

## White Paper: Hypertension

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## Hypertension

**Growing Problem** -73 million Americans have high blood pressure (defined as an individual: with systolic pressure of 140 mmHg or greater and/or diastolic pressure of 90 mmHg or greater, taking antihypertensive medication, or being told at least twice as having high blood pressure by a physician or other healthcare professional). Nearly one in three U.S. adults has hypertension. About 69% of people who have a first heart attack, 77% who have a first stroke, and 74% with heart failure have blood pressure higher than 140/90 mmHg<sup>1</sup>.

**Consequence** - Among those individuals with hypertension age 18 and older, 71.8% are aware of their condition, and 61.4% are currently undergoing treatment. However, just 35.1% have their blood pressure under control while 64.9% do not. This large gap continues despite the facts that more than 90% of adults with hypertension have health insurance, and hypertension is the leading cause of visits to the doctor. If blood pressure control could be improved, cardiovascular morbidity and mortality would decrease significantly<sup>2</sup>.

**Cost** - The estimated direct and indirect cost of high blood pressure for 2008 is \$69.4 billion. This is probably an underestimation because of the costs of coronary heart disease (\$156.4 billion), Stroke (\$65.5 billion) and heart failure (\$34.8 billion) all having a high association with hypertension<sup>3</sup>. Approximately 12.8% of all deaths (7.1 million) and 4.4% of all disability life-years lost (64.3 million) in the year 2000 were due to cardiovascular disease (CVD) attributable to uncontrolled Blood Pressure (BP).

**Opportunity** - Controlled blood pressure has been associated with a 35-40% mean reduction in stroke incidence, 20-25% mean reduction in myocardial infarctions and more than 50% reduction in heart failure. An increase in 20 mmHg systolic or 10 mmHg diastolic blood pressures doubles the risk of cardiovascular disease. A 12 mmHg decrease in stage 1 hypertensive patients with cardiovascular risk factors will prevent 1 death in every 11 treated patients over 10 years and in patients with cardiovascular disease and /or target organ damage 1 death in every 9 patients will be prevented<sup>4</sup>.

The use of home blood pressure monitoring is recommended by several national and international guidelines for the management of hypertension, including The American Heart Association, The American Society of Hypertension, The Canadian Hypertension Society, The European Society of Hypertension, The British Hypertension Society, The European Society of Hypertension, The Japanese Hypertension Society, the World Health Organization–International Society of Hypertension, and JNC 7 which is the generally accepted guideline for the United States<sup>5</sup>.

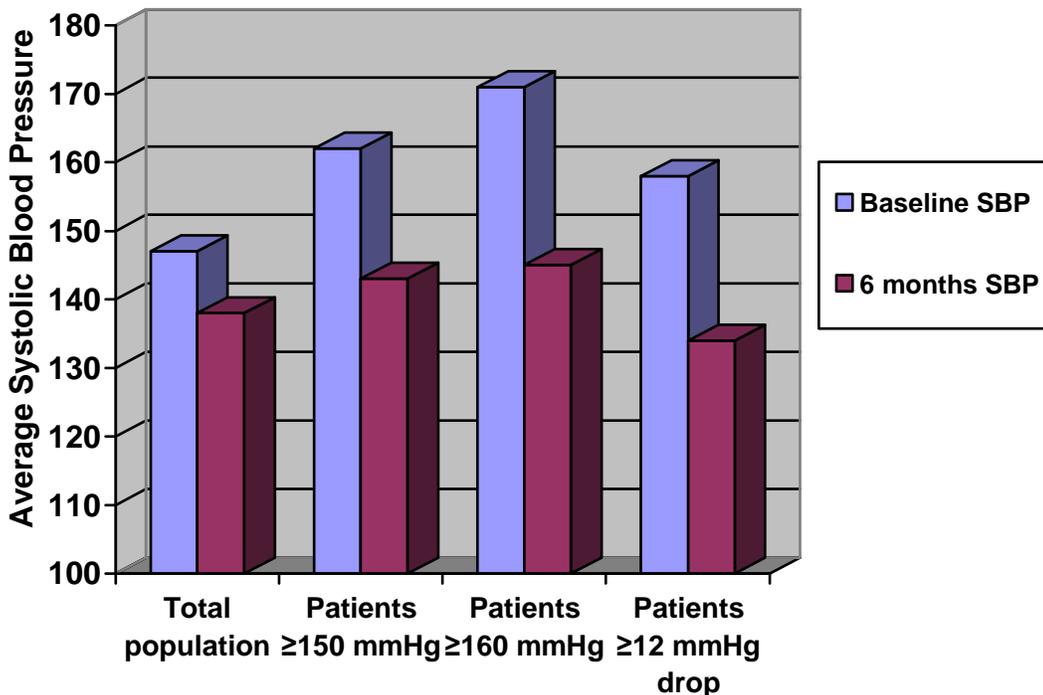
**The IDEAL LIFE Solution™** - The IDEAL LIFE Hypertension program has been successfully tested to optimize at-home treatment. Through the use of a wireless enabled blood pressure device, combined with the remote IDEAL LIFE information management platform™ a patient's blood pressure and heart rate are immediately communicated remotely to the hypertension automatic data analysis engine. Within seconds of taking a

