

CONNECTING HEALTHCARE

TOWARDS THE NEXT 50

ANNIVERSARY REPORT - JANUARY 2022



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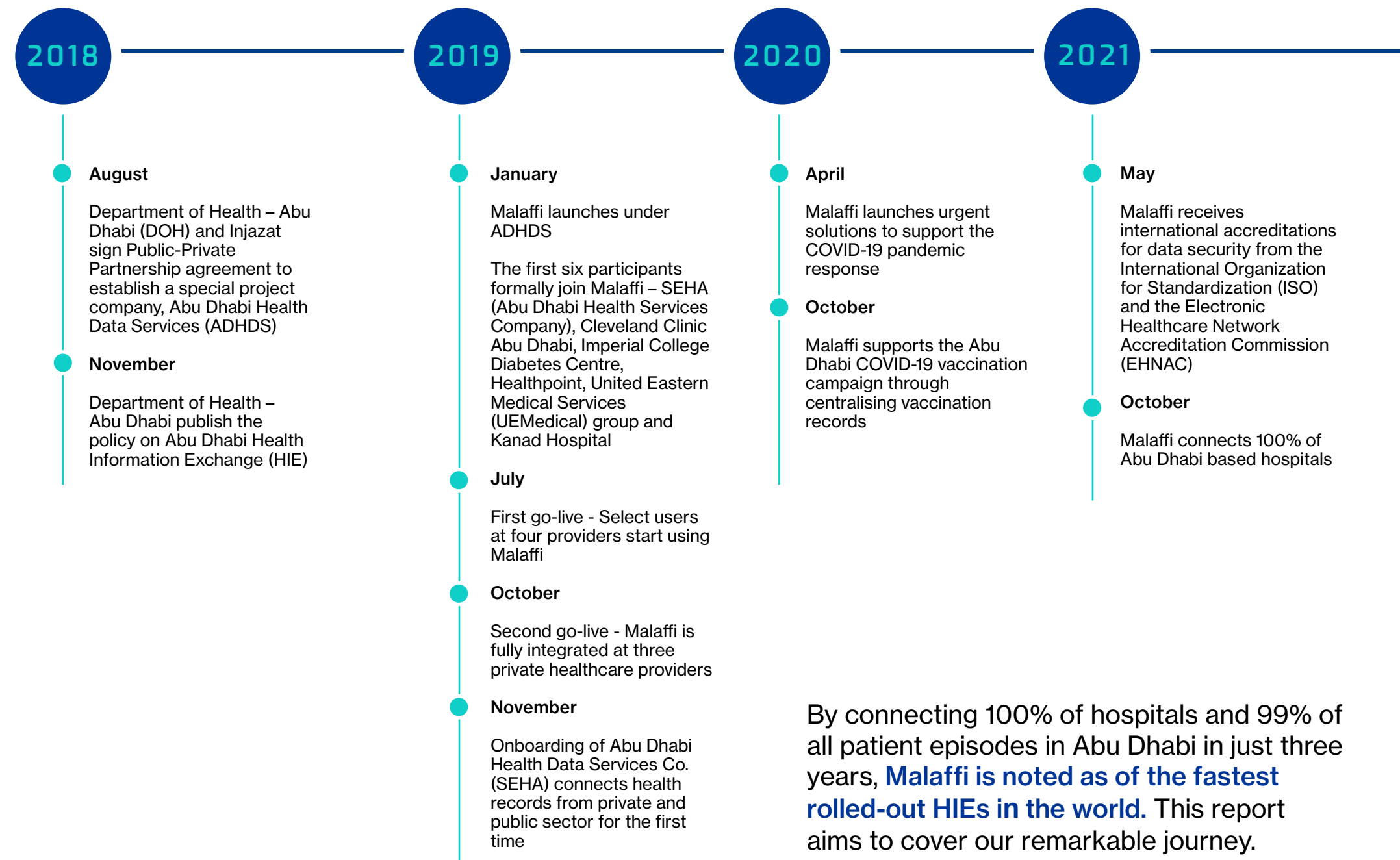
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Malaffi is the region's first Health Information Exchange (HIE) platform, that safely and securely connects public and private healthcare providers in the Emirate of Abu Dhabi, in the United Arab Emirates. Malaffi enables the meaningful, real-time exchange of important patient health information between healthcare providers, creating a centralised database of unified patient records to ultimately improve healthcare quality and patient outcomes.

