A wireless patch for monitoring emergency-room patients

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A small, wireless patch developed by EPFL spin-off Smartcardia can measure emergency-room patients' vital signs with the same reliability as existing systems involving cumbersome cables. After extensive testing at several hospitals, the device recently obtained the European Union's CE marking for medical devices and will be launched on the market in the coming days.

To make the right decisions, emergency-room doctors need to be able to continuously monitor their patients' vital signs, including temperature, pulse, blood pressure, blood oxygen levels, cardiac rhythm and cardiac electrical activity. But existing monitoring systems typically rely on bulky sensors and an array of cables that prevent patients from being able to move comfortably. Smartcardia, an EPFL spin-off, has developed a small patch that contains a fusion of wireless sensors on a single unit, thereby eliminating the need for cables to connect the data collection devices with data storage and display equipment. An internet connection is all doctors need to be able to view and track patients' vital signs remotely and in real time, such as on a smartphone or smartwatch.

The patch can be applied easily to patients' chests. It has been tested successfully on hundreds of patients at several hospitals and has proven to be just as reliable as existing cable-intensive systems. It recently obtained the European Union's CE marking for medical devices; large-scale production has already started and the device will be launched on the Swiss and EU markets in the coming days. "Patients and medical staff alike really appreciate this new wireless system," says Tiziano

Cassina, head of intensive care at Fondazione Cardiocentro Ticino, a cardiac surgery center in Lugano and one of the facilities where the patch was tested.

Researchers in both the private and public sector have long been trying to develop wireless sensors reliable enough to be used on critical-care patients. According to Smartcardia CEO Srinivasan Murali, this patch is the first that performs well enough to replace conventional monitoring systems. Murali and his team spent several years at EPFL developing their device and the complicated algorithms needed to effectively screen out interference signals from things like patients' movements and deliver extremely accurate results.

Monitoring patients at home in real-time

The patch is around 20 cm^2 and can be worn under patients' clothes as they go about their daily activities. Which means the startup's next step is to deploy the system to monitor patients' symptoms while they are at home – preventing them from having to make frequent trips to the hospital. "This kind of system could be used for patients with chronic cardiac or pulmonary diseases, or people with sleep disorders," says Francisco Rincón, Smartcardia CTO. That could help prevent complications and reassure patients living under the sword of Damocles. " Home monitoring of patients is one of the major new frontiers in healthcare, because the remote data collection from patients suffering from chronic diseases would allow to timely diagnose a worsening of the illness and a prompt management could prevent hospital readmission. The continuous stream of vital clinical signs, with the acquisition of relevant physiological signals from a single point-of-care device could encompass out-patient monitoring with in-hospital backup by on-site physician evaluation " says Cassina.

Spotting potential health problems early with

artificial intelligence

Smartcardia is also working on a system that can spot health problems early on and alert care givers. The system uses artificial intelligence and big data to provide important information about a patient's condition before it gets serious. For example, it can detect slight changes in a patient's vital signs and link them together – such as a small increase in blood pressure at the same time as a decrease in blood oxygen level or respiratory rate – in order to compare them with existing models. "There is currently no preventive system out there that looks at key vital signs and is so complete," says Murali. Large-scale clinical trials of the system on over 2,000 patients is under way.

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