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The future of health insurance in an age of prediction and prevention

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Why this paper?

With advances in technology specifically in artificial intelligence and computing power coupled with genomics we are now embarking on a journey that will see continuing improvement in our ability to predict future illness in specific individuals. This will enable a greater focus on targeted preventive medicine to reduce the risk of contracting disease, increasing longevity and reducing the incidence of health insurance claims (although not necessarily reducing the cost of claims).

This pivot towards prediction and subsequent prevention will have a significant impact on the health insurance sector. In this paper the author explores what this new environment might mean for insurance companies and the need for them to adapt their approach.

About the author

The author of this paper has 33 years' experience across all forms of insurance, including health insurance, in many countries. His last 10 years have been specifically focused on health system financing in developing countries in the Middle East and Africa. The author's work has included working for a "Big 4" advisory firm, a GCC government and providing *pro bono* advice to other regulators in the Middle East and Africa. He has also provided advisory and consulting services in health system financing and regulation to clients of global consulting companies.

Limitations on scope

This paper focuses primarily on the health insurance market of the United Arab Emirates (UAE), the most competitive insurance market of the countries that form the Arabian Gulf Cooperation Council (GCC) with some references to other GCC countries.

Accreditation

All views expressed and statements made in this paper (unless otherwise specifically referenced) are those of its author.

Driven by government

Recent activity

Abu Dhabi Global Health Week (ADGHW) delivered its second annual event in February 2025. Compared to the long-running Arab Health Exhibition in Dubai it was a relatively small affair. However, it was used as a platform for government and government-related entities to clearly signal its intentions for the future of healthcare in the emirate.

Compared to the Dubai event, policy was at the forefront rather than the event being an "exhibition" of healthcare and healthcare technology vendor solutions.

ADGHW showcased organisations such as Department of Health Abu Dhabi, PureHealth (the sovereign wealth fund entity) and M42 Healthcare amongst others. There were many high profile signings of agreements and MOUs between quasi government entities and private sector organisations including healthcare technology companies and pharmaceutical companies.

What was the message of ADGHW and what are its implications?

It was clear that the government is driving change in healthcare through its various affiliates and other government-related entities.

With advances in data analysis brought about by enhanced computing power and artificial intelligence as well as advances in genomics and even multiomics, there is a clear realization that more effective healthcare outcomes should be based upon prediction of illnesses followed by preventive interventions.

This is a clear pivot from the traditional curative approach towards a predictive and preventive approach. This will have profound effects on the way that healthcare is financed. Currently in GCC countries the approach is a two channel approach. For GCC nationals funding is generally provided by government at either an Emirate or Federal level. Funding for resident expatriates (which can number up to 85% of a GCC country's population) is covered by employer-funded private health insurance or, for those not in employment, by individuals themselves. Some countries require employers to also fund for their employees' dependents whilst some countries do not.

These two funding models are founded on a curative approach to healthcare. The government-funded channel will be able to adapt since the money comes from central funds and can be allocated as each government feels best, for example more investment in prediction and prevention which will result in a lower proportion spent on curative over time. However, the private health insurance model will not survive in its present form. More to follow on this point.

Technology in early diagnosis and prediction

Artificial intelligence and machine learning systems are already in use providing faster, more accurate diagnoses than humans. These tools help physicians identify potential disease before it takes hold but they are capable of more.

There are three aspects to the use of AI in this area. The first is early diagnosis of a condition that already exists while the second is predicting the onset of a disease in the longer term and the third is predicting an acute episode such as a heart attack (possibly just days in advance).

Some examples of early diagnosis

AI systems can detect abnormalities in X-rays, MRIs, and CT scans which human radiologists cannot. This technology is not new and has been around for at least 8 years. What is new is that advances in data analysis

and computing power have made the analysis faster, more accurate and able to identify problems at an earlier stage.

In breast cancer, systems can analyse mammograms with far greater accuracy than a human radiologist reducing false positives and missed diagnoses.