Malaffi (Arabic for 'my file'), is operated by Abu Dhabi Health Data Services - Sole Proprietorship LLC (ADHDS), established as Public Private Partnership (PPP) between the Department of Health - Abu Dhabi (DOH) and Injazat, a regional leader in digital transformation, cloud, and cyber security. As part of the DOH's strategic priorities, Malaffi is a key component of the digital transformation of the healthcare system in Abu Dhabi.

The journey so far





DOH Chairman's message

His Excellency Abdulla bin Mohamed Al Hamed
Chairman of the Department of Health - Abu Dhabi

It is my pleasure to salute a significant milestone on our digital transformation journey, achieved under the guidance of our wise leadership. Three years ago, Abu Dhabi proudly announced the launch of "Malaffi" as a strategic initiative of the Department of Health and the first Health Information Exchange (HIE) in the Middle East and North Africa. The platform's goal was to enhance the efficiency and quality of care and patient outcomes in the emirate. Indeed, in a short time, Malaffi became a significant asset to the sector that improves healthcare delivery while warranting the health and safety of all members of society.

Malaffi provides a central platform that serves as a bridge of information between the different parts of the emirate's healthcare sector, directly improving its efficiency while aiding the development of relevant health policies and solutions. Since its launch, Malaffi has been an integral component of the healthcare system, enabling doctors, nurses, and other clinicians to access key medical information safely, efficiently, and effectively, eliminating duplication, time-consuming processes, and manual data-sharing.

By connecting 100% of all government and private hospitals, and 99% of all patient episodes in Abu Dhabi in just three years, Malaffi has been noted as the fastest HIE rollouts in the world. Currently, Malaffi connects 1,193 clinics and medical centres and 722 pharmacies. Over 45,000 doctors, nurses and staff members from the 1,975 healthcare facilities across Abu Dhabi have secure access to 703 million unique patient records and are enabled to make better-informed and more efficient decisions.

Malaffi has directly contributed to Abu Dhabi's globally recognised successful COVID-19 pandemic response by digitally linking medical records and providing a reliable database of COVID-19 test results. The seamless platform supported the frontlines by streamlining the management of patient data and vaccination records, in addition to providing various insights for decision making on how to manage the response of this pandemic.

The success of Malaffi is a direct reflection of the outstanding talent of the Abu Dhabi medical practitioners and the advanced infrastructure that supports innovation and the implementation of modern technology. The early

integration of Artificial Intelligence (AI) and the Internet of Things (IoT) in the local healthcare system enforce Abu Dhabi's position as an incubator for innovations in the life sciences industry.

Today, Malaffi has been recognised as a unique addition to the world of healthcare – the hard work and dedication instilled by Malaffi's team, paralleled with the visionary outlook and strategic planning, elevated the healthcare sector.

God bless and keep you all safe.

Abdulla bin Mohamed Al Hamed
Chairman of the Department of Health - Abu Dhabi



Malaffi CEO's message

Atif Al Braiki
Chief Executive Officer of
Abu Dhabi Health Data Services (Malaffi)

I'm incredibly proud of how far, and how fast, we have come on our journey at Malaffi. In just three years since the launch on January 23rd, 2019, we have built, from the ground up, what is now the region's foremost Health Information Exchange (HIE) platform.

From the outset, our mission has been to enable the access and exchange of important patient health information securely and in real-time to improve the quality and efficiency of healthcare. The ability to make this data available to healthcare professionals at the point of care has been transformative both for patient outcomes and experience.

In only three years, we have established and operationalised the first HIE in the Middle East and North Africa, setting a regional blueprint in how improved use of health data can improve the quality of healthcare. Within the emirate of Abu Dhabi, Malaffi has changed the way healthcare is delivered by improving coordination of care, increasing efficiencies and patient safety.

Our approach was nothing if not ambitious, with a mandate to connect more than 2,000 public and private healthcare facilities in under three years. Malaffi is a complex platform and a complex project which required us to work very closely with the Abu Dhabi

healthcare community. There were certainly moments where we needed to navigate challenges related to IT systems maturity, interoperability and data quality. But we had a clear plan and our iterative process—setting limited requirements for providers to connect and increasing them over time—enabled us to connect the facilities very quickly. The first go-live, six months after the platform launch, was a clear sign that we are on the right track. Feedback from clinicians started coming in, recognising how Malaffi was helping them to improve patient care. This not only fuelled our enthusiasm but offered welcome encouragement for the providers, who often needed to go above and beyond to deliver against our technical requirements. Each go-live was a little team celebration of our joint ground-breaking efforts. Our successes in these regards are owed deeply to the support of the DOH and the trust placed in Malaffi by the healthcare provider community.

