Improving Your Blood Pressure Using Smart Technology

The American Society of Hypertension and the American Heart Association published recommendations in 2008 that home blood pressure measurement become a routine component of monitoring in the majoring of patients with known or suspected hypertension. This study offers wireless home monitoring to patients who have been identified by their primary health care provider as having newly diagnosed hypertension, or as having out of control (>140/90) hypertension.

**Purpose**
The purpose of the *Improving Your Blood Pressure Using Smart Technology* study is to improve the monitoring, management, and control of hypertension by identifying high risk patients with the diagnosis of hypertension, engaging the patients in discussion and education about their disease, promoting self-monitoring using an automated wireless blood pressure measurement device, and expanding the use of the electronic health record (EHR) to manage the disease.

**Background**
Blood pressure readings are a continuous variable defined only by multiple measurements under various conditions. Office measurements are often inaccurate for a variety of reasons, so a logical solution is to have patients with hypertension monitor their blood pressure at home and/or work where they spend most of their time. Rapidly growing literature shows that measurements taken by patients at home are often lower than office reading and closer to the average blood pressure recorded by 24-hour ambulatory monitors.¹ Billings Clinic has partnered with the American Medical Group Association (AMGA) and its’ constituents, over 430 medical groups in a Measure Up Pressure Down national campaign. The primary campaign goals are to mobilize medical groups to achieve measurable improvements in high blood pressure prevention; detection and control-80% of patients at goal by 2016. Secondarily, engage and empower patients to actively manage their health, by raising awareness of the dangers of uncontrolled high blood pressure and to encourage consumers to obtain blood pressure screening, partner with health provider, make life style changes, etc. Billings Clinic has joined with American Medical Group Foundation (AMGF), Anceta (a data warehouse forAMGA) and Withings, Inc., in a project that uses the Automatic Wireless Blood Pressure Monitor system to allow participants to transmit home blood pressure readings to Anceta, and Billings Clinic, via an iPhone, iPad, iPod Touch, or Android smart phone device. Billings Clinic will transfer the actual blood pressure values to the Cerner electronic medical record twice a week and Anceta will use the Withings and Cerner data to evaluate progress of hypertension in this population.

**Significance**
The prevalence of hypertension (HTN) has increased significantly in Yellowstone County in the last nine years, from one-fourth of the adult population in 2005 to more than one-third of the population in 2014.² These rates are twice the Health People 2010 target of 16% or lower.³ Despite improvements, about 20% of the U.S. population professes to be unaware of being hypertensive, and only 50% of all people with HTN have controlled blood pressure.¹⁴ At Billings Clinic, 31% of patients with HTN remain uncontrolled.⁵ As obesity incidence increases and the population ages in the U.S., the number of patients with hypertension is likely to grow. Over the last 14 years, the rates of overweight or obese adults in
Yellowstone County increased from a low of 62.7% in 2005 to a high of 74.7% in 2010, and are currently, in 2014 at 67.1%.

Hypertension is associated with a number of serious adverse effects, including the risk for cardiovascular disease, stroke, ischemic heart disease (IHD), heart failure, left ventricular hypertrophy, and intracerebral hemorrhage. It is also a risk factor for chronic kidney disease and end-stage renal disease. Hypertension is associated with an enhanced incidence of ventricular arrhythmias, death following myocardial infarction, and sudden cardiac death.

**Outcome measures**

1. How satisfied physicians/staff/participant are with use of the device, the usefulness of the measurements, the ability of the device to improve blood pressure control, how useful the home blood pressure monitoring was in modifying treatment patterns such as visit frequency and medication changes.
2. Clinical outcome measures will include longitudinal blood pressure control among HTN patients collected per physician instruction to the patient.

**References**

5. Improving the management of hypertension through positive deviance: Billings Clinic. 2010.

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