Remote Patient Monitoring Takes Heart:

How Steth IO is Giving Personalized Remote Care in a Digital Age

As organizations around the country are scrambling to remotely manage the exacerbation of chronic conditions in patients following the onset of COVID-19, one organization has been mastering remote medicine since 2015.

Author and title
Suman Mulumudi created Steth IO when he was 15 years of age - a stethoscope that could listen and visualize lung sounds and heart sounds. Seth IO later developed artificial intelligence to identify murmurs and provide clinical decision support to the clinicians. Suman developed Steth IO in his bedroom using a 3D printer, later as the current pandemic was looming, hunkered down at home from college and finishing his final semester he created Steth IO Spot working with a team of engineers, and designers.

Today, Steth IO represents a blend of innovative hardware and software technology designed to connect patients with chronic conditions from home to healthcare. Steth IO's innovative solution provides episodic care for telemedicine visits and remote physiological monitoring between episodes of care creating a continuum of care for chronic diseases. With its remote cardiopulmonary monitors, Steth IO is taking telehealth and remote patient monitoring to the next level with technology that allows patients to check vitals using their smartphone and share data directly with the primary care provider or specialist via a secured platform.

A Better Way to Detect Abnormalities

While a typical doctor visit is rarely complete without the use of a stethoscope, being able to use that tool effectively can take years. Heart murmurs, lung rales or wheezing, and other abnormalities that are key in diagnosing potential problems early but can be subtle and difficult to identify.

Dr. Mulumudi shares:

> *Abnormalities in the heart and lung sounds can be subtle. Although the stethoscope remains an important screening tool, with the advent of new technology like ultrasounds and CT scans, providers are less able to interpret them. Helping providers use the stethoscope effectively to detect abnormalities early on becomes key in screening and getting the appropriate additional testing to address clinical conditions*.

The original hardware for Steth IO was a phone case that could listen to the heart and lungs. Steth IO subsequently developed AI algorithms to process the sounds recorded by the case, visually represent them on a phone screen, and automatically identify potential murmurs and

other abnormalities—providing clinical decision support for teams to review and confirm the abnormalities.

From Provider to Patient: Increasing Accessibility to Remote Patient Monitoring Technology

Now, Steth IO has expanded use of its cardiopulmonary device from provider offices to the home of the patients who need them. Using a device that plugs into the lightning port of their Apple or Android smartphone, patients can record vital signs themselves—opening the door for improved telehealth capabilities for both episodic and chronic conditions.

The FDA-regulated device and app is able to accurately capture heart and lung sounds with the visualizations—as well as visuals of other abnormalities such as rashes or swelling. This gives remote physicians an advantage when identifying possible causes behind coughs, sore throats, fevers, and other symptoms requiring episodic care.

For managing chronic conditions, the device and app work together to provide a robust remote continuum of care. Using the device and app, patients submit vital signs —including pulse rates, respiration rates, temperature, blood pressure, and weight. Physicians can then login and review these signs on a daily basis to monitor for potential issues.

Early Identification for Timely Adjustments, Not Costly Emergencies

According to the CDC, chronic conditions account for 90% of the $3.5 trillion spent on healthcare nationally. And it's estimated that roughly 60% of Americans live with at least one chronic condition—and 40% have two or more.

By facilitating check-ins for patients using the Steth IO Spot device, physicians can use Steth IO portal to identify abnormalities, changes, and potential issues early-on and make adjustments to medications before the condition is exacerbated and requires acute care. Dr. Mulumudi explains:

> *There is a wealth of information that happens between brick-and-mortar provider visits. The idea of monitoring patients between episodes of care allows healthcare providers to harness this data, review patient information more frequently, and make necessary changes to medications or care plans as needed. For example, if someone has a flare up of their CHF, we can suggest changes to their diuretics, restrict water, and allow them to titrate their medications—avoiding a visit to the emergency department or hospital admission. These continuous minor tweaks have a long-term impact on the chronic disease.*

The cost savings when patients are able to avoid such admissions—or readmissions—is significant. Continuing the example of a patient with CHF, the average cost of hospitalization for

a CHF-related diagnosis is $16,000 per visit. For the same patient to be readmitted, a study by the American College of Cardiology shows care costs to total $20,000—suggesting two-fold savings for programs preventing readmissions over the span of two years.

Embracing the Future of Remote Patient Monitoring

By 2030, the Partnership to Fight Chronic Disease estimates that 83 million individuals will have three or more chronic conditions, leading to a cumulative $42 trillion spent on chronic care within fifteen years.

Innovations like Steth IO Spot help providers and patients work together to identify and address potential issues early-on with these patients to prevent unnecessary hospitalization and costs. As these costs decrease, patient outcomes conversely improve with better preventative care and provider connectivity—ultimately fulfilling Steth IO's mission to develop technology that brings medicine into the digital, connected age and potentially saves lives.