



The hospital of tomorrow is in a patient's home

By Eric J. Topol, M.D. | January 9, 2017

Technology is changing how hospitals care for patients. Innovations in remote monitoring and mobile apps are shifting more and more hospital services to outpatient facilities, urgent care, and even to patients' homes. Innovations such as the smartphone ECG (electrocardiogram) have already reduced emergency room visits for patients with heart rhythm disorders. This trend will ultimately lead to radical redefinition of the hospital's routine inpatient functions, with minimal impact on intensive care units, operating rooms, and advanced imaging facilities.

A major contributor to this change comes from advances in remote physiological monitoring, potentially pre-empting the need for hospitalization. Although the medical community has taken only tentative steps to adopt it, monitoring technology is now able to deliver a high level of accuracy and sophistication to standard hospital functions like tracking all vital signs. And remote monitoring from home means that a patient's physiological metrics can be followed around the clock, instead of once per shift.

The transition to providing care at home hinges on our ability to capture and analyze enormous amounts of patient data, generated continuously by multiple sensors in real time. The data are

monitored and analyzed by algorithms and cued up for medical professionals at centrally located data surveillance facilities. If, for example, using predictive analytics, a cardiac patient's vital signs foretell instability, an alarm can trigger immediate notification for the patient's care provider.

Telemedicine allows experts to care for geographically dispersed patients, without the cost and inconvenience of transport. One such data surveillance center is at Mercy Hospital in St. Louis, where healthcare teams have the composite, real-time view of patients' vital signs, all their medical records, prescriptions, and lab work. Mercy Hospital has also received federal funding to install and utilize monitoring devices in patients' homes.

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By integrating and assessing this data, care teams can devise better interventions and treatment plans. It's now possible to achieve the same level of

intensive care unit monitoring in a patient's own home, at a fraction of the cost of a hospital stay, where a single overnight averages \$4,500.

However, the medical community still lags in its willingness to embrace remote monitoring technology. That's partly because today's healthcare reimbursement structures don't incentivize innovative approaches such as home care that are designed to reduce cost. Instead, under current payment schedules, hospitals benefit from having patients in their beds.

Changing the reimbursement models will help spur innovation and drive the medical community to embrace change. Physician researchers can do their part by validating home monitoring in clinical trials, using the algorithms and artificial intelligence tools needed to extract the maximal usefulness from each patient's data.

Hospitals are just the latest among many institutions to be disrupted by technology, and sooner or later, patients will demand new lower-cost options like home care. Once patients start experiencing the accompanying convenience and savings, they'll question why they need to go to a facility, when exams or procedures could be done remotely. This increasing consumer awareness will likely push the medical establishment to overcome its resistance to change, for everyone's benefit.

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