Yet, despite our progress, one of our biggest challenges remained: how to ensure that people understand the value of this novel system to the healthcare system and to society? I believe the emergence of COVID-19 in 2020 was the moment in which the benefits of Malaffi became truly apparent to stakeholders outside our immediate environment.

Malaffi's established central database of patient information—which we quickly updated to include all COVID-19 test results, and later vaccine records—meant that we were able to provide the regulator with a comprehensive view of how the pandemic was affecting the Emirate. This accurate, detailed and real-time information from Malaffi, was instrumental in Abu Dhabi's successful data-led response strategy, and rapidly made the concept of an HIE much more tangible.

The pandemic triggered a paradigm shift in healthcare, with broader global recognition of the benefits connected healthcare brings, from healthcare delivery to public health management. As of January 2022, Malaffi has collated over 700 million unique clinical records of medical information, from patient visits and lab results to radiology reports, vital signs, medications and more. Over 45,700 doctors, nurses, pharmacists and other members of staff from the 1,975 healthcare facilities across Abu Dhabi have secure access to Malaffi and are empowered to make better-informed, safer, and more efficient decisions.

As testament to our achievement, Malaffi has been the recipient of several awards, including accreditation by the Electronic Healthcare Network Accreditation Commission (EHNAC) for the

Health Information Exchange Accreditation Program (HIEAP). As the first HIE outside of the US to receive this accolade, recognising excellence in data privacy and security best practices, we are extremely proud on behalf of the healthcare community in Abu Dhabi.

Looking to the years ahead, we enter a new phase for Malaffi, with a roadmap guided by the strategic priorities of the Department of Health – Abu Dhabi. While we are working to provide patients in Abu Dhabi with access to their medical records in Malaffi, we continue to meet the expectations of our providers to improve the platform to benefit the individual patient. We have also started to explore how the collated robust population health data can play a greater role in improving our capabilities to make data-driven decisions in areas such as disease risk management, preparedness, prevention and healthcare quality. Malaffi now serves as a blueprint for countries across the MENA region with similar health challenges and infrastructure, and I take great pride that through our active engagement with the HIE community, our learnings and successes will help inform digital health strategies elsewhere.

The openness to embracing and executing new ideas – from the Department of Health and the healthcare providers in Abu

Dhabi – has been instrumental in taking Malaffi from a strategic plan to a fully established HIE in just three years. Our success is a success of each and every partner we have worked with, whose unwavering support has enabled Malaffi to become a central component of the digital transformation of the healthcare system in Abu Dhabi.

I am grateful to everyone who has been a part of Malaffi's story so far, and I am excited for the next stage in our journey together.



Atif Al Braiki
Chief Executive Officer
Abu Dhabi Health Data Services (Malaffi)

The openness to embracing and executing new ideas has been instrumental in taking Malaffi from a strategic plan to a fully established HIE in just three years



The driving forces behind Malaffi



Dr Rahul Goyal
Senior Vice President
Clinical Engagement and Adoption

The health system in the UAE is young but deeply aspirational, with an ambition of offering world-class care to citizens, residents and tourists. Over the last 15 years, great strides have been made in this regard.

In 2006, the Abu Dhabi Government introduced mandatory health insurance, a turning point that was designed to improve health outcomes across the Emirate and ensured a minimum level of coverage for residents. This led to the expansion of private healthcare facilities within the Emirate, each using their own electronic medical record systems. The different systems didn't connect with each other so patient records were siloed within each provider they visited. This meant that if patients visited multiple healthcare professionals at different locations, tests had to be repeated and healthcare decisions were being made based on incomplete information.

At the same time, the costs of healthcare continued to rise globally, and within the GCC the UAE has become the most expensive. Indeed, according to a 2018 report from Alpen Capital the average cost of a short visit to a doctor in the UAE is 80% higher than in Singapore and 2.4 times of that in Saudi Arabia. Data from 2017 found there were an average of 9.5 insurance claims per member and 21 for Thiqa members in Abu Dhabi¹, compared to average of 10 claims in the USA².

