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## Patient Self-Management Support: Novel Strategies in Hypertension and Heart Disease

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### Abstract

Cardiovascular diseases (CVD), has become the leading cause of death and disability in most countries in the world. In this paper, we address patient self-management of hypertension and CVD as a crucial component of effective, high quality health care for hypertension and cardiovascular disease care. The patient must be a collaborator in this process and methods of improving patients' ability and confidence for self-management are needed. Successful self-management programs have often supplemented the traditional patient-physician encounter by using non-physician providers, remote patient encounters (telephone or internet), group settings, and peer support for promoting self-management. Factors to consider in self-management include ensuring the programs are patient-centered, staffing and training, content of the program, patient population served, supporting material, protocols for how staff members are to provide support, communication with patients, communication between health care providers and self-management support. Given our healthcare systems' inability to achieve a number of quality indicators using traditional office-based physician visits, further consideration is needed to determine the degree to which these interventions and programs can be integrated into primary care, their effectiveness in different groups, and their sustainability for improving chronic disease care.

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Chronic diseases, specifically, cardiovascular diseases (CVD), have become the leading cause of death and disability in most countries in the world.<sup>1,2</sup> In the U.S., an estimated 81.1 million persons have CVD, and coronary heart disease (CHD) and stroke remain the first and third leading causes of death, respectively. CVD also carries an enormous personal and financial burden (the total direct and indirect cost of heart disease and stroke in the U.S. for 2010 is estimated at \$503.2 billion).<sup>3</sup> These epidemiologic data integrated within the

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context of unsustainable health care expenses define a burning platform for prevention and the incorporation of strategies that allow patients to take more control over their illnesses. In this paper, we address patient self-management of hypertension and CVD as a crucial component of effective, high quality health care for chronic diseases.

## What is self-management of hypertension and cardiovascular disease?

Managing a chronic illness is a time consuming and complex process. Patients and their informal caregivers are required to make day-to-day decisions about such actions as how to respond to new symptoms, what and how much to eat, whether to take their medication, or whether to exercise – all of which can have substantial effects on their clinical outcomes particularly when the decisions are aggregated over months and years. These day-to-day decisions and tasks are referred to as self-management, which was formally defined by Barlow and colleagues as “the individual’s ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition.”<sup>4</sup> All patients with hypertension self-manage; the question is how well they self-manage and its influence on the patient’s experience of chronic disease and health outcomes. An important goal for our health system is to discover effective interventions that improve patients’ ability to self-manage and implement them into our practice.

The potential benefit of interventions to improve patients’ self-management and subsequent health behaviors exceeds that of interventions aimed at health care providers, in part because unhealthy behaviors may contribute more than inadequate health care does to poor health and premature death. Unhealthy behaviors such as smoking, poor diet, and sedentary lifestyles accounts for as much as 40 percent of premature deaths in the United States, whereas deficiencies in health care delivery account for only 10 percent.<sup>5</sup> Thus, with recent discussions of health care reform, focus on self-management in chronic diseases, particularly hypertension, is likely to increase.

Self-management is more than simple adherence to provider recommendations because it also incorporates the psychological and social management of living with a chronic condition. Indeed, self-management consists of the following components: engaging in activities that promote physical and psychological health; interacting with health care providers and adhering to treatment recommendations; monitoring health status and making associated care decisions; and managing the impact of the illness on physical, psychological and social functioning.<sup>6</sup> To a great extent, patients’ outcomes will be dictated by the degree to which these choices lead to improved risk reduction.

Studies conducted among individuals with chronic conditions demonstrate that many patients struggle with self-management,<sup>7-11</sup> and as a result suffer from inadequate disease control, reduced quality of life, and poor psychological well-being.<sup>12-14</sup> Patients’ ability to self-manage may be influenced by the demands of their illness(es) and their social and economic circumstances.<sup>6</sup> For patients with multiple or complex conditions (multimorbidity), the time, effort, and cost of effective self-management from the patient perspective can be challenging.<sup>15</sup> From the provider perspective, improving patients’ medication adherence and timely initiation or intensification of medications as well as counseling on self-management behaviors is complex and time-consuming. Time limitations, competing demands,<sup>16, 17</sup> the burden of comorbid illness,<sup>18</sup> and inadequate mechanisms for follow-up all constitute barriers to effective CVD self-management.