Systems are also being trained to detect signs of skin cancer far earlier.

In ophthalmology systems are reviewing retinal scans and diagnosing diabetic retinopathy.

Predicting the onset of a disease

The predictive powers of AI tools sit in their ability to analyse millions of data points such as vital signs, genetic markers, lifestyle habits, environmental exposure and social behaviors allowing them to identify patterns which can predict the onset of a disease many years before any symptoms develop.

For example, subtle changes in heart rhythm, blood pressure, cholesterol levels or stress levels could predict the onset of cardiovascular disease allowing physicians to identify at-risk individuals.

The human genome stores the instructions for all aspects of how our individual biology functions and develops, including susceptibility to disease. There are over three billion base pairs of DNA in each cell and now with AI/ML and advanced computing power we are able to begin interpret its instructions and impact on our health enabling us to predict who will contract what disease and possibly even when.

AI can be used to analyze genetic data and identify risk factors for a range od diseases such as cancer, heart disease, rare inherited conditions and cognitive disorders.

AI of this means that we are reaching a point where a personalized approach can be employed meaning that that treatment is tailored not just to the disease but to the individual's unique biological roadmap.

Predicting an acute episode

Another revolution feeding AI's predictive power is the increasing use of wearable technology (although not across entire populations and also being either unaffordable or unavailable in many countries). Smartwatches, fitness trackers and smart rings collect real-time data such as heart rate, sleep patterns, body temperature and oxygen levels. Combined with AI powered data analysis this provides insights into a person's health direction on a daily basis.

During the COVID-19 pandemic, wearable data combined with AI was used to detect early signs of infection, sometimes days before symptoms appeared. Studies showed that changes in resting heart rate, respiratory rate, and sleep duration were correlated with early viral onset.

A recent development has been the use of a camera aimed at a person's ankles which takes 2,000 images per minute. The images are analysed using AI to detect fluctuations in water content which can then be used to predict a cardiac arrest many days before its occurrence.

Predictive mental health

Subtle signs of mental health decline can be detected by analyzing patterns in speech, facial expressions, social media activity and smartphone usage.

Some AI systems can detect suicidal inclinations based on voice tone, online posts or language patterns while others use wearable data to monitor physiological signs of stress and anxiety. This allows by patients and therapists to understand the mental state of health and take appropriate actions.

It is possible that predictive psychiatry will create an environment of proactive mental health care to identify individuals who are at risk and initiate interventions before the condition develops or worsens.

Prevention will follow early diagnosis and prediction

With these tools available, early diagnosis of a condition or prediction that an individual is at risk of developing a disease, healthcare can become highly personalised with treatments and lifestyle changes being implemented to prevent a condition developing unnoticed or to prevent it ever happening.

The movement from curative to preventive medicine

Healthcare delivery will move from its current, mainly curative approach to a personalised, preventive approach. This will have a profound effect on the way healthcare providers are structured as over time we see a lesser need for hospital beds and surgeries to deal with those suffering particularly from chronic conditions and non-communicable diseases. At the same time we may see a greater demand for physicians, clinicians and counsellors to be involved with assisting patients with their personalised programs of disease prevention and lifestyle change.

This movement from curative to preventive medicine will also impact the health insurance sector which will be discussed in detail in a later section.

Population health management from a public and private perspective

Population health management is a long-term project

It requires investment, research, behavioural change measures. It requires a full understanding of chronic health condition prevention as well as condition management and an understanding of the relationship between and effects of co-morbidities.

What enhanced data analytics can now deliver is the information to direct population health management from the perspective of both prediction and prevention.

This all requires investment in research and analysis. Where a government is constitutionally responsible for the healthcare of its own nationals it makes sense for such a government to make this investment. Aside from the societal benefits of a healthier population, in the long term the burden of curative and palliative care will decrease thereby containing health care expenditure.

What is the private sector healthcare approach to population health management?

Quite frankly, in an environment such as in the GCC and many other countries which operate a fee for service approach to healthcare delivery, there is no incentive for private medical facilities to address population health management. They make their profits from curing or treating sick people, so the more, the better.