It quickly became apparent to the DOH that without a unified database of patient records accessible to clinicians, the coordination of care would remain inefficient, the standard and quality of care would be inconsistent, tests would be duplicated, and costs would continue to rise. A platform known as a health information exchange (HIE), that would enable the sharing of healthcare information between different healthcare providers was needed. With a holistic view of patients' health history, medical teams could deliver a higher quality of care and improve patient outcomes.

¹Department of Health Abu Dhabi 2017
²2017 CAQH INDEX

The different systems didn't connect with each other so patient records were siloed within each provider they visited. This meant that if patients visited multiple healthcare professionals at different locations, tests had to be repeated and healthcare decisions were being made based on incomplete information.



Establishing the region's first HIE



Robert Denson
Senior Vice President
Operations and Technology

Malaffi, the first HIE in the Middle East and North Africa region, was launched in January 2019, under Abu Dhabi Health Data Services (ADHDS), a Public-Private Partnership between the DOH and Injazat, a regional leader in digital transformation, cloud, and cyber security. It was part of the strategic initiatives of the DOH and a key component of the digital transformation of healthcare in Abu Dhabi.

To address challenges around efficiency, quality, safety and cost, Malaffi was designed to be a centralised database of unified patient records to enable the real-time exchange of important patient health information between healthcare providers. The original scope included demographics, encounters, problems and diagnosis, allergies, laboratory results and radiology reports, medications and procedures. Priority was placed on sharing data responsibly under meticulously designed safety and security

measures complying with all Abu Dhabi and federal privacy laws, to improve patient outcomes while respecting their privacy.

Following the launch, a phased onboarding schedule was planned based on the digital maturity and size of the providers, with selected clinicians starting to use Malaffi within just six months. To ensure clinical value and early usage of the platform, the largest providers, including the public system (SEHA) were connected first, along with other key private providers groups that made up to 70% of the inpatient admissions in the Emirate. In addition, data from previous years was ingested to provide instant clinical value to early users.

Based on users' feedback, functionality is regularly improved and updated to add new data domains and functionality thereby increasing the information and clinical value to providers. In 2021, clinical documents, immunisation records and vital signs were included. Symptoms, appointments and radiology images, will soon be part of the exchange.

As of January 2022, all Abu Dhabi hospitals and most of the healthcare facilities are connected to Malaffi, which stores over 700 million unique patient records of Abu Dhabi residents, securely maintained and available to those that provide patient care in the Emirate.

"HIMSS joins the global digital health community in applauding Malaffi and the Department of Health in Abu Dhabi for rolling out a benchmark HIE in a record time of three years," said Hal Wolf, President & CEO, HIMSS. "Their efforts demonstrate the power of what we can achieve through digital health transformation. I am confident that, with the same energy and focus, the next phase of unlocking the value of the collected data will have a positive, significant impact on population and public health in the Emirate."



Harold (Hal) Wolf
President and CEO of HIMSS



Wide scope of real-time clinical data

1st
phase
2019-20



Patient
Demographics



Patient
Encounters



Problems &
Diagnosis



Allergies



Laboratory &
Radiology
Results



Medications



Procedures



Clinical
Documents

2nd
phase
2021



Immunisation
Records



Vital
Signs



Radiology
Images*

*Work in progress

Improving healthcare



Dr Sanji De Sylva
Director
Clinical Adoption and Informatics

The Malaffi team works closely with the DOH and other stakeholders to maximise the value of the centralised information for improving the overall health and wellbeing of the people in the Emirate.

In this regard, the Malaffi platform is designed to scale and, via different functionalities and solutions, to provide value to the entire healthcare eco-system, including healthcare providers, patients and the Abu Dhabi Government, through the Department of Health.

The Health Portal enables access to the longitudinal patient medical history to authorised users of healthcare providers (doctors, nurses, pharmacists and others), helping them make more informed decisions and provide better care to their patients.

Through the **Malaffi Insights Portal**, the DOH has access to the population health data and critical insights based on advanced data analytics.

The COVID-19 pandemic brought clear proof of the value of centralised vital medical data. Malaffi was crucial to the success of the Abu Dhabi's globally recognised pandemic response.

As the system evolves and the volume of data available increases, population health insights will help the DOH analyse health trends and identify risks within the population, shaping decision making about public health programmes that will improve prevention, preparedness and better management of chronic diseases.

Soon, citizens and residents in Abu Dhabi will have access to their medical history through a **Health Portal**, aiming to improve patients' engagement in managing their health.