blood pressure and heart rate measurement, information is logged and analyzed, and when appropriate, alerts generated and communicated. This allows for timely adjustment of treatment and proper management of the chronic condition.

**IDEAL LIFE Results** – In an analysis of 904 patients using real-time readings on the hypertension management program for a period of six months, the average reduction of systolic blood pressure was 9 mmHg, from 147 mmHg to 138 mmHg. The largest reduction seen on any one patient was 77 mmHg, from 221 to 144. 48% of the patients had a greater than 10 mmHg reduction in their average systolic blood pressure (SBP). 61% of the patients had a greater than 5 mm Hg in their SBP.

Before entering the program, 42% of patients had an average systolic blood pressure of  $\geq 150$  mmHg. These patients experienced an average reduction of 19 mmHg, from an average of 162 mmHg to an average of 143 mmHg. 21% of patients had an average systolic blood pressure of  $\geq 160$  mmHg. These patients experienced an average reduction of 26 mmHg, from an average of 171 mmHg to an average of 145 mmHg. 42% of patients experienced a  $\geq 12$  mmHg drop in their average systolic blood pressure, from an average of 158 mmHg to an average of 134 mmHg.

**IDEAL LIFE Hypertension program after six months of 904 patients**



These decreases in blood pressure are very significant because controlled blood pressure has been associated with a 35-40% mean reduction in stroke incidence, 20-25% mean reduction in myocardial infarctions and more than 50% reduction in heart failure. A 12

mmHg drop in average systolic blood pressure will save one life in every 11 treated patients over ten years<sup>6</sup>, in the 904 patient population almost 40 lives would be saved. The IDEAL LIFE solution™ has displayed through remote monitoring and timely interventions the opportunity to save lives and decrease serious complications which will allow patients to live longer and healthier lives.

The phenomenon of reporting bias is another important aspect that the IDEAL LIFE System overcomes. Home BP monitoring has shown to be a better predictor of morbidity than office BP readings, although traditionally, home readings have the problem of reporting bias. The phenomenon of reporting bias occurs when patients do not accurately report their BP readings. A possible explanation for the reporting bias is some patients lower their BP readings to avoid additional antihypertensive medication and some report higher readings to emphasize the severity of their hypertension<sup>7</sup>. IDEAL LIFE avoids this bias, among others, by automatically communicating the data when a measurement reading is taken, remotely updating the patient's record independently of the patient.

