Magee and CMU Partner to develop novel app to combat preterm birth

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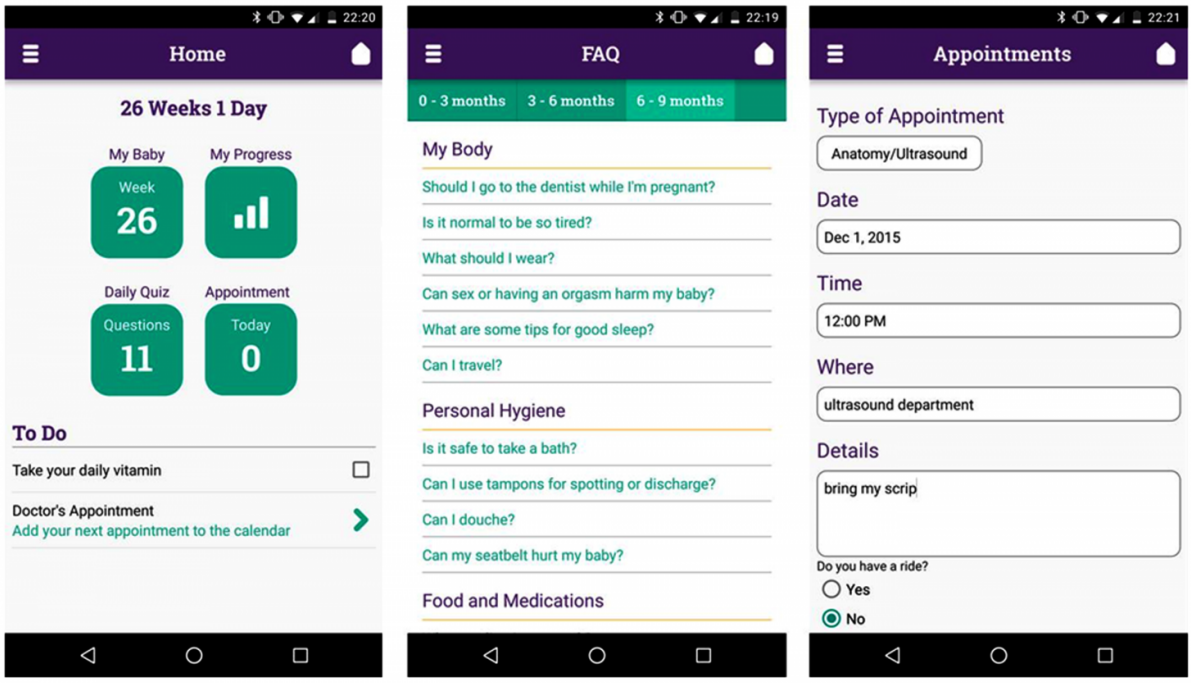

The app answers FAQs, helps users track appointments, and much more. Credit: Carnegie Mellon University, Department of Civil and Environmental Engineering

Maternal-fetal medicine specialists at Magee-Womens Hospital of UPMC collaborated with decision scientists at Carnegie Mellon University (CMU) to develop and test a personalized smartphone

application designed to combat preterm birth by engaging a typically hard-to-reach population of pregnant women. The findings, reported in the *Journal of Medical Internet Research mHealth and uHealth*, indicate that the app was successful in providing accessible and personalized obstetrical care, designed specifically to target preterm birth risk.

Preterm birth, the leading cause of neonatal death or long-term disability, is on the rise in the United States with approximately one of every 10 births occurring prior to 37 weeks of gestation. These rates are disproportionately high among some socioeconomic groups, including African Americans and families living in poverty. These patient groups often are the hardest to reach due to limited access to and attendance at routine prenatal care.

"Mobile phone apps are a great way to engage a vulnerable population in their health care because approximately 86 percent of American adults own a mobile phone, regardless of racial and ethnic groups," explained Tamar Krishnamurti, Ph.D., lead author and assistant research professor of engineering and public policy at CMU. "Moreover, 20 percent of all smartphone owners downloaded a pregnancy app in 2015. Although hundreds of pregnancy-related apps exist, few have been developed through a scientific process that is patient-centered and grounded in behavioral decision research."

To develop the app, CMU decision scientists and Magee maternal-fetal medicine specialists conducted interviews and user testing with medical experts and women recruited from high-risk groups. Sixteen study participants from Magee's outpatient clinic, which specializes in high-risk pregnancies, were then provided a smartphone with the preloaded app and a digital weight scale. Through the app, participants were queried daily over three months to assess such risk factors as rate of weight gain, smoking, alcohol consumption, depression and intimate partner violence. Because transportation to appointments is often a

barrier to prenatal care, free transportation using Uber was incorporated into the app's functionality.

The researchers found that use of the app was higher among participants at higher risk, as reflected in such factors as poorer daily moods or being earlier in their pregnancies. Participants had an attendance rate of 84 percent at prenatal appointments (89 percent for those who used Uber) compared with the clinic norm of 50 percent, with conservatively estimated cost savings of $450 per patient over three months.

On average, participants voluntarily logged into the app every one and a half days to complete daily risk assessments. Computer algorithms then delivered patient-specific risk feedback and recommendations tailored to individual users. For example, if the app detected a decrease in self-reported cigarette use, it provided encouraging messages in addition to quitting resources. The app also provided basic pregnancy education, reminders about appointments, and fetal health monitoring aids like a "kick counter."

When the app detected high-risk events such as intimate partner violence or thoughts of suicide, it sent real-time alerts to medical staff. Women were then contacted directly and linked to appropriate medical and social service resources.

"While we do not understand why certain socioeconomic groups are at a higher-risk for preterm birth, we do know that prenatal care that starts early in pregnancy is critical for a healthy baby and mother," explained Hyagriv Simhan, M.D., professor, Obstetrics, Gynecology, and Reproductive Sciences, University of Pittsburgh School of Medicine, and chief, Division of Maternal-Fetal Medicine at Magee. "This pilot shows that smartphone apps are a promising and potentially cost-saving way to provide personalized care for the highest-risk patients."

The researchers' next steps include conducting a randomized controlled trial over the entire pregnancy of participants and evaluating the effects of the app on behavioral and clinical outcomes, including adverse birth outcomes.

More information: Development and Testing of the MyHealthyPregnancy App: A Behavioral Decision Research-Based Tool for Assessing and Communicating Pregnancy Risk. *Journal of Medical Internet Research mHealth and uHealth*. DOI: 10.2196/mhealth.7036

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