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Intelligent sensor informs you to change a diaper via SMS

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IBN's diaper wetness monitoring system can alert caregivers by SMS when the patient's diaper needs to be changed. Credit: A*STAR

Diapers could soon come with a sensor that alerts caregivers by SMS when the diapers are soiled. Researchers from the Institute of Bioengineering and Nanotechnology (IBN) of A*STAR have invented an "intelligent continence management system" comprising a thin disposable sensor strip, a compact wireless transmitter, a receiver and

software, which has the potential to improve the care of elderly and bedridden patients.

"Lying in soiled diapers for prolonged periods is not only uncomfortable and unhygienic, but may also cause skin rashes and infection for the wearer. While increasing the frequency of diaper checks and changes may help to reduce this problem, it would also add to the workload of caregivers. Clearly, there is a need for an alternative solution," said IBN Executive Director, Professor Jackie Y. Ying, who led the research effort.

Timely replacement of soiled diapers is a challenge for caregivers of patients who are unable to communicate this need, such as those who suffer from aphasia, the loss of speech after a stroke or brain injury.

IBN's sensor can be easily integrated into the adult diapers currently available in the market to facilitate timely diaper change. It comes in the form of a thin, lightweight strip of metal, plastic and paper. This inexpensive strip will be embedded in the diaper and can be disposed easily after use. The wireless transmitter, which is connected to the sensor, is easily attached and removed for reuse.

IBN's system tracks the wetness level in the diaper via the sensor. Once the diaper wetness reaches a predetermined level, the sensor will transmit a signal wirelessly to the caregivers using their preferred interface such as SMS. This will prompt the caregiver to change the patient's diaper when needed.

IBN conducted a clinical validation of the prototype on 20 elderly residents at
St Joseph's Home in November-December 2013. The validation was supported by the Agency for Integrated Care, and Dr Philip Yap, a specialist in geriatric medicine from Khoo Teck Puat Hospital, who is

also IBN's Adjunct Clinician Scientist.

The validation results show that IBN's diaper wetness monitoring system was robust, reliable, easy to use, and highly accurate in detecting soiled diapers. Importantly, patients wearing the sensor-embedded diapers spent approximately 90% less time in wet diapers compared to those wearing normal diapers. Each sensor-embedded diaper was changed within minutes after the caregiver received the alert.

"Physically frail and cognitively impaired patients have for a long time suffered the ignominy of lying for prolonged periods in soiled diapers; this is incompatible with the high quality care we want to give to our patients. The smart diaper sensor is a significant advancement for we can now truly provide care that upholds the dignity of our patients and reduces the risk of complications such as skin breakdown and infections," shared Dr Philip Yap.

This patented technology has been licensed to IBN's eighth spin-off company Wet Alert Pte Ltd in March this year for commercialization. The technology also won the Bronze Prize at the Long-Term Care Quality Festival Poster Competition in 2014 organized by the Ministry of Health and the Agency for Integrated Care.

"Our diaper sensor would contribute toward better management of elderly and bedridden patients in nursing homes, hospitals and at home. We are now working with Wet Alert to develop the prototype into a commercial product by further improving its user-friendliness and reducing the production cost," added Professor Ying.

Provided by Agency for Science, Technology and Research (A*STAR), Singapore

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