing AI solutions in several industries including healthcare. The National University Health System, one of the three national health clusters in Singapore, is collaborating with the government-backed National Supercomputing Centre Singapore to build a supercomputing infrastructure to support artificial intelligence programmes in public healthcare institutions by mid-2022.
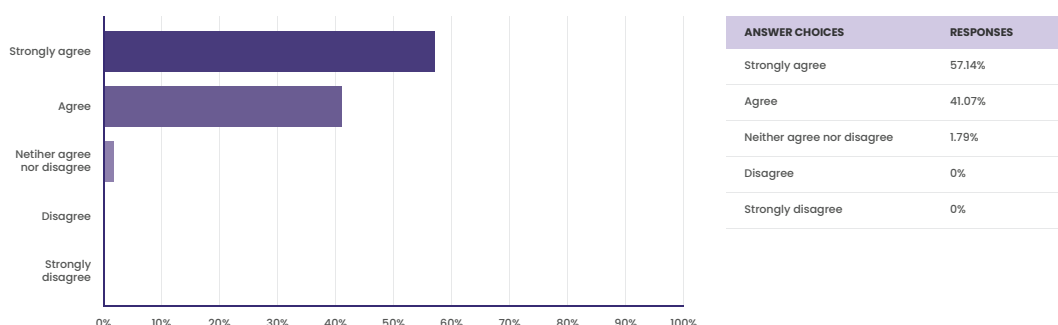
However, our poll results painted a different story of AI adoption in the overall region. Only 12% of the poll respondents - mainly healthcare executives in Asia - were using some sort of AI in their department.

This stands in contrast with booming investments in this field by healthcare institutes worldwide. PwC estimates a 40% growth in AI investments in healthcare from 2014 to 2021, with Frost and Sullivan placing the investment figure at some US$6.7 billion (compared to US$634 million in 2014).

Robotic surgery, another fast-growing trend in medicine, is expected to register a CAGR of 12.7% over the five years, but with market share dominated by North America (63.4%) and Europe (19.8%).

The relatively slower rate of adoption in Asia is not because of a lack of openness towards such technologies, though. Almost all respondents (98%) agree that AI holds the potential to transform healthcare for the better. In addition, 90% indicate that they would be open to working with AI in their work.

AI technology has the potential to transform healthcare delivery for the better

ANSWER CHOICES	RESPONSES
Strongly agree	57.14%
Agree	41.07%
Neither agree nor disagree	1.79%
Disagree	0%
Strongly disagree	0%

I am open to working with AI technology in my department

4.3
average rating

Very not open	1	·	1.79%
Not open	1	·	1.79%
Neither	3	·	5.36%
Open	24	·	42.86%
Very open	27	·	48.21%

So, what is the reason for this gap between willingness to adopt, and eventual decision to adopt? As it turns out, there are various factors or challenges to adoption identified by our survey respondents:
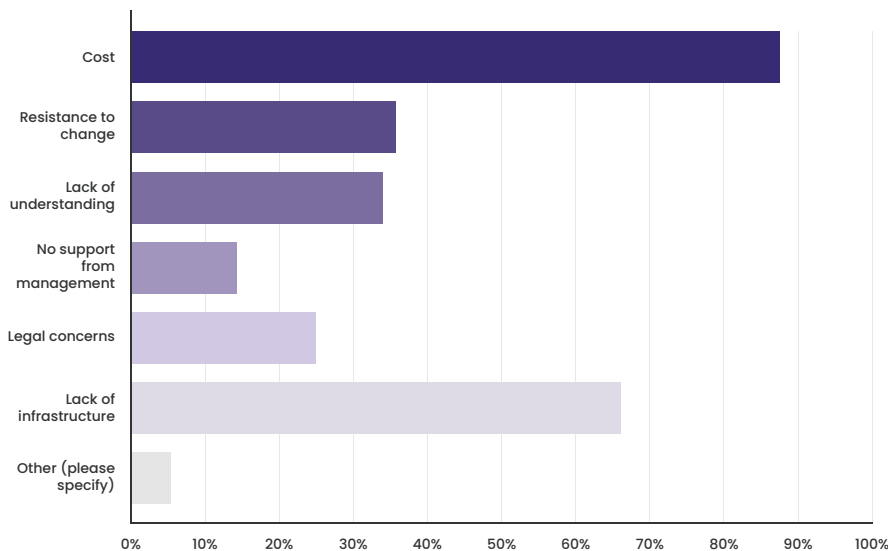
ANSWER CHOICES	RESPONSES
Cost	87.50%
Resistance to change	35.71%
Lack of understanding	33.93%
No support from management	14.29%
Legal concerns	25.00%
Lack of infrastructure	66.07%
Other (please specify)	5.36%

