An Innovative Technology Profile:

In-Car Telehealth

Class IV

The automobile is synonymous with American life and, increasingly, synonymous with America's growing obesity epidemic. Given that 119 million Americans, or 86% of all commuters, use a car and that the average commute by car is 24-28 minutes, Americans spend more than 47 million hours in the car each year driving to and from work alone.[1] Some health care technology manufacturers are developing systems to make use of this "lost" time for health management purposes.

In-car telemedicine is an emerging class of technologies that leverage recent advancements in automobiles to monitor and manage chronic diseases. As more cars are equipped with information technology systems and wireless capabilities, car manufacturers are beginning to leverage these new capabilities to actively monitor patients' health while driving.

Both Ford, with their "Sync" technology, and Toyota are actively developing in-car telehealth technologies. Ford, in particular, is developing its technology in partnership with other traditional health care companies including device manufacturer Medtronic, e-health provider WellDoc, and allergy management website developer SDI Health.

Use Case

- In-car telehealth can offer a safe and effective way to utilize mobile telehealth technology while patients are driving.
  - Portable medical devices, be they stand-alone or smartphone-based, face significant and growing legal limitations on use while driving.
  - Advanced information technology and mobile data connectivity have become increasingly common in automobiles. Voice recognition and wireless connectivity (Bluetooth) technology currently allow drivers to make phone calls, use GPS mapping and manage more traditional functions.
  - In-car telehealth uses the built-in automotive systems in conjunction with wireless health measurement devices and cloud-based data systems.
- The system is designed to support the management of chronic conditions.
  - Example Use Case 1: A diabetic patient's wireless glucose monitor communicates with the system, alerting that the driver is borderline hypoglycemic. The driver is prompted by the vehicle to remind him of the need to manage his blood sugar and to, if necessary, pull over and stop driving. Such an approach can enhance the consistent maintenance of glucose control or, in extreme cases, prevent loss of consciousness and resulting accidents.
  - Example Use Case 2: An asthma patient, driving through a known asthma attack-inducing allergen area, is warned by the system and the vehicle automatically switches the HVAC system to recirculate and closes the windows. These steps can prevent an asthma attack or prompt the driver to have a rescue inhaler at the ready.
  - Example Use Case 3: A patient with a known cardiovascular condition can be continuously monitored by integrated heart monitors. These data can be used to provide alerts to patients of impending heart attacks or to collect data for analysis.
- The system is wirelessly linked to cloud-based data management systems, allowing for the collection, analysis and use of data collected in the vehicle and from other sources.

[1] McKenzie, B and Rapino, M (2011). Commuting in the United States: 2009, American Community Survey Reports, ACS- 15. U.S. Census Bureau, Washington, DC.

- The system also allows for real-time patient coaching, behavioral education and medication adherence support information to be "pushed" to the driver based on collected data.

Clinical Benefit

- No published data currently exist on the clinical benefits of in-car telehealth.
- However, data do suggest that general mobile telehealth interventions for diabetes can be clinically effective:
    - In one study, intervention patients exhibited a 1.9 percent decline in A1C compared to 0.7 percent for the usual care group after one year. All patients had private insurance coverage and access to the internet (manufacturer, n=163).[2]
    - The probability of surviving the first year after a heart attack was more than double for patients using cardiac telemonitoring services compared to those who did not use the service (mortality rate of 4.4 percent compared to 9.7 percent) (Israel, Intervention = 699, Control = 3,899).[3]

Financial Analysis

- No published data currently exist on the financial benefits or return-on-investment for this technology.
- Technology costs are not yet known, but it is anticipated that the majority of the system costs would be covered in the purchase of the vehicle and, as such, not require financial support from the health care system.
    - Given the use of standard connectivity technology protocols, the costs of health care devices which connect into the system should not be higher than other connected devices.
    - Ongoing service/monitoring fees will likely be necessary, but specific costs are currently unknown.

Barriers to Adoption

- *Availability*: None of the technologies are currently available to the public.
- *Regulatory Approval*: Significant unanswered questions remain regarding need for FDA 510(k) regulatory approval for these systems, perhaps even the vehicle – is it a " 4,000 pound medical device?"
- *Limited Data*: No clinical trials or significant pilot programs have been conducted to test this technology.
- *Reimbursement Issues* There is, as yet, no clear financial model for the ongoing funding of this technology and its associated service. It also remains unclear whether any costs would be borne by the patient themselves or paid for through traditional health insurance models.

Next Steps to Implementation

1. Clarify Regulatory Issues: A proactive approach to clarifying outstanding regulatory approval issues is required to advance the prospects of in-car telehealth. Manufacturers should begin conversations with the FDA regarding the regulatory framework for these "devices" as well as with the appropriate automotive regulatory agencies.
2. Identify Patient/Consumer Need: Significant effort is needed to develop compelling use cases for in-car telehealth from the perspective of patients/consumers. Given that consumers are responsible for much of the financial investment in this technology, via the purchase of the vehicle, the technology must have a compelling benefit to them, not simply to the health care system.

[2] Quinn, C (2011). Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control, *Diabetes Care,* 2011; 34:1934–1942.
[3] SHL Telemedicine (2007). Results from The Israeli Heart Society (ACSIS), April 2007. Accepted for Publication in the European Heart Journal. Investor Presentation. Accessed December 2011.