"I was very happy to hear from my doctor that now all healthcare providers in Abu Dhabi have access to the centralised patient records in Malaffi. As a cancer survivor, this means that I don't have to keep bringing my medical records to each of my visits and that I do not have to repeat tests without a reason. I am delighted that soon patients like me will have access to their medical records. I urge all healthcare professionals in Abu Dhabi to use the system so they can provide better and safer care to their patients."



Sofia Khalid Mian
Abu Dhabi



The key differentiators and factors for the success of Malaffi include the simple and intuitive design, seamless access to the HIE via the Electronic Medical Records (EMR) systems of the providers, the breadth of clinical data being made available to the clinicians and Malaffi's analytical capabilities, all of which have been key to providing in-depth credible insights into the health of our community.

Another key factor has been the continuous alignment with the providers' needs through the establishment of key Healthcare Advisory Committees comprised of representatives from the healthcare providers, including clinical informatics, technical and security subject matter experts. This enables the voices of those that use the system to drive the continuous improvement of the platform in a way that will empower them to provide better care. Malaffi works very closely with a dedicated team at the DOH to ensure alignment, guidance, and government oversight.

"Malaffi and the DOH made an important decision to engage clinicians at an early stage of development to ensure the platform is user-centric, which then underpinned the wider clinical adoption. They recognised that the voice of the user was going to be essential. We continue to work together on all critical improvements to ensure we take full advantage of this ground-breaking system in Abu Dhabi which enables us to deliver more efficient and higher quality care to our patients."



Dr Martin Lascano
Staff Physician
Medical Subspecialties Institute
Cleveland Clinic Abu Dhabi
Member of the Malaffi Clinical
Advisory Committee

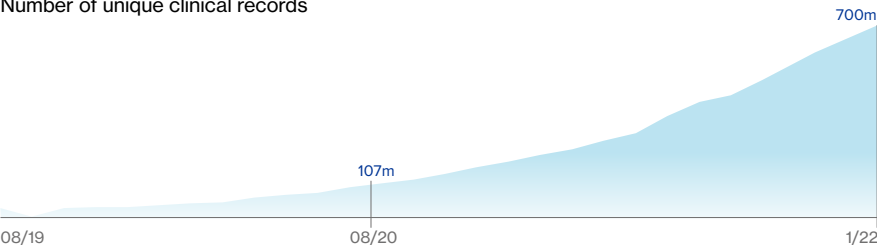


In numbers

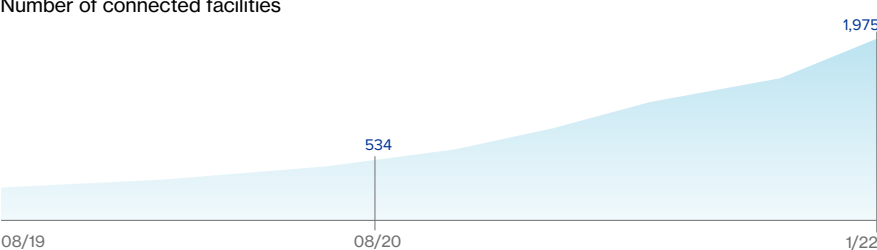
Malaffi has been recognised as one of the fastest rolled-out HIEs globally. In September 2021, Malaffi reached the significant milestone of connecting all hospitals in Abu Dhabi.

Connected providers include all facilities of the largest public healthcare network **SEHA**, and all private providers groups, medical centres, clinics and laboratories. This includes Mubadala Health, Mediclinic, UEMedical Group, VPS, NMC, Capital Health and many others.

