

USING MODELLING FOR A HEALTHY FUTURE

70% REDUCTION IN LONG-TERM SICKNESS, THE PFA APPROACH COMBINING AI + HUMAN EXPERTISE

With health measurements increasingly focussed on prevention of long-term incapacity, **Camilla Holm of PFA Denmark** spoke to **The European Actuary** about PFA's successful strategy combining health professionals' experience with data scientists' modelling, leading to a 70% reduction in long-term sickness. She highlighted the importance of using measures focused on operational relevance while ensuring human contact to build customer trust. The approach involved early intervention, combining psychological and physical care. Future plans include refining models and using AI for case handling. Holm emphasised the need for industry standards for preventive impact and highlighted the Nordic model's success in integrating labour market policies, health systems and pension security.



CAMILLA HOLM

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What specific customer need triggered your focus on prevention-and what decisions did you make that truly moved the needle?

‘It actually started with a series of observations. When we meet customers who are on long-term sick leave, we often see that we already had contact with them earlier. Once they are on sick leave, and it becomes long-term sick leave, then it is too late to prevent. We saw a clear need to start the preventive initiatives earlier. The big shift came when we decided to be proactive and try to prevent customers from becoming sick to the point where they risk long-term absence. Once they are in that position, it is very difficult for us to help them back to work. That decision to act and to invest resources and time earlier was what really moved the needle.’

In terms of impact, which two or three initiatives have had the strongest effect on preventing long-term sickness?

‘The key was using data and combining it with the expertise of our health professionals. We brought together the health team, which helps customers every day and the data scientists who were doing the modelling. When the data was combined with the actual experience from meeting customers and understanding what made them ill and what helped them return to work faster, that’s when things really changed. You can imagine the data scientists working with limited direct customer contact. What really helped us was bringing those two worlds together – the modelling team and the health professionals with customer contact.’

Mental health as a game changer: what have you done differently in recent years-and which specific offerings/programs have delivered the greatest preventive impact and shorter case durations?

‘In recent years, PFA has fundamentally redesigned our prevention approach — especially within mental health — by moving interventions earlier in the disease pathway and by systematically using AI-driven risk prediction to identify individuals before they develop long-term conditions.

PFA uses an AI model that calculates individual risk scores based on health insurance data, treatment history, demographics, geography, and behavioural patterns. This model identifies customers at the highest risk of developing long-term illness, including those with early mental-health-related stress or strain reactions. PFA uses data to ensure customers receive ‘the right treatment at the first attempt,’ which shortens especially mental-health-related and musculoskeletal cases — conditions that typically risk becoming long-term.

This is the program with the clearest and most significant preventive impact:

- 70% reduction in risk of long-term illness (TAE) among contacted customers.
- 54 avoided cases of long-term sickness.
- Significant positive implications for the customers and their close relatives.
- Approx. DKK 86 million in economic benefits for customers.
- More than 4,400 customers contacted and 100+ proactive calls every month. >

The model doesn't 'label' people

We use targeted individual interventions rather than mass screening. PFA does not screen all customers. Only people who already have an established relationship through a previous treatment pathway are contacted – ensuring legitimacy, relevance and higher impact.’

Of course, you have the data, but you need a business case. Which few metrics do you use to manage and communicate impact? And how do you handle lag effects and causal uncertainty when the board asks ‘How do you know that A caused B, and why should we invest in this?’

‘That is exactly the difficult part. First, we focused on operational relevance. We looked at how many customers we reach, how many accept a dialogue with us, and whether the health professionals find the data meaningful. You need to establish trust between the health professionals and the data team.

Second: we track customer feedback – both structured feedback and written comments – because prevention only works if customers perceive it as supportive and relevant.
Third: we’ve done a statistical effect evaluation using a recognised causal approach, Targeted Maximum Likelihood Estimation, to estimate the impact on long-term sickness risk. Based on that, we see a strong preventive effect – around a 70% reduction in the risk of becoming long-term sick in the following year for the customers who receive early support.
We did extensive modelling, where data scientists mapped statistical effects using causal

approaches like targeted maximum likelihood estimation and other robust, data-driven analyses.