Perceived cost of these technologies came in as one of the key barriers for 87% of respondents. Coming in second at 66% was a lack of infrastructure – whether in hardware or IT systems to support such technologies, or in trained personnel to maintain and manage them.

Also mentioned was the issue of staff or management resistance to change. This is also closely related with the subsequent factor in lack of understanding or awareness.

In the second part of our report, we will delve into each of these challenges in more detail, together with insights from our speakers and proposed ways to overcome these issues.

Key perceived challenges to introducing AI

While there are several major barriers to entry when it comes to implementing AI technology in hospitals, these issues are not insurmountable.

But first, let us take a closer look at the common reasons cited by hospitals for their reticence incorporating AI technology

High cost

As shown in the survey results above, the perceived prohibitive costs of AI and robotics were cited as the most common reason for hospitals to avoid adopting the technologies.

This issue is particularly acute when it comes to robotic surgery – there are currently fewer than 40 robotic surgical systems in the whole of Southeast Asia, of which, more than half are accounted for by Thailand and Singapore.

In the panel discussion on 'What's holding back hospitals from adopting AI and Robotics?', Dr Chua Hwa Sen, Orthopaedic Surgeon at Sunway Medical Centre – the only hospital in Malaysia to boast the latest da Vinci Xi surgical system – explained that the hesitancy to invest in robotic surgical systems is largely down to the difficulty in securing the funding for it.

> **Sometimes, for new technology that comes in, hospitals in countries with a higher GDP can find it easier to spend on improvement and development. - Dr Chua**

"They don't need to put money into taking care of the essentials of healthcare, because that is already taken care of.

"But, for hospitals in developing countries, a certain amount of money still needs to be used for the essentials, which does not leave much excess money for the investment in new technology (like robotics surgery and AI)."

This issue, however, is likely to be circumvented with the expected future reduction in costs for AI and robotics technology, as a result of an increase in the number of vendors and suppliers.

Dr Zhu Gang, Associate Chief Medical Officer, United Family Healthcare China, cited how some companies in China have developed various robotic surgical systems, one of which has already been approved by China's National Medical Products Administration (NMPA).

The country recently released a five-year plan for the development of the robotics industry, with healthcare applications forming a key part of that proposal.

The development of medical robots is also happening in Asian countries like Japan and South Korea, with more technology companies recognising the high demand for such products.

Indeed, one such company, South Korean Medical Robot developer, Curexo, was invited to showcase and share the capabilities of their medical robots at HMA's AI & Robotics virtual conference.

Dr Zhu elaborated: "In China, we have developed several versions of robots…one of them has been approved by China's NMPA. This will provide more opportunities for healthcare providers in China, as well as other low GDP countries to invest in robotic surgeries, as the costs to purchase such technologies will go down with an increase in supply.

"Currently, there are over 200 surgical robotics being used in China, but it is not enough. In the United States, there are over 1,000 surgical robots, so there's still a big gap there. But many other countries are starting to develop robotics surgery, so hopefully, there will be more options for robotics surgery in the market soon."

Dr Chua added that healthcare providers should not just focus on the cost of investment, but also look at the multitude of benefits it brings, not least being able to improve patient outcomes.

"The last thing you want is for the healthcare providers to think about the economic side of things," said Dr Chua. "More importantly, hospitals must see whether the technology improves the patient outcome."

Dr Timothy Low, CEO of Farrer Park Hospital, who was a panellist for the discussion on 'AI in Medical devices: Can it be trusted?', said: "There's definitely costs that go into incorporating AI in the system and diagnostics, in treatment modalities.

