the detection, staging, and tracking of AD and potentially reduce the need for more-invasive and expensive techniques. ❐

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Competing interests
Washington University and R.J.B. have equity ownership interest in C2N Diagnostics and receive royalty income based on technology (blood plasma assay) licensed by Washington University to C2N Diagnostics, and R.J.B. receives income from C2N Diagnostics for serving on the scientific advisory board. Washington University has submitted the US provisional patent application 'Plasma Based Methods for Detecting CNS Amyloid Deposition' (co-inventor, R.J.B.) and the US non-provisional patent application 'Methods of Diagnosing and Treating Based on Site-Specific Tau Phosphorylation' (co-inventors, R.J.B. and N.R.B.).

DIGITAL HEALTH

Wireless monitoring in the ICU on the horizon

Wireless monitoring of vital signs in the neonatal intensive care unit enables the detection of vital signs, body movement, and vocalization.

Prakesh S. Shah

High-risk newborn infants admitted to neonatal or pediatric intensive care units (ICUs) are usually monitored for vital signs via wired technology with rigid interfaces attached to the immature skin of these patients. This requires multiple wires and at present does not measure blood pressure or temperature, which requires extra devices and wires. This type of monitoring can interfere with the baby's movement as well as limiting the opportunities for parents to hold the baby while the baby is attached to the wires and monitors. In this issue of *Nature Medicine*, Chung et al. report their development of a prototype of a conformable, skin-safe, soft, sterilizable, and reusable biosensor for the wireless data capture of vital signs and vocal biomarkers from newborn and pediatric patients in the ICU[1] (Fig. 1).

Chung et al. had previously developed a wireless sensor for monitoring infants in the ICU, and here they refined this[2]. They used Bluetooth technology, which allowed signal transmission of up to a distance of 10 meters. The sensor has the ability to capture movement and position signals; vocal changes (cries); and quantified pulse-wave dynamics, which can help in the recording of blood pressure. The sensors were tested for vital-signs monitoring for short periods in 3–20 neonates, and skin safety was assessed for a continuous 24 hours in 50 neonates. Comparing the new prototype and current standard sensors, the authors identified very small measurement differences between the two for heart rate, oxygen saturation, and body temperature, and slightly greater differences for respiratory rate and blood pressure (still within recommended ranges) over a 60-minute period, in even in preterm neonates of 27 weeks' gestation. Other notable advantages of the new sensors included maintenance of skin integrity after 24 hours of continuous use with no heat-induced damage, and a lack of interference with diagnostic imaging studies such as X-rays.

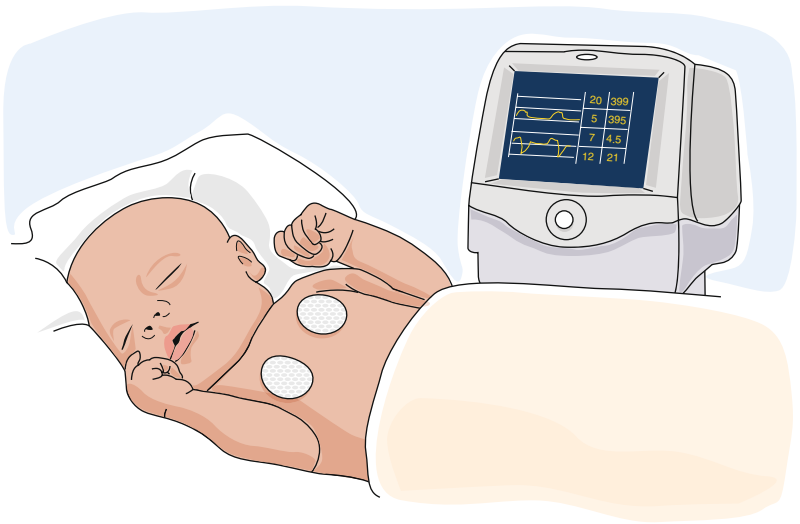

Fig. 1 | A baby's vital signals can be monitored by wireless devices.