Specifically on lag effects and causal uncertainty: prevention has two built-in challenges: lag and causality. The benefit often comes later – because the success is that a long-term illness doesn’t develop – and many outside factors influence sick leave. So we’re careful not to overinterpret quick signals or simple comparisons. We manage this with leading indicators like customer acceptance and professional assessment, and lagging indicators where we track long-term outcomes over time. On causality, we’ve used a recognised causal evaluation approach.

The key for us is to be transparent about what we know and what we’re still learning. We designed it to be supportive and non-stigmatising. The model doesn’t ‘label’ people. It helps us prioritise who might benefit from early intervention and an offer of help. And the outreach is framed as exactly that – an offer of a health guide.

We use only the data we already have about the customer, including basic demographics and their interaction with the health insurance. We also focus on transparency internally – our health professionals need to trust the approach, understand what it is and what it is not, and feel confident that it supports their professional judgement. It is always the human that decides.

What worked best for adoption was building it together: close collaboration between AI and health professionals, plus an ongoing feedback loop from the people doing the outreach calls.’ >

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How do you identify needs early in a fair and non-stigmatising way – and what has worked best to bring employees and managers on board with confidence? Is it a big concern?

‘Yes, because trust operates on several levels. Inside PFA, my colleagues in the health team need to trust the data from the data science team. They are the ones picking up the phone and calling customers, so they must believe that the risk signals are meaningful. With customers and companies, managers and HR departments have to accept that PFA is reaching out to their employees and giving them what we call a ‘we care’ call.

Let me give an example of what happens in practice. Our data shows that risk often builds up over time. Say I first use my health insurance to see a physiotherapist because I have a sore neck. Two months later, I contact PFA again because I would like psychological counselling. At the same time, we can see in the data that I have also moved home recently, which is stressful for most people. When these factors combine, the model raises an alert that this customer may be at risk of becoming long-term ill or long-term sick.

We made sure the modelling reflected what our health professionals actually see in practice. That’s why bringing the two teams together was so important. It is quite uncomfortable for a health professional to call a customer if it turns out to be a false alarm. The way we manage the call is therefore crucial. We typically say something like: ‘We can see you have used your insurance. Did it help you? Were you satisfied with the treatment?’ From there, we explore whether additional support might help.

Once the health professionals felt safe about the data, they could see they were actually helping customers more effectively, because we reach them early. Sometimes we speak with customers before they are themselves aware that they are heading into a stressful situation. The second trust dimension is getting permission from HR departments for these calls. At first, they were sceptical and worried that employees would feel surveilled. But as they saw the benefits, supported by our data and modelling, they realised this helps the individual employee, the company, and society overall by preventing long-term illness. It has taken several years to build this level of trust, and when we measure customer satisfaction on this service it is sky high.’

In terms of products, how do you create coherence between health, work ability, and pension so that employees, employers, and PFA all win-and where have you seen the greatest synergy gains?

‘In Denmark, we have a tradition where the insurance product is also provided by the pension company. So your pension scheme typically includes a health insurance component. As you can tell from this experience, it is very important for us to have data about how customers use their health insurance and link that to their loss-of-work-ability coverage. The Danish term is ‘TAE,’ which stands for loss of ability to work.

So, you have your pension with us, and attached to that you have coverage that pays out if you lose your ability to work, for example if you are injured or become ill in a way that prevents you from working. That product, together with the health insurance, lets us collect data on both >

‘What really matters is that actuaries do not just look at the figures.’

sides and link them. By doing this, we can prevent many customers from becoming long-term sick. For customers and their employers, long-term sickness is a huge cost, so the integrated product setup allows us to serve all parties better.’