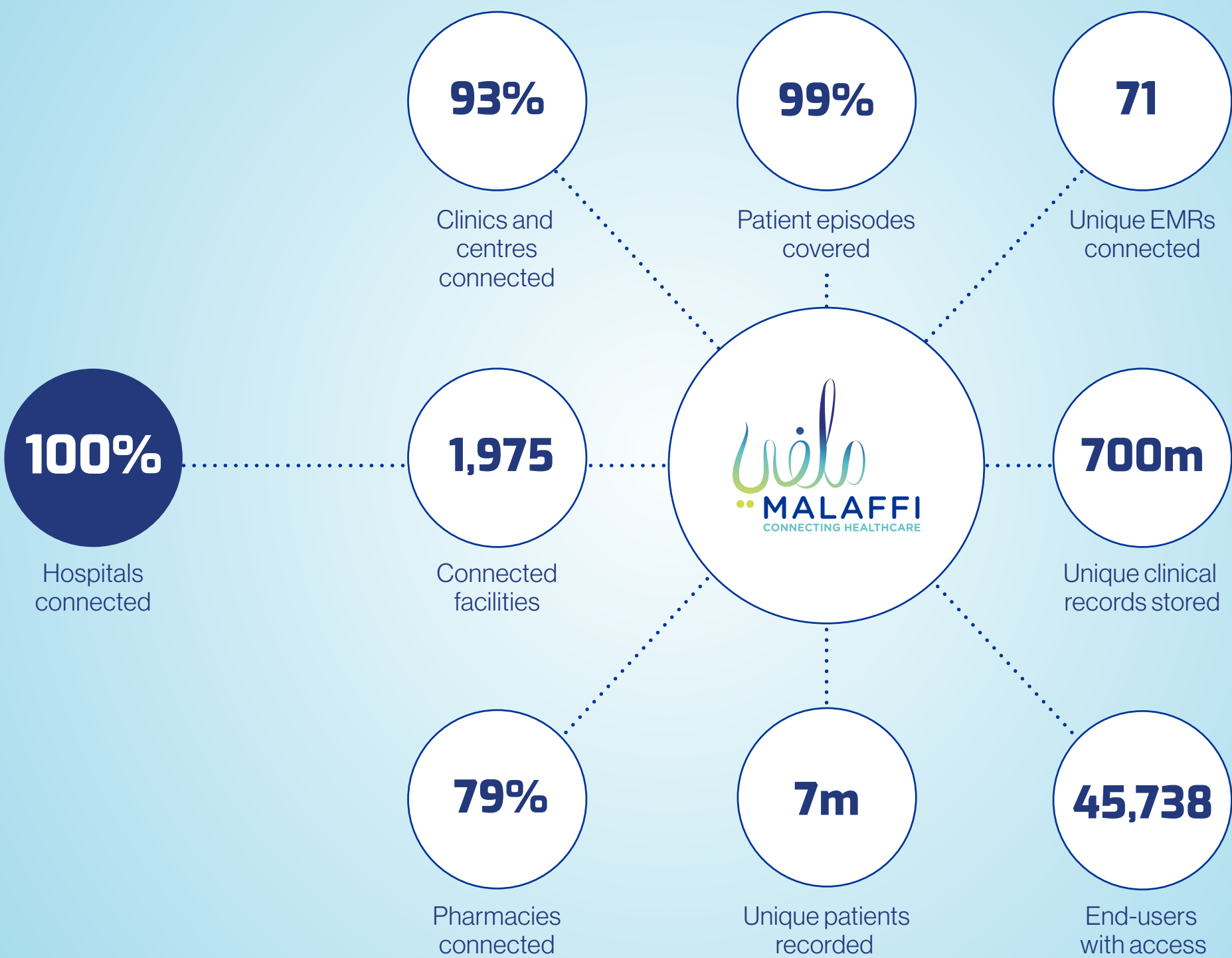
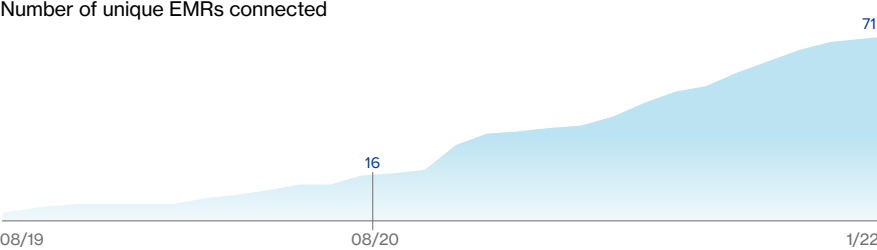
Number of unique clinical records



Number of connected facilities



Number of unique EMRs connected



*All numbers reported as of January 2022

Positive impact on patient care

Malaffi is widely used in clinical practice as measured by unique monthly users, a standard measure for HIE usage. Thanks to the efforts of our dedicated clinical teams to ensure Malaffi is part of the workflow, we see that consistently around 30% of users with access to Malaffi are logging in and using the platform each monthly, which compares favourably to global averages. This includes users with different clinical roles and specialities, which indicates the benefits Malaffi brings to the entire care team.