Multiple technological challenges were considered by the authors. Their attention to fabrication, sensor size, and water resistance in the sensors all enhanced usability. Furthermore, the sensors included skin-friendly characteristics and easy-to-peel adhesives that did not elicit substantial dermatological reactions; even extremely pre-term neonates did not react to them. A newborn or child inevitably needs a sensor that maintains functionality while adapting to the continuous movement of newborns

and children[3]. The new sensor's ability to detect pulse signals indicates its malleability and versatility. Another feature of this system is its ability to monitor heart-rate variability, which can be useful in predicting a change in the baby's clinical status before obvious signs of disease become apparent. Furthermore, the water resistance allows its use in the high-humidity environment of a preterm neonate's incubator. Additionally, the system-level integration provided by Bluetooth technology could alleviate practicality-of-usage concerns.

It is notable that although the absolute differences between measurements obtained with this sensor and those obtained with standard sensors were within acceptable ranges, differences for certain parameters may have clinical relevance for extremely preterm neonates with relatively low blood pressure and warrant further investigation before implementation of this system in the ICU. Additionally, the current testing was limited to children with relatively normal vital parameters; further testing is also needed in children with abnormal vital signs to ensure that the results remain similar[4].

Furthermore, a particularly important and challenging consideration for the new biosensors will be their implementation in routine care. As the recommendation for neonatal care is moving more and more to skin-to-skin care[5] and family integration[6], wireless monitoring is immensely valuable from the perspectives of the psychosocial well-being of the children and their parents, health outcomes, and resource utilization. This technology offers most elements desired by healthcare workers[7] for an intensive care monitoring system, but they will need some further reassurance about perceived barriers, including trust in newer digital technologies. A review of trust in digital health has also identified other barriers—excessive cost, defective technology, and time-consuming troubleshooting[8]—which are probably applicable to this technology and should not be forgotten. Finally, the traditional preference for status quo over innovation and the demands of stricter validation for newer technologies may signal an arduous path ahead from a regulatory-approval perspective[3]. However, the proliferation of digital health technologies at all levels has opened an effective dialog with regulatory agencies, and there is willingness from all parties to push this envelope faster than before, with an understanding of the limitations and process of ongoing evaluation.

Overall, Chung et al. have described a promising technology that can revolutionize monitoring and humanize care[1]. They have undertaken pilot testing of a patient- and parent-friendly monitoring device with improved capabilities for recording more information. It can integrate multiple outputs for machine-learning algorithms to develop prediction models to identify acute deteriorations before they occur.

Thus, this wireless monitoring system demonstrates many hallmarks of a health-technology revolution. However, the path between testing and routine use in both high-resource settings and low-resource settings includes several surmountable challenges. Once these are met, we can easily think that such systems can only lead to improved outcomes and that the ICUs of the coming decade could be more comforting places. ❐

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Competing interests

The author declares no competing interests.

INFECTIOUS DISEASE

Emergence of a novel human coronavirus threatening human health

In late December 2019, a cluster of patients with 'atypical pneumonia' of unknown etiology was reported in Wuhan, China. A novel human coronavirus, now provisionally called 'SARS-CoV-2', was identified as the cause of this disease, now named 'COVID-19'.

Leo L. M. Poon and Malik Peiris

It is increasingly recognized that coronaviruses can cause major emerging viral disease threats, with the respiratory syndromes SARS and MERS being two recent examples, and two coronaviruses now endemic in humans (229E and OC43) have emerged from animals within the past few hundred years[1]. The outbreak of the coronavirus SARS-CoV-2 started in December 2019. On the 30 January 2020, the World Health Organization declared this event a Public Health Emergency of International Concern. The reported cases and deaths of COVID-19 already exceed those of SARS or MERS. Here we highlight some of the key recent findings related to this global epidemic.

SARS-CoV-2 can be readily cultured from clinical specimens, and viral isolates are now available in mainland China[2] and elsewhere, including in our own laboratory (Fig. 1). SARS-CoV-2 is genetically similar to other coronaviruses in the subgenus *Sarbecovirus*, a clade of betacoronaviruses formed by the coronavirus that causes SARS (SARS-CoV) and other SARS-CoV-like coronaviruses