Research and practice of self-management has been improved by a larger understanding of the context or framework in which these healthcare decisions are made. One framework that contextualizes patient self-management within a larger health systems and community is the Chronic Care Model.<sup>19</sup> This model emphasizes the role of patients with chronic conditions

as being their own principal caregiver and the importance of provider, family, and community support in self-management.<sup>7, 20</sup> In effect, patients are at the center of the care model with providers, family, and community interacting in different ways to influence and support health decisions. This model of care recognizes a collaborative partnership between the patient and provider, each with their own expertise in managing that person's health, to share in the decision making process. This collaborative partnership between patient and provider is important in supporting the patient's management of chronic disease over multiple encounters and adjustments in the treatment plan to achieve optimal care.

### **What are the goals of effective self-management?**

One important goal of self-management support is to provide the patient with problem-solving skills to recognize challenges in their chronic disease management and generate a plan to forge a solution.<sup>21</sup> Whereas traditional patient education offers information and technical skills, self-management programs include education as well as problem-solving skills. Self-management programs focus on helping patients develop self-efficacy and the confidence to carry out behavior change necessary to reach a desired goal. Self-management education programs are distinct from simple patient education or skills training, in that they are designed to allow people with chronic conditions to take an active part in the management of their own condition.

Effective self-management of hypertension and CVD consists of self-monitoring of disease control and symptoms; knowing when blood pressure levels or symptoms indicate a problem; responding with appropriate actions (adjust medications, initiate call to a health care provider); making major lifestyle changes (e.g., stop smoking, reduce alcohol consumption, modify diet, lose weight, and increase exercise); adhere to medication regimens (even in the absence of symptoms), some of which are inconvenient or produce side effects; identify and respond to the psychosocial contributors to chronic disease management; and maintain regular contact with health care provider for monitoring progress. Thus, self-management programs designed to reduce the impact of CVD might include components to address each of the problems listed above by (1) promoting patient-centered care and improving physician-patient communication,<sup>22, 23</sup> (2) increasing patients' adherence to recommended medications and self-care regimens, (3) facilitating greater communication between physicians and patients, (4) making medical care more evidence-based through proven health behaviors,<sup>24, 25</sup> and (5) increase focus on self-monitoring (e.g., weight, blood pressure, glucose levels, etc).

### **How does self-management fit into the larger context of the health system?**

Driven largely by methods of reimbursement, traditional health care, both primary and specialty, has been office or clinic based requiring a direct encounter between a provider and the patient. While providers have always done what they could to teach patients how to manage their conditions in this setting, it is increasingly recognized that this model is not sufficient, particularly for chronic illnesses. There has been an increase focus on self-management as we move towards incorporating the patient-centered medical home into medical practice. The Veterans Health Administration, Medicare, and other large health care insurers are exploring the 'medical home' as a way to improve quality, satisfaction, and outcomes for patients with chronic medical illnesses. The *Joint Principles of the Patient-Centered Medical Home* consists of individuals having a personal physician, who provides first contact care, which is continuous, comprehensive, and accessible, while being coordinated with the care offered by other providers.<sup>26</sup> Thus, the core features of medical home include a physician-directed medical practice; a personal doctor for every patient; the capacity to coordinate high-quality, accessible care; and payments that recognize a medical

home's added value for patients.<sup>27</sup> Such strategies require an evidence base to understand which components should be included to maximize benefit, yet limit cost.

