Meet TidalSense, the respiratory intelligence company

After a recent £7.5M investment led by BGF and Downing, we spoke to Dr. Ameera Patel, CEO of TidalSense about developing innovative hardware and software, reinventing respiratory diagnoses and the critical importance of people in a business.

TidalSense evolved out of the thesis that if you could build the best sensor in the world to measure respiratory function, it must be able to improve the diagnosis and management of chronic respiratory conditions. To be honest, this was probably the wrong way round to be approaching the problem, but, fortunately for us, we ended up in the right place anyway!

COPD and asthma affect about 10% of the world's population and this figure is rising steadily. COPD is the third leading cause of death in the world. Respiratory diseases are often diagnosed late and the clinical tests are inaccurate. Late diagnosis drives healthcare costs into the billions, with the majority of cost incurred at the later stages of disease through hospitalisation. Late stages of disease are also associated with significantly worse quality of life.

Tell me about the business – what it is, what it aims to achieve, who you work with, how you reach customers and so on?

TidalSense is a respiratory technology company. Built on the foundations of our novel, patented, sensor technology (N-Tidal), TidalSense's AI models, trained on millions of patient breaths, perform accurate diagnosis and predictions in patients with COPD and asthma, using our sensor data. From our single sensor data stream, we now have models that can perform different predictions which are now coming through our product pipeline.

Our flagship diagnostic technology will be targeting earlier, more accurate diagnosis of COPD, which can facilitate improved care in the early stages, thus slowing the worsening of respiratory conditions.

We work with organisations across the care spectrum, from healthcare providers (e.g. the NHS) to the pharmaceutical industry (to support new medicines development), to reinvent the respiratory care pathway.

How has the business evolved since its launch? When was this?

The business was founded in 2013 and spent the first several years developing and refining the hardware and sensor technology. It took a number of years to solve the technical problems associated with direct rapid CO2 sampling and measurement of breath from the mouth, along with the ability to reliably use the sensing technology outside of the hospital setting, in patients' homes, without the requirement for any wifi or bluetooth connection.

Over the last 3-4 years, the company has evolved into a software company, building AI-driven solutions to perform clinical predictions using our sensor data. With N-Tidal Diagnose (our diagnostic solution), the idea is that a patient can breathe into our N-Tidal respiratory device for about a minute, and our AI models will output the diagnosis on the spot. So there's no need to come back for another appointment or wait in long waiting lists for a test. Over time, these AI models will get smarter as we introduce new predictive capabilities. Our vision is that these models will not only be able to tell you the diagnosis, but might also predict how severe your respiratory condition is, what treatments might work best for you and what your level of clinical risk is.

Tell us about the working culture at TidalSense

Culture is the single most important thing for me as a leader. Like many others, I've worked in places with poor working culture and it not only impacts your work output, but it has a big negative impact on your self-esteem and mental health. So, having been through that, I knew exactly what type of company I didn't want to build!

We're really proud to have people from 5 / 7 continents on our team. We don't have a hierarchy, but everyone in the team has respect for everyone else. Everyone is encouraged to contribute their ideas and concerns, and, on a personal level, the business leaders genuinely care about the team. The thing I hear most when people visit our office is that there is a 'great energy'. People are drawn in because our employees are not only bright and work hard to deliver business goals, but look after each other and have fun in the process. You can routinely hear raucous laughter in the office – often initiated by our Director of Engineering (and cofounder) Julian. Of course, being a bright and driven team, there is a healthy degree of friendly competition in the office too: everything from table tennis to who can deliver the most breath recordings through N-Tidal for our R&D projects.

How are you funded?

In the early years of the company, TidalSense was funded with public grants from Innovate UK, NIHR and SBRI to the tune of £4.5M. This funding was used to develop the hardware and run some of our early clinical studies, which helped with early validation and allowed us to collect some of the data we then used to build our AI algorithms.

Our _recent venture investment of £7.5M, led by BGF and Downing_, is being used to build, regulate and launch our AI diagnostic solution and support commercialisation.

What has been your biggest challenge so far and how have you overcome this?

We've found the UK venture market to be more risk-averse to hardware companies, which generally require larger amounts of capital early on to develop the technology, with longer development cycles, compared to software companies. This is probably the biggest challenge we've had to overcome.

Attracting the right type of capital early on which acknowledges the unique challenges with developing innovative hardware, as well as the longer returns cycles in healthcare, has been a challenge. As a result of this, the early hardware development was largely funded with public money, until the technology could be sufficiently de-risked for venture investment and our focus shifted more to software.

There are also the somewhat inevitable challenges associated with innovating in medicine: changing mindsets and clinical pathways requires alignment from multiple stakeholders, which takes time etc.

How does TidalSense answer an unmet need?

The current testing for COPD and asthma involves spirometry, an 1840s technology with a number of known shortfalls. It's not only notoriously challenging to perform reliably, requiring specifically trained clinicians, but it's also unpleasant for patients. The average diagnostic spirometry appointment takes 30 minutes and the output is non-specific, (i.e. spirometry on its own doesn't discriminate between respiratory conditions), meaning that misdiagnosis is frequent.

Furthermore, spirometry stopped during the pandemic and has had little pick up since, which has impacted already stretched patient wait times. In England alone, it's estimated that 200-250 per 500,000 of the population are awaiting a respiratory diagnostic test driving wait times of up to 5-10 years. It's clear that there's a need for a faster test that has fewer barriers.

Our solution, N-Tidal Diagnose, uses a simple handheld device, doesn't require specialist training, doesn't require forced breathing (making it more pleasant for patients and eliminating technique-dependence), and can diagnose within minutes. Our preliminary usability studies show that 96% of patients agree that N-Tidal is easy to use, so we know that it's a comfortable experience for patients too.

What's in store for the future?

Our main focus is on building our diagnostics business further in the UK and beyond the UK. We have several new diagnostic AI algorithms in development which we're really excited about as well.

What one piece of advice would you give other founders or future founders?

Honestly, people are the most important thing in your business. If you build the right team and the right culture (which is, of course, easier said than done), you will build a loyal employee base, and importantly, the tough times will be easier and work won't feel like work anymore.

And finally, a more personal question! What's your daily routine and the rules you're living by at the moment?

I've never been one for strict routines, or mornings for that matter. My team knows not to book meetings before 10am unless they want to listen to semi-formed thought processes. I'm definitely not the stereotypical Silicon Valley CEO who gets up at 6am for a jog, pilates and a superfood smoothie before their 9am. You don't have to fit this mould to succeed. I'm rarely conscious before 8.30am and the morning Nespresso and muesli is a must before getting to work; but if there's a leftover tiramisu in the fridge, then I'll have no problem necking that for breakfast instead.

Being a CEO is a very lonely job and you have to shoulder a lot. It's very easy to get consumed by the stresses of running a business and forget to live. This year, on the weekends I am trying to 'do no work'. I have a great chair who sometimes texts me those three words on Fridays. To switch off, I've found that doing sports like bouldering where you have to be in the moment and focus on problem solving to avoid falling is great if, like me, you have a very active brain. And I'm trying to spend more time on self-care activities these days too. It's not something that is spoken about a lot by CEOs, but the mental health of CEOs of early stage companies is, on average, very poor. Fortunately, I have a great team, and to be honest, they look after me – I've started getting weekend self-care reminders from my head of machine learning now. I try to take inspiration from the team too. For example, our software team started a Wednesday lunchtime yoga club, which seems to be proliferating rapidly throughout the company. So I've now bought a yoga mat – let's see whether it ever gets used.

Dr. Ameera Patel is CEO of *TidalSense*.

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