“Malaffi has been life-saving for our patients. For example, a patient arrived and collapsed in the UCC. When we checked Malaffi, we saw that he has been taking anti-epileptic medication and this was likely an epileptic seizure. Malaffi has helped us treat the patient quickly and efficiently while avoiding any unnecessary CT or MRI scans. This also saved the patient from unnecessary radiation exposure and cost.”

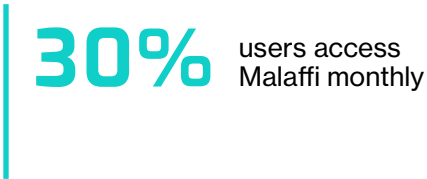


Dr Curtis Emordi
Consultant - Emergency Medicine
Chief Medical Officer
Urgent Care Centre (UCC)
Ruwais Hospital

Malaffi receives regular and overwhelmingly positive feedback from clinicians across the Emirate on how the HIE is improving both efficiency and quality of care. An anonymous satisfaction survey sought detailed feedback from the users community, taken by around 450 respondents in October 2021.

We were pleased to note that nine out of ten respondents agreed or strongly agreed that Malaffi improves patient safety and quality of care. Eight in ten also felt that it improves patient outcomes and coordination of care. Similarly, users agreed that Malaffi has helped reduce medical errors and prevention of drug-to-drug interaction, the making of better-informed clinical decisions, improved patient experience and satisfaction. Users also strongly believe that the system is easy to use and that it improves their job satisfaction.

Based on data from this survey, on average, consulting the Malaffi file halves the time clinicians spend searching for past medical information during consultations and reduces duplication of laboratory test orders by 60%.





A key player in Abu Dhabi's COVID-19 response

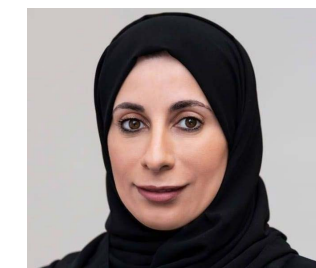
By the time COVID-19 emerged in 2020, Malaffi was already well established to facilitate healthcare data sharing across Abu Dhabi, and it proved critical to the globally recognised pandemic response of the Emirate.

Malaffi instantly connected all facilities that were providing frontline care to COVID-19 patients, creating a centralised database of test results in the Emirate. Providing visibility on positive cases ensured swift action from frontline teams to protect the patients, medical staff, and others. Facilities that were not connected to Malaffi, but were part of Abu Dhabi's COVID-19 response, were provided urgent secure access to the platform to ensure comprehensive data sharing.

Later, Malaffi became a crucial part of the DOH's vaccination programme, by centralising all vaccine data in the Emirate. With the availability of real-time data, our government was better prepared to allocate resources efficiently and implement measures such as mass testing, isolation, and vaccination, keeping us in a fortunate and safe position. In addition, all other vaccine records were collated and made available to the users through an immunisation viewer.

Around 90% of the surveyed users in October 2021 strongly agreed or agreed that Malaffi helped them provide better care to patients during the COVID-19 pandemic.

"Malaffi has been a key to the successful pandemic response of Abu Dhabi that ensured we contained the pandemic whilst protecting the health and safety of our community. By providing a resilient and sustainable infrastructure for the secure exchange of health information, Malaffi ensured the DOH and the Public Health Centre have real-time pandemic insights to support vital decisions."



HE Dr Farida Al Hosani
Executive Director of Infection
Diseases Sector in Abu Dhabi
Public Health Centre
Official Spokesperson for
Health Sector in the UAE

76m

COVID-19 PCR
test results*

10.3m

COVID-19 vaccine
records*

*Number of Malaffi centralised records as of January 2022

Economic benefits

Beyond patient and public health outcomes, one of the critical benefits of HIEs is cost containment. This is achieved by increased operational efficiencies on the level of the healthcare providers, improved clinical outcomes and significant reduction of duplication of costly tests and procedures. In addition, the advanced population health insights will allow for targeted measures to prevent the development of diseases that put a great financial strain on the system. Therefore, by enabling the sharing of clinical information through Malaffi, it is expected that the cost of delivering healthcare will decrease over time.

A study by Ernst and Young in 2021³, estimates that Malaffi's economic uplift is at ~\$3.9bn to 2040, equivalent to an economic uplift of ~\$200mn per year or ~2.0% of current annual health and care spend in the Emirate.

The same study found that patients were the biggest beneficiary group with health improvements worth ~\$85 million every year. Every year, more than 130,000 newly diagnosed people would benefit from improved outcomes and better quality of life.