"But if AI and robotics can give you a more precise clinical outcome for the patients, how do you measure that? A better quality of life for the patient, minimising the number of repeat visits needed, reduced medication, these are all costed on a value-based system.

"What is the cost that goes in in terms of AI, and what is the clinical outcome - you have to do an economic analysis to show there is a cost benefit.

"Even in the treatment of cancer, AI has this predictive value to see which cancer patient will respond to which cancer drug. With that, you do not waste medication and time, which is something that cancer patients do not have much of. So if you can cut down on trying different treatments and drugs, to have a predictive value, this saves money, and more importantly, can save lives."

Lack of infrastructure

While there has been an acceleration in the digitisation of healthcare in recent years, with innovations such as the Internet of Medical Things (IoMT), telehealth and AI-driven diagnostic tools coming to the fore, there is still some concern about the quality of IT infrastructure supporting these innovations.

Given the massive amount of data that hospitals produce each year, which AI technologies then help to make sense of, a certain level of digital infrastructure is required.

At Thailand's Siriraj Hospital, for example, the use of 5G technology has enabled them to incorporate various AI and robotics innovations into their hospital operations and processes.

Likewise, in Singapore, the National University Health System (NUHS) recently entered into an agreement with the National Supercomputing Centre Singapore to build a supercomputing infrastructure, which will be used to support AI programmes in public healthcare institutions by the middle of this year.

NUHS has also partnered with Singapore telecommunications company Singtel to deploy a 5G indoor network in the operating theatres and wards of National University Hospital (NUH).

Keynote speaker Dr Ngiam Kee Yuan, chief technology officer at NUHS, said: "With the maturation of 5G technology and faster connectivity to the cloud, we are now able to deploy more advanced software onto limited robot hardware. This allows us to move to the fourth generation of healthcare technology, like cloud robotics, which are also termed as collaborative service robots.

"These robots are deployed in the wards and in operating theatres, not to operate on patients, but to support our healthcare staff in mundane stuff like monitoring and delivering of equipment. That is the future we are moving towards."

With AI technology highly-dependent on the data being fed into it, ensuring the quality and quantity of the information collected is of paramount importance.

This, as Dr Sichon Luerithiphong, Assistant Director of Siriraj Hospital explained, can make it difficult for hospitals that are used to traditional methods of data collation to transition to AI technology.

"AI technology is based on existing infrastructure and data management – how do you collate, process the data, to make it useful for the application," said Dr Luerithiphong. "The barrier is that some hospitals use traditional handwriting for records. The document can be scanned and stored in the cloud, but it is still in a photo-like file, so it's unsearchable."

This is why hospitals that intend to incorporate AI technology and robotics must be willing to put in the hard yards, and be fully committed to the project, as Dr Chua said: "For us, as healthcare providers, to embrace onto this particular technology or improvement, it's important that everyone involved must be properly trained, passionate, and believe in it."

Resistance to change

The healthcare industry has traditionally been slow to accept new technologies, although the COVID-19 pandemic helped to greatly accelerate digitalisation among hospitals in the Southeast Asian region.

The successful adoption of technologies such as Electronic Medical Records (EMRs) and telehealth, however, has proven to healthcare providers the benefits that

digital innovation can bring – this is evidenced by the survey results above, which showed that the majority of the respondents believed that AI technology can transform healthcare for the better.

Nonetheless, there is still a reticence among certain sections of the healthcare industry to fully embrace AI and robotics technology.

Healthcare providers are a product of the past. When we were in medical school, our professors told us to believe in ourselves, in our skill, in what we see and hear, in our physical examination, and not to rely on machines or equipment.
– Dr Luerithiphong

"But back then, we didn't have the kind of advanced technologies that we have today. However, that mindset is ingrained in many of us, because it's something we've been taught and practising for years. But things are changing. We are moving from high-touch, low-tech, to high-touch, high-tech.

"So, how can we have healthcare providers trust in new technology? It will need time. There are generally two groups of healthcare providers – ready believers of innovation, the other group will require for us to support them and convince them to trust in technology like robotics and AI."