While self-management is an important component of the medical home, a goal of self-management support programs is to reduce health care costs and workplace costs related to the reduced productivity of chronically ill workers. Offering patients better support may help them stay healthier, prevent expensive exacerbations and complications, and decrease utilization of health care services, thereby reducing costs for providers, insurers, employers, and other large purchasers of health care services, as well as for the patients themselves. However, data thus far suggests that self-management programs that are not well integrated with patients' providers, are not all that efficacious<sup>28</sup>

### **What are the effective components of self-management support?**

A key requirement of self-management for chronic conditions such as hypertension is that patients must be empowered and motivated to take an active role in their care and ownership of patient-centered management plans. Self-management programs typically emphasize patients being their own principal caregiver and the importance of provider, family, and community support in the self-management process. Despite this common goal, the methods by which self-management programs have worked to empower the patient have varied significantly.

One important tool in supporting hypertension self-management has been use of home blood pressure self-monitoring. Home monitoring is inexpensive, accurate, and has gained wider acceptance as an important component of managing hypertension.<sup>29</sup> Patients' home BP is more prognostically important than their office measurement in predicting clinical events and represents an important target in reducing risk attributable to hypertension.<sup>30</sup> Furthermore, blood pressure home monitoring allows patients to gauge blood pressure responses to their health behaviors. It also overcomes the fact that hypertension is an asymptomatic disease until it is too late to treat. Home blood pressure monitoring alone has also been shown to have a modest effect in lowering patients' blood pressure.<sup>31</sup>

A second effective method of promoting patient self-management is collaborative goal-setting.<sup>32</sup> This is the process by which providers and patients agree on a health goal related to the target disease. This can be a general goal (e.g. get more exercise) or involve a specific action plan (e.g. walking one mile three times a week). Establishing specific action plans allows the patient and provider to agree on discrete actionable goals as well as establishing accountability for the proposed goal. Goals identified through this process then become the basis for future conversations that address methods to help patients achieve their goals.

An additional tool used by members of the healthcare team for enhancing the effectiveness of patient self-management is motivational interviewing (MI). There has been considerable interest in adapting MI which may be used by various providers (e.g., nurses, healthcare coaches) to address health behaviors such as treatment adherence.<sup>33</sup> A key goal of MI is to assist individuals to work through their ambivalence about behavior change. In motivational interviewing, the goal is not simply to exchange information with the patient, but to promote behavior change by helping the patient to explore and resolve ambivalence.<sup>34</sup> Effective motivational interviewing results in patients' ability to make the right choice and follow through.

More recently, self-management has been studied in the context of more direct reward mechanisms through introducing financial, or other, incentives to help patients achieve meaningful change. Many patients have strong health incentives to engage in healthy behaviors, but they fail to do so, in part because the benefits tend to be delayed and

intangible. Rewards can provide immediate and tangible benefits for reducing such costs by improving health behavior, leading patients to internalize the future costs they impose on themselves.<sup>35</sup> One study found a significant impact when patients were provided with financial incentives to improve smoking cessation rates<sup>36</sup> as well as for promoting weight loss<sup>37</sup>. Policy decisions concerning who would provide such financial incentives to patients are complex. They may make the most sense in an insurance model or for payers of healthcare. However, further research into the use of financial incentives and operationalization of them are needed.

The timing and sequencing of interventions to support patient self-management may also be important. Hypertension control, for example, is known to involve long-term, sustained changes in multiple behaviors, including increased medication adherence, dietary modification, increased exercise, weight loss, reduced sodium intake, alcohol moderation, and smoking cessation.<sup>38</sup> On going work suggests self-management interventions may differ depending on whether there is a focus on initiating one or multiple behaviors as compared to maintaining single or multiple behaviors. A recent hypertension intervention study (PREMIER) demonstrated that, after 6 months, change in multiple risk factors improved systolic blood pressure. The improvement was linked specifically to weight loss, greater physical activity, DASH dietary changes, and reduced sodium intake.<sup>39</sup> Because changes in the various lifestyle factors were generally not associated with each other (e.g., few dietary changes were linked to increased exercise), it appears that some patients successfully controlled hypertension through exercise, others through diet, and still others through sodium reduction. These results suggest that counseling which simultaneously addresses multiple paths to improved behavior and is tailored to individuals' level of change (initiating or successfully maintaining behavior(s)) may be a promising approach when multiple risk behaviors are present, as is often the case with patients with complex chronic conditions.

