Monitoring of critically ill children can be improved by a soft, flexible wireless device that generates accurate, comprehensive, and continuous data.
Careful monitoring of patients in an intensive care setting is complex and involves multiple wired sensors including electrocardiography leads, pulse oximeter, and blood pressure cuff. An intraarterial catheter for continuous blood pressure monitoring frequently is required but poses serious risks. Monitoring of critically ill infants is even more complicated, particularly regarding the need for frequent positional changes for holding, feeding, and diapering, including the skin-to-skin contact with a parent associated with improved outcomes. These activities are severely hampered by wired sensors, and these positional changes may introduce artifacts in the measurements.

Chung and colleagues reported the development of a wireless pair of noninvasive skin-adherent biosensors, one attached to the torso and the other to the foot or hand; these biosensors allow continuous monitoring of blood oxygenation, heart rate, temperature, respiratory rate, and electrocardiography, but also continuous measurement of other parameters, including systolic blood pressure, body orientation, activity, vocalization, and specialized cardiac parameters, none of which are available from noninvasive standard monitoring devices. These outputs compare very well against gold-standard measurements using U.S. Food and Drug Administration–approved devices and have less potential for artifact generated by motion or ambient sound. These measurements are wirelessly transmitted to generate a real-time graphical display within 10 m of the device. The device allows multiple approaches to power management, including wireless recharging of a fully enclosed battery; removable battery options allow for autoclaving of the device for sterilization. The device is soft and highly flexible, and the torso biosensor can be placed on the chest or back, allowing further flexibility. Both sensors have been tested in >50 neonates without any skin adverse events and with negligible heat generation.

This device has promising preliminary clinical data that demonstrate its accuracy, high performance, and versatility, and it appears very close to widespread dissemination. Further testing will be critical to ensure that it reliably compares with gold-standard approaches across a broad range of clinical situations before it can completely replace current monitoring modalities. However, this device and others that likely will follow seem poised to revolutionize the intensive monitoring of critically ill children and also will have applicability to adult patients.

Highlighted Article


Recommended articles from TrendMD

Epidermal devices for noninvasive, precise, and continuous mapping of macrovascular and microvascular blood flow
R. Chad Webb et al., Sci Adv, 2015

Skin-like biosensor system via electrochemical channels for noninvasive blood glucose monitoring
Yihao Chen et al., Sci Adv, 2017

Printed multifunctional flexible device with an integrated motion sensor for health care monitoring.

Flexible submental sensor patch with remote monitoring controls for management of oropharyngeal swallowing disorders
Min Ku Kim et al., Sci Adv, 2019

Epidermal electronics for noninvasive, wireless, quantitative assessment of ventricular shunt function in patients with hydrocephalus
Siddharth R. Krishnan et al., Sci Transl Med, 2018

Arterial pressure changes monitoring with a new precordial noninvasive sensor
Lucia Venneri, Radcliffe Cardiology

Arterial pressure changes monitoring with a new precordial noninvasive sensor
Lucia Venneri et al., Cardiac failure review.

Remote Monitoring for Follow-up of Patients with Cardiac Implantable Electronic Devices
Niraj Varma, Radcliffe Cardiology, 2014

Ultrafiltration in the Management of Heart Failure
Maria Rosa Costanzo, US Cardiology Review

Electrocardiography in Various Settings
Omron, European Cardiology Review

Powered by TrendMD
Related Jobs

Postdoctoral Fellow
Emory University
Emory University School of Medicine, Atlanta, GA

W2 - Professorship of Biopharmacy
/Pharmaceutical Technology (m-f-d)
Martin-Luther-University Halle-Wittenberg
Halle (Saale), Sachsen-Anhalt (DE)

Postdoctoral Fellow - The Role of Stem
Cells in Gastrointestinal Disease
Cincinnati Children's Research Foundation
Cincinnati, Ohio

Read the Latest Issue of Science

3 April 2020
Vol 368, Issue 6486

FEATURE
Where are the women?