What are your leadership principles for the responsible use of data – and especially AI – so that you have enough guardrails, bias testing, explainability, governance, and so on, to ensure fairness and trust? How do you work with that in practice?

‘We have a clear framework, and in practice it comes down to a few important focus areas. We only use data to create value for customers. One key trust issue early on was that customers feared we would use data for pricing or even for excluding some customers. That never happens. Data is only used to help customers. Of course, it also helps PFA because we prevent costly long-term sickness, but the starting point is always customer value.’

We are also very transparent about how we use digital solutions and data, and it is important that customers understand what we do and why. We always ensure human contact and individual assessment. There is always a human being involved. When we reach out to a customer based on data, it is always a person making that contact. That human touch is essential. We maintain strong data quality and use only internal data. For example, we use data on how customers use their health insurance, and we do not bring in random external data sources.’

Turning to the actuaries’ role and expectations: which competencies and mindsets do you especially expect from actuaries? Where have actuaries contributed the most, and what is their ‘secret sauce’?

‘In this specific case, the predictive model was built by our AI team with data scientists, not by the actuaries. However, the actuaries have played a very important role around the model. They use the data in our pricing models and bookkeeping, and they work closely with the AI team to measure effects and integrate the findings into the financial results.’

What really matters is that they do not just look at the figures. The real impact came when the AI team and the health professionals worked together to validate that what the model shows reflects what we see in real life. For example, we looked closely at the indicators of entering a stress-related situation. Actuaries help evaluate what the effect on customers is and how it translates into long-term financial impact and PFA’s bottom line. We are getting better at ensuring that it is not only about the data model, but also about its real effect on customers.’

Do you see a need for industry standards for measuring preventive impact? And what would you concretely invite the actuarial community to own?

‘We clearly see a need for industry standards for measuring preventive impact. It is important to have comparable metrics and robust causal methods that everyone can rely on. We would encourage the actuarial community to lead the >

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development of unified outcome measures, particularly for duration of sickness, level of function, and return to work. Shared standards for causal evaluation and model governance would allow actuaries to raise the bar for the entire industry.

I know this is not easy. But if we could take our experience and models and apply them in the public health system, we could help many more people. We face a lack of labour force, and many people struggle with mental health and other challenges. Standardisation could help society as a whole.’

You mentioned the Danish – or Nordic – model of integration and the labour market. What can other countries learn from this? And where might they run into difficulties?

‘That is a big question. What works in the Nordic model, and in Denmark, is the seamless integration of labour market policy, health systems and pension security. We have a very secure pension model, which is extremely important to Danes, both for long-term financial safety and wellbeing after they leave the labour market, and for short-term security if they become ill.

The core strengths are universal welfare services, coordinated labour market institutions, high levels of trust, and a strong social insurance system. Using modelling in such a system is heavily dependent on trust, and our society is built on that trust. We aim to keep people attached to the labour market while maintaining

income security, which also creates incentives to stay in work.

Where replication often fails is in assuming these results arise purely from specific policies. In reality, the Nordic model depends on high social trust, organised social partners, coordinated wage setting, high taxation to finance universal benefits, and a long tradition of consensus-based governance. All of these surrounding factors make the model work. They are not easy to copy quickly, but they are central lessons that can, at least in part, be exported from the Nordics.’

Finally, PFA’s next strategic steps: where will you focus over the next 12–24 months, and what will success look like?

‘We are continuously refining our modelling to become even more precise. So far, our main actions have been in the psychological area, especially stress, but there is also a lot to be done on the physical health side. Our documentation shows that early, proactive intervention is what prevents long-term illness, so we will increasingly focus on physical conditions as well, again combining real-world experience with what the data tells us.

We are also using AI and modelling to become more efficient in case handling – for example, by using AI to interpret large volumes of legal material, where sometimes you have to read thousands of pages. In prevention, our goal is clear: to extend this early, proactive approach across more areas of our customers’ health so that we reduce the incidence of long-term illness.’ <