This is not to say that healthcare professionals themselves are only interested in helping to see their medical facilities make profits. But the fact remains that where bonuses are paid based upon revenues generated by physicians and clinicians then there is a complete conflict of interest.

This is one reason why value based healthcare (VBHC) as an alternative reimbursement model has been widely lauded but rarely, if at all, implemented. Many ask “why would providers abandon fee for service in favour of VBHC?”

What is the health insurance sector approach to population health management?

The answer to this question lies in the dynamics of the private health insurance market in several GCC countries, particularly those who have implemented mandatory health insurance for expatriate residents.

In the UAE there are some 45 insurance entities selling private health insurance (either as a locally listed company or as a licensed branch of a foreign insurance company). This is for an expatriate population of around 9mn people. The Republic of Ireland has a little over half that population and just 4 insurance companies.

Accordingly, the market for private health insurance is extremely crowded to the extent that most companies lose money on their health insurance portfolios. So the question may be asked "why do they continue to offer health insurance?". The simple answer is that such insurance is mandatory so employers must provide it and if the insurer does not offer it they risk the client taking not only its health insurance business to another insurer but possibly its whole portfolio. And so, insurers continue to run loss-making portfolios with perhaps just a handful making a profit.

This leads to insurers selling schemes at unsustainably low premiums. Employers and brokers both know this. So they hunt around for a cheaper deal at every renewal date and there is always an insurer willing to sell at a cheaper price thus simply perpetuating the losses.

So now we come to why insurers are not interested in preventive medicine let alone population health management. The reason that insurers are not interested in investing in preventive schemes to improve population health is because they take the view that any employer may move its business at renewal so that the benefit of any investment in preventive measures which generally produce health status improvements in the longer term will produce no benefit to the incumbent insurer in the short term.

This is a completely short-sighted approach but consistent with market dynamics and the short-term nature of health insurance business and those who manage it.

When the tide rises all boats float higher

What insurers collectively fail to see is if they all invested in preventive measures, the health of the population in general would improve so that future claims costs could be contained regardless of whether or not the employer has moved his insured members to another insurer.

The clash between long-term population health and short-term insurance

This is the crux of the problem. Population health management is a long-term project. For governments responsible for the healthcare provision of their own nationals it makes sense for them to make the necessary investments.

However, as explained above, for those private health insurance companies reliant upon premium revenues from employers of expatriate residents and workers under mandatory health insurance schemes they have no incentive to invest in prevention.

Yes, there are some who promote "wellness" schemes and apps but these are generally a marketing gimmick including elements such as a monthly "park run" or discounts at various commercial vendors such as opticians, dentists, pharmacies or sports clubs and gyms.

These "wellness" schemes are a collection of disjointed activities or offers and do not follow the model of a holistic wellness scheme which incorporates the RDIMAR principles, namely research, design, implement, monitor, assess and realign.

To summarise, the market for and approach to short-term private health insurance does not lend itself to population health management.

Impact on underwriting and risk pooling and the implications for health insurance policy design

Major principles of health insurance underwriting

All insurance contracts are based on the principle of "*uberrima fides*" or "utmost good faith". This means that an applicant for insurance must disclose all facts that may be material for the insurer to determine whether or not it will provide the cover requested and if it does, at what premium.

Health insurance underwriting will also often require an individual to disclose any "pre-existing condition". Failure to do so, if discovered at a later date, might render the policy invalid or see a claim denied.

The definition of a pre-existing condition can be very broad. Essentially it is a medical issue experienced in the past. This includes chronic conditions such as diabetes or asthma and one-off symptoms such as back pain.

A pre-existing condition is when a person has had symptoms, medication, advice, treatment or tests for a condition before taking out health insurance. This could be for any disease, illness or injury. It can include having had symptoms or tests for a condition that has not yet been diagnosed.

Importantly, it can include a condition that was present prior to effecting a health insurance policy but of which the individual was not aware.