\$3.9bn

Malaffi's economic uplift by 2040

\$85m

value of health improvements per year

130k

newly diagnosed people to benefit every year



Awards and recognitions

In recognition of its success, during 2021, Malaffi received two awards, two certificates for data security management and a certificate for business continuity management.

Malaffi was also noted by the DOH for being a critical factor in Abu Dhabi's successful COVID-19 response, and the Emirate's place at the top of a list of 25 global cities for handling the pandemic, according to the London-based Deep Knowledge Group. A recent report from the UAE National Committee for Sustainable Development Goals also called out Malaffi as an example of the UAE's successful public-private data sharing partnership which among other things helped address urgent COVID-19 challenges.



The ZIMAM-Elsevier Digital Health Transformation Project of the Year



Middle East Technology Excellence Reward for Information Management



Health Information Exchange Accreditation Programme (HIEAP) by the Electronic Healthcare Network Accreditation (EHNAC)



ISO 27001 Certification and Accreditation for Information Security Management



ISO 22301 Certificate for Business Continuity Management

³Study commissioned by Abu Dhabi Health Data Services

Looking into the future

Improving interoperability and data standardisation

Ensuring that healthcare providers capture high-quality and standardised data is a basic premise to enabling interoperability and the use of digital technology to transform healthcare. The COVID-19 pandemic, further accelerated the efforts to improve interoperability and develop processes to monitor and improve data standardisation and quality.

While examining the collated data in Malaffi, the team identified specific gaps and issues with data quality. Based on the analysis and to enhance data quality, the DOH has issued guidance on coding standards to healthcare providers in Abu Dhabi. The universal adoption of these standards, such as SNOMED CT⁴ and LOINC⁵, is expected to significantly improve interoperability, increase the clinical value of the data, and improve the accuracy and scope of population health insights.

New frontiers in population health management

Malaffi enables the DOH, for the first time, to draw population health insights in near real-time, based on the analysis of the consolidated clinical data of the entire population.

For example, in 2021, Malaffi premiered a demonstration of a population risk management platform that will empower the healthcare sector to support care management, improve population health and assist in ensuring continuity of care.

The platform uses advanced artificial intelligence (AI) analytics technologies, such as machine learning, to build predictive models based on the clinical data and run algorithms to predict future hospital admissions, emergency department visits, readmissions, disease complications such as diabetes, and other risks. These insights will be used to action targeted measures that will reduce the risk of groups or individual patients developing certain conditions, improve overall efficiencies among providers and reduce costs.

Malaffi will contribute significantly to creating advanced systems tailored for syndromic and pandemic surveillance and

response. Such systems will be of the utmost value for early alerts and increased readiness to handle any potential future outbreak, ensuring Abu Dhabi remains at the forefront of public health and safety. Other solutions will also be developed to take advantage of advanced analytics of the robust population health data in Malaffi, to improve the quality of care and health outcomes for everyone in the Emirate.

The next chapter for Malaffi

Malaffi has transformed healthcare in the Emirate of Abu Dhabi and will undoubtedly continue to do so as the data quality and capabilities of the platform increase.

Having established itself firmly in the healthcare infrastructure of the Emirate, Malaffi now enters the next phase of its development. The remaining healthcare facilities will be connected in 2022 and we will continue to complete data sources contributed by the different providers to create a more comprehensive patient record.

During the pandemic, the people of Abu Dhabi witnessed first-hand how connected healthcare, through Malaffi, plays a significant role in protecting the health and safety of the community. Soon, patients will have access to their records in

Malaffi, that will enable them to be better engaged in managing their health. The information available within Malaffi will strengthen the research and development capabilities of the pharmaceutical and medical companies, and research organisations, to drive innovation and investments.

As the healthcare system matures, Malaffi will become increasingly important for the realisation of strategic initiatives of the DOH towards establishing a primary care model, transition to value-based care and the practice of precision medicine. Integration with the federal HIE, Riayati, will enhance connectedness beyond Abu Dhabi, into the other emirates.

The benefits of HIE platforms are endless. As is a hallmark of the UAE, we will continue to push ourselves, to keep innovating and discovering new capabilities to improve the health and wellbeing of our population.

The future looks bright. Towards the next 50.

⁴ SNOMED CT- Systematized Nomenclature of Medicine - Clinical Terms. ⁵ LOINC - Logical Observation Identifiers Names and Codes.