Another issue of concern includes possible misdiagnoses when using unreliable office readings as the sole tool of assessment. Known as the white coat effect, patients in the community can experience a high office blood pressure in the physician office with normal home blood pressure. A substantial proportion of patients receiving antihypertensive medication are being over treated due to this phenomenon<sup>8</sup>. The IDEAL LIFE System allows the treating clinician to receive the home blood pressure information in a easy fashion to overcome potential concerns of misdiagnoses related to unreliable office readings.

The case studies below illustrate a few examples of the above noted issues concerning current usual care practices. An example of the white coat effect is an 80 year old man with office systolic blood pressure readings above 150 mmHg and 160 mmHg. His PCP doubled the patient's dose of nifedipine. The patient continued monitoring on the IDEAL LIFE system and BP readings below 100/60 mmHg were discovered. The patient was experiencing hypotensive symptoms as well. The patient's dose was lowered and his hypertension was brought under control.

Another case study demonstrating the concern of using unreliable office readings as the sole tool of assessment relates to masked hypertension or reverse white coat effect, and was observed in a female patient on the IDEAL LIFE system at 79 years of age. She had a history of multiple mini strokes yet was reported to have consistently normal office blood pressure readings. After initiating home blood pressure monitoring on IDEAL LIFE it was identified that her home blood pressure readings ranged from 180/100 mmHg to 220/140 mmHg. The patient was instantly identified as hypertensive and a change in drug therapy was initiated which subsequently allowed the patient to achieve goal BP.

A case study of a 90 year old female patient, demonstrated the possible adjustments that can be undertaken to prevent an adverse event and a possible hospitalization. The patient was on antibiotics for a GI infection, had complaints of diarrhea, excessive urination,

severe dizziness, and weakness. The blood pressure trend showed a decline on the IDEAL LIFE system, in response the patient was contacted. It was discovered the patient was still taking a diuretic that she had previously been told to discontinue. The patient's medications were adjusted and a hypotensive event and possible dehydration were reversed and prevented.

Hypertension is a risk factor for heart disease, kidney disease and stroke. Patients achieving target blood pressure can prevent many of these devastating and costly diseases. It has been shown through the proper use of medication these complications can be prevented<sup>9</sup>. Using reliable at home health information can assist patients achieve long term management of their chronic conditions. IDEAL LIFE is a proven solution that delivers home health information through a cost effective and easy to use platform, that helps modify treatment to achieve reductions in morbidity and mortality.

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<sup>1</sup> American Heart Association. Heart Disease and Stroke Statistics — 2008 Update. Dallas, Texas: American Heart Association; 2008. ©2008, American Heart Association

<sup>2</sup> B.B. Green et al. Electronic Communications and Home Blood Pressure Monitoring (e-BP) study: Design, delivery, and evaluation framework, *Contemporary Clinical Trials* 29 (2008) 376–395

<sup>3</sup> American Heart Association. Heart Disease and Stroke Statistics — 2008 Update. Dallas, Texas: American Heart Association; 2008. ©2008, American Heart Association

<sup>4</sup> A. W. Chobanian et al. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of High Blood pressure. *JAMA*, May 21, 2003, Vol. 289, No. 19

<sup>5</sup> Pickering et al AHA/ASH/PCNA Call to Action on Home BP Monitoring *Hypertension* published online May 22, 2008

<sup>6</sup> A. W. Chobanian et al. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of High Blood pressure. *JAMA*, May 21, 2003, Vol. 289, No. 19

<sup>7</sup> M.G. Myers. Reporting bias in self-monitoring of blood pressure. *Blood Pressure Monitoring*. 2001, 6:181-183

<sup>8</sup> M.G. Myers et. al. Overtreatment of Hypertension in the Community? *American Journal of Hypertension*. May 1996, 9:419-425

<sup>9</sup> F.H.H. Leenan et. al. Results of the Ontario Survey on the Prevalence and Control of Hypertension. *Canadian Medical Association Journal*. May 2008, 178 (11)