For group health insurance schemes, the underwriter will often offer a policy on the basis of "medical history disregarded" meaning that if the number of lives insured exceeds a pre-determined figure, individual employees will not have to disclose pre-existing conditions. However, for individual and small group policies the insurer will require disclosure before accepting or pricing the risk to be covered.

Impact of early diagnosis on underwriting

Being able to diagnose an illness earlier with the assistance of AI-enabled tools means that earlier interventions can be made to address the condition and possibly stop or slow-down its development. For individuals already insured, this may mean claims being made sooner rather than later but the upside for the insurer is the possibility of a reduced number of future claims and those claims being less severe (costly) in the future.

Underwriters may therefore need to adjust their underwriting to account for this but it will require input from health actuaries who would need to assess the impact of earlier diagnosis on the timing, number and severity of claims.

For anyone not currently insured, an earlier diagnosis would be classified as a pre-existing condition and the risk would be underwritten accordingly as described above.

Impact of prediction on underwriting

This is perhaps a less clear area than the impact of earlier diagnosis. There are a number of scenarios.

Firstly, let's take an individual who is not currently insured yet has undergone a personalised analysis which predicts a probability of that individual contracting a particular disease such as cardiovascular disease or some form of cancer. This would be of no concern to underwriters unless and until that individual applies for health insurance. Will this "prediction" be classified as a pre-existing condition even though there are no current symptoms or a diagnosis of the disease. How would underwriters factor in the predicted timing of the onset of the disease? How would they treat the "probability" of the disease occurring?

Secondly, let's look at individuals who are currently insured and receive such a prediction. Would this need to be disclosed at renewal date? If so, the same questions on timing and probability would apply.

Thirdly, and in a more general whole population sense, how would underwriters need to adjust their pricing knowing that predictive analysis will become more widespread? Would this suggest higher premiums or lower premiums?

The demise of risk pooling?

A key principle of insurance is that of risk pooling. Underwriters will look at the collective risk of a pool of insured assets and set the overall insurance risk premium at a level that assumes that not every asset will be subject to a claim and will make assumptions about the severity of the actual claims which may be incurred. The result is that any single asset owner within the pool will pay a lower premium than if he or she applied individually.

Risk pooling applies equally to health insurance where, within a group of individuals, underwriters know that for example, not everyone will suffer cancer whilst the total expected cancer claims costs can be spread across the group as a whole.

But how will the principle of risk pooling be affected with an increase in predictive analytics? At a general population level it may not be affected but what about at the individual level? Will underwriters be able to use similar AI-enabled predictive analytics and apply the results to identify specific individuals who might be predisposed to certain illnesses based upon factors such as age, gender, ethnicity, biodata, lifestyle and other factors. If so, could this lead to the abandonment of risk pooling or at the very least the exclusion of such individuals from the pool? In either event, the outcome would be individual insurance premiums of a much higher or even unaffordable level.

How will policy benefits need to change?

A health insurance policy usually only considers claims which are the result of a "medical necessity". Elective tests (those which an individual asks for out of curiosity) are not covered. Tests recommended by a physician are generally covered if they can be justified using the medical necessity test and fall within internationally accepted clinical guidelines.

But should health insurance policy benefits now cover predictive analysis and preventive treatment? The reasons for the reluctance of insurers to pay for preventive treatment in highly competitive health insurance markets as found in many GCC countries is documented earlier in this paper. It may be that to support improvement in general population health some form of regulatory intervention might be required.

On the predictive analytics side, it might be of advantage to insurers to cover this as it would enable them to better price for their future potential claims. However, from a consumer perspective it could result in them facing higher premiums if the probability of acquiring a disease, its timing and its severity are a concern to the insurer.

Regulatory intervention

The fee for service reimbursement model remains the predominant (if not, the only model) in GCC countries. This model creates conflicts which disadvantage the most important stakeholder in the healthcare system – the patient. On the one side, it encourages healthcare providers to maximise revenues in the knowledge that most patients have an insurance plan behind them. This often leads to unnecessary tests and sometimes tests which can do potential harm such as unnecessary X-rays. On the other side, it leaves insurers always looking at ways to minimize claims with little or no regard to the patient's welfare.

