Researchers develop algorithm to find possible misdiagnosis

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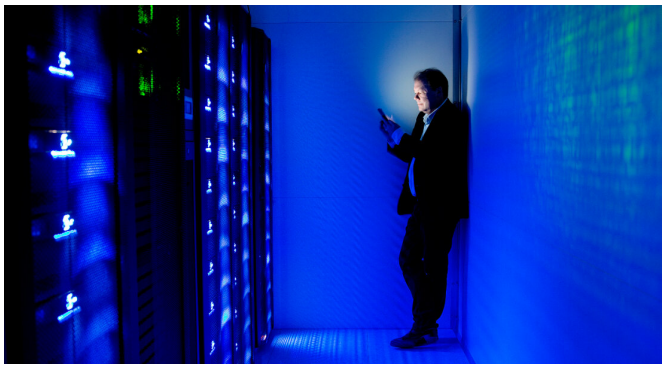

Professor Søren Brunak hopes that the new algorithm could become a support tool for physicians. Credit: Peter Hove Olesen

It does not happen often. But on rare occasions, physicians make mistakes and may make a wrong diagnosis. Patients may have many diseases all at once, where it can be difficult to distinguish the symptoms of one illness from the other, or there may be a lack of symptoms.

Errors in diagnosis may lead to incorrect treatment or a lack of treatment. Therefore, everyone in the healthcare system tries to minimize errors as much as possible.

Now, researchers at the University of Copenhagen have developed an algorithm that can help with just that.

"Our new algorithm can find the patients who have such an unusual disease trajectory that they may indeed not suffer from the disease they were diagnosed with. It can hopefully end up being a support tool for physicians," says Isabella Friis Jørgensen, Postdoc at the Novo Nordisk Foundation Center for Protein Research.

The algorithm revealed possible lung cancer

The researchers have developed the algorithm based on disease trajectories for 284,000 patients with chronic obstructive pulmonary disease (COPD), from 1994 to 2015. Based on these data, they came up with approximately 69,000 typical disease trajectories.

"In the National Patient Registry, we have been able to map what you could call typical disease trajectory. And if a patient shows up with a very unusual disease trajectory, then it might be that the patient is simply suffering from a different disease. Our tool can help to detect this," explains Søren Brunak, Professor at the Novo Nordisk Foundation Center for Protein Research.

For example, the researchers found a small group of 2,185 COPD patients who died very shortly after being diagnosed with COPD. According to the researchers, it was a sign that something else might have been wrong, maybe something even more serious.

"When we studied the laboratory values from these patients more closely, we saw that they deviated from normal values for COPD patients. Instead, the values resembled something that is seen in lung cancer patients. Only 10 per cent of these patients were diagnosed with lung cancer, but we are reasonably convinced that most, if not all of these patients actually had lung cancer," explains Søren Brunak.

Data that will provide an immediate benefit

Although the algorithm was validated through data from COPD patients, it may be used for many other diseases. The principle is the same: the algorithm uses registry data to map the typical disease trajectories and can detect if some patients' disease trajectory stand out so much that something may be wrong.

"Naturally, our most important goal is for the

patients to get their money's worth with respect to their health care. And we believe that in the future, this algorithm may end up becoming a support tool for physicians. Once the algorithm has mapped the typical disease trjaectories, it only takes 10 seconds to match a single patient against everyone else," says Søren Brunak.

He emphasizes that the algorithm must be further validated and tested in clinical trials before it can be implemented in Danish hospitals. But he hopes it is something that can be started soon.

"In Denmark, we often praise our good health registries because they contain valuable data for researchers. We use them in our research because it may benefit other people in the future in the form of better treatment. But this is actually an example of how your own health data can benefit yourself right away," says Søren Brunak.

More information: Isabella Friis Jørgensen et al, Time-ordered comorbidity correlations identify patients at risk of mis- and overdiagnosis, *npj Digital Medicine* (2021). DOI: 10.1038/s41746-021-00382-y

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