Getting the clinician's buy-in into AI and robotics is also the first step in helping patients feel more comfortable with these new technologies.

Speaking at the panel discussion on 'Will patients ever accept AI in hospitals?', Dr Chatchai Yachantha, Chief Patient Experience Officer at Bumrungrad International Hospital said: "When we first introduced AI to our hospital, it was actually quite challenging for us to convince our staff that AI is our friend and is working with us, not against us.

"After you gain the trust from the staff, they will start to share the trust with the patients, who will then be more open with accepting AI technology."

Dr Kenneth Tsang, CEO of Gleneagles Hospital Hong Kong, who spoke at the panel discussion on 'How AI can transform clinical decision processes', added: "Training, adoption of AI by clinicians, and also the integration of the system to the current workflow are all interrelated. We cannot do one part of it without solving the other two issues.

"When we were trying to adopt AI in our hospital in Hong Kong, we realised that training will be very different to normal training. These days, if you want people to be engaged and use the system, it has to be integrated into the daily work of the staff."

Lack of understanding

Given that AI and robotics really only recently came to the fore, there is naturally still a lack of understanding – on the part of both clinicians and patients alike – about the technology, and how it works.

Dr Tsang said: "When it's some sort of algorithm, there is this worry about where this algorithm is formed, how it's designed, and whether it's really aligned with what we have in mind when we treat patients."

However, Martijn Hartjes, Head, Global Portfolio, Precision Diagnosis at Philips, highlighted that most healthcare regulatory bodies around the world require AI algorithms to be transparent.

"The transparency of AI algorithms is key. It's not just a Philips principle, but also something that regulatory bodies around the world demand," said Hartjes. "That means you need to provide test data that has gone through the algorithm. You cannot allow the algorithm to be self-learning, because that means it will change over time.

"The algorithm that we have implemented today is set, and doesn't change based on new data. It is trained on a fixed data set, and is rigorously tested with multiple inputs and has been validated by us and the regulatory bodies."

Dr Low expanded further on his hospital's workflow when it comes to incorporating new medical devices with AI technology.

He said: "Firstly, we have to have the Health Science Authority's (HAS) approval. If that is approved, with whatever information the vendor provides to HSA, we are able to then evaluate the AI device.

"Internally, within the hospital, we have our legal, IT department, the clinicians, and medical quality committee looking at the devices itself. Basically, we cover the patient's security, from the IT point of view, and we cover the patient's safety, from the clinician's point of view."

Dr Aung Myint Oo, Deputy Chief Medical Information Officer at Tan Tock Seng Hospital, added in the same discussion: "For the regulatory processes, we have to look at the entire spectrum, all the way from the development stage. You start with the needs – how this solution was brought about, from the research stage, what are the clinical needs, what is the data, whether all the ethical considerations have been sought.

"This is followed by the development stage, based on the research, and what comes after that is the regulatory process. The entire spectrum needs to be looked at carefully, what is the data governance framework, what is the ethical framework and so on.

> **This leads you to the outcome solutions, and from that solution, the question is how much value is added to the end user, be it for clinicians or patients.**

AI & Robotics is the future

While AI & Robotics is still in its infancy stage in healthcare, there is little doubt that it will form the bedrock of the industry in time to come.

The multitude of benefits it provides – from improving clinical outcomes, to reducing the workload on clinicians, to even enhancing the patient experience – make AI and robotic technologies an invaluable asset for any modern hospital.

There are, however, still some kinks for the healthcare industry as whole to work through when it comes to AI and robotics, but these obstacles, as highlighted above, are not insurmountable.

As Dr Tsang aptly summarised: "The technology for AI and robotics is ready. The doctors are ready. The hospitals, and healthcare system are ready. It's just a matter of the willingness to commit the necessary resources, and the commitment of management to drive the change.

"We do believe there is no stopping AI and robotics in healthcare – it's just a matter of time. There will come a time when patients expect the efficiency, accuracy and advanced developments of the hospital, rather than the traditional methods. When patients come around with those expectations, and your hospital or health system is not ready for it, you are going to be in trouble."

About Hospital Management Asia (HMA)

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