For over 15 years the author has worked in the healthcare insurance ecosystem, many times organising roundtable events bringing together CEOs of both healthcare payers and healthcare providers. During such meetings each side denies any malfeasance. Each side agrees that they need to work with each other to create a better system. Yet on leaving the room each side goes back to doing the same practices. In 15 years there has been no change whatsoever to the way the health insurance ecosystem operates. This leads the

author to conclude that only regulatory intervention will fix the problem. So which areas might need to be addressed bearing in mind that some of these are necessary but not sufficient to support a new world of predictive, preventive and personalised healthcare?

Health insurance premium regulation

The overcompetitive market for health insurance leads, as we have seen, to a regular "churn" of business with brokers and insurers always looking to win business by buying it at unsustainably low premium rates. It is the resultant unprofitability that drives insurers to challenge claims made by healthcare providers.

The solution is clear and simple – regulators must implement a system of health insurance premium regulation which ensures that insurers can only charge premiums which are technically sustainable from the perspectives of both underwriting and actuarial principles.

Most in the insurance sector are fearful of any such regulation, worrying that it would be proscriptive and be similar to the approach with motor insurance which tends to set tariff rates and maximum discounts.

However, and as the author has written in another paper ("The case for health insurance premium regulation in the United Arab Emirates" updated July 2023) a system can be designed which contains health insurance premiums within sustainable ranges but which also allows insurers the flexibility to adjust rates to maintain a degree of competitive advantage.

The author has proposed such a system many times in the UAE both whilst a regulator at Dubai Health Funding Department (now Dubai Health Insurance Corporation) and since. Unfortunately emirate level health authorities see this as not their concern and the federal regulator, previously the Insurance Authority and now the Central Bank of the United Arab Emirates, appears to show little concern on the destabilizing effect on the market of the current unregulated system.

Imposition of a system of value-based healthcare (VBHC)

Despite many papers having been written on VBHC, its achievement remains a long way off. Saudi Arabia is leading the way and the Emirates of Abu Dhabi and Dubai have talked about it.

The issue is that the fee for service model serves healthcare providers very well, whilst at the same time leading to the situation of health insurers (in a highly competitive market with no system of premium regulation) scrambling to reduce claims costs using techniques such as not pre-authorizing genuine requests, delaying payments, denying claims or scaling back claims amounts.

The transition to a functioning VBHC system will require premium regulation to begin with and an overhaul of the way in which healthcare providers and payers of healthcare interact with each other. I the author's opinion and many years' observing the status quo this is not possible without regulatory direction and intervention.

Can the health insurance sector adapt?

The "short termism" challenge

As described above, health insurance is a short term business with almost exclusively one-year term policies. This leads to the current situation where insurers have no incentive to include preventive measures in their benefits schedules. A solution may be to introduce multi-year policies yet most insurers are not keen on the risks associated with this, especially as reinsurers appear to have no appetite.

However, as described earlier, reducing the "churn" of business from one insurer to another at renewal can be alleviated with a workable system of health insurance premium regulation.

Are alternative reimbursement models an option?

Value-based healthcare can provide a platform for alternative reimbursement models which will facilitate a move away from a pure fee for service model. Some examples follow.

Adjustments to healthcare provider tariff rates can be linked to outcomes. For example, in renal care[1], incremental increases in tariffs can be "earned" based upon measurable factors such as:

- Member was compliant with pathology calendar tests within a calendar year (potential tariff increase of up to +0.50%)
- Member received dietician advice (twice within a calendar year) (+ 0.25%)
- Patient satisfaction score (+0.25%)
- Improvement on patient satisfaction score (+ 0.25%)
- No patients to receive less than 120 dialysis visits a calendar year (+ 0.50%)
- No patients on temporary catheters (+0.25%)

The above would provide a potential tariff increase of 2%. This would be above any increase in general inflation. (Note that some local health authorities also provide rules and boundaries in tariff setting).

Consultant remuneration could be based upon the following[1] rather than purely fee for service:

- A base hourly fee assuming a fixed number of hours each month
- A patient interaction fee for every consultation accepted and concluded (fee for service)
- An additional percentage based on overall patient satisfaction score

The role of third party claims administrators

With very few exceptions, all insurers operating in the UAE use a Third Party Administrator (TPA). The role of the TPA includes designing health insurance plans, tariff negotiations, pre-authorisations and claims processing.

The basis of TPA remuneration has traditionally been to receive a fixed percentage of premiums received by the insurer client although some have moved to a per member per month fee. The TPA market is also very concentrated with the top three controlling some 80% of the overall market. Two of these are owned by global reinsurers and another controlled by a global health insurance company.

Clearly, if tariffs are to be linked to care outcomes and since TPAs are responsible for tariff negotiations they will need to be involved in any new system.

Can reinsurers assist?

It would seem to make sense that reinsurers should be interested in supporting a system that focuses on prediction, prevention and personalised care. However, this makes sense only if reinsurers take a long term view. Unfortunately, for as long as health insurance policies remain one year contracts, the focus of the reinsurer is only on the risk for the coming year. Reinsurers must therefore revisit the potential for multi-year policies given that predictive data analytics will increasingly offer them a little more certainty in pricing for the medium and longer term.

To achieve the necessary changes needed to move from a fee for service remuneration model to one based upon value-based healthcare and patient outcomes, reinsurers need to rethink their approach to health insurance and work with their insurance company clients as well as healthcare providers.

[1] Source: Insight Actuaries and Consultants, South Africa

Can the health insurance sector adapt?

To answer this question which is the subject of this section the health insurance sector MUST adapt. It (including TPAs and reinsurers) must work with healthcare providers to design new remuneration models which make use of AI-enabled predictive data analytics, genomics and multiomics.

If the payer sector remains rooted in a volume-based fee for service model funded by one year health insurance policies there will be a funding crisis in the private sector. Why? Because without the necessary changes, predictive and preventive measures will be unfunded leaving many without the personalised care pathways that prediction and prevention can influence and design.

This leads the author back to the question of regulatory intervention. In his 19 years' experience in the region he has seen no change in the *status quo* of health system financing without regulatory change. As explained earlier, healthcare providers are happy with the volume-based fee for service model whilst insurers begrudgingly pay the bills and hope to cross-subsidise any health insurance losses with profits from other business lines.

However, the fee-for service and current reimbursement model do not support the financing of predictive analytics and preventive measures in order to achieve an improvement in long term population health.

Recently, the health authorities of both the Emirates of Abu Dhabi and Dubai have issued statements and policies that focus on an environment of predictive, preventive and personalised care including the approach to child and maternal health as well as mental health. The Kingdom of Saudi Arabia is moving in the same direction. The difference between KSA and the UAE is that there appears to be a greater national insurance regulatory will in the former to intervene and support change.

In the absence of regulatory intervention, if payers and providers do not address fundamental health financing system challenges, the private health insurance sector is in danger of collapse leaving many insured members and patients to bear the burden.

The role of The Consilient Consultancy in driving change

The author of this paper has 19 years' experience of the health insurance markets of the Middle East alone. He has worked with governments, regulators, payers, providers, consultancy firms, brokers and pharmaceutical companies.

The challenges posed in this paper can only be addressed by bringing together all stakeholders in the health system financing and delivery ecosystem. The author of this paper is well-placed to do this given his extensive network of connections.

- If you would like to be part of the necessary transformation and work with senior leaders in the healthcare financing ecosystem please reach out to him
- If as an individual organisation you would like advice on the potential future environment in which health insurers will need to operate in and adapt to he can support
- The author also has an extensive network of highly qualified and experienced individuals from around the globe who can advise and support your journey