An important component of self-management is also the consideration of individuals' culture and environment; a patient's health beliefs and health-related behaviors are grounded, at least in part, in his or her culture's values and norms. Cultural competence is a dynamic, continuous process by which an individual provider, healthcare system, or healthcare agency finds meaningful and useful care-delivery strategies based on knowledge of the cultural heritage, beliefs, attitudes, and behaviors of those receiving care.<sup>20</sup> Self-management interventions to improve BP control are more likely to be accepted if the intervention can be adapted to: 1) the norms of the specific culture and community of which the patient is a part and 2) the health decision-making in that culture. Competency can involve asking questions to determine cultural beliefs or practices that may influence health behavior, listening closely, and using information about the patient to tailor an intervention to local context.<sup>20</sup>

## Where does self-management support occur?

Most patients with hypertension receive the majority of their information about their disease and all of their treatment in the ambulatory clinic settings. Paradigms of 'self-management support' have been developed in recognition that treating chronic illness requires more than simple face-to-face clinic visits. Thus, relying on the outpatient provider to deliver the needed self-management support is often limited by the competing issues that arise during routine office visits or due to lack of accessibility to primary care. Improving patients' hypertension management behaviors, and medication adherence, while critically important, can be complex and time-consuming. In a typical office setting time limitations, competing demands,<sup>16, 17</sup> along with inadequate mechanisms for follow-up all constitute barriers to effective hypertension risk factor management. Moreover, the primary care office visit is

often filled with multiple tasks including cancer screening, medication refill, and payment issues making it even more difficult to concentrate on any given disease. Perhaps for these reasons, prior interventions that sought to influence physician medication prescribing (through education, reminders, and academic detailing) in a clinic setting have been mostly ineffective.<sup>22, 40</sup> Current reimbursement models also inhibit alternative mechanisms to improve self-management such as telephone or e-visits. In addition, solely focusing on patients receiving treatment in health care settings may lead to under representing patients with chronic diseases who are disenfranchised from the health care system or who have limited access to healthcare because of transportation issues. Novel approaches to test treatment interventions outside of the office setting and their effects on quality indicators as well as costs, need to be considered.

An initial step in choosing or building a self-management program is to decide where it will be positioned. Will it be managed and administered within the patient's primary care setting or external to it? The distinction often has important ramifications for the degree to which self-management support is integrated with other aspects of the patient's chronic care and thus who the players are, the quantity and kind of data available to support it, and the nature of the administrative oversight and support. Most aspects of hypertension risk reduction, however, do not require a physical examination or laboratory evaluation and could therefore be accomplished through encounters that happen outside of the traditional office visit. Recent data suggest that incorporating self-management into clinical care as opposed to an added layer of care may be preferred.<sup>28</sup>

Modes of administering hypertension interventions and programs include the use of landline or cellular telephones. As of 2003, most U.S. homes have phones (>97%)<sup>41</sup> making it a useful tool to deliver self-management programs. Telephone care has an established track record as an acceptable<sup>42</sup> and often preferred method of receiving care by patients.<sup>43</sup>

Telemedicine or remote monitoring in patients' homes has also been offered as a plausible solution to improving ambulatory medical care. In the case of hypertension, advances in home blood pressure tele-monitoring are likely to have a significant impact in the way healthcare for those with cardiovascular disease is provided. Home BP tele-monitoring refers to hypertensive persons self-monitoring their BP at home and then transmitting their BP readings over telephone lines to a central server.<sup>44, 45</sup> Adults, particularly those who are the most vulnerable (e.g., greater comorbidities, lower social economic status, lower literacy) may have barriers to receiving care in the traditional clinic-based model given the relatively longer distances they live from their usual source of care. One way to improve BP control is to facilitate access to care by incorporating BP tele-monitoring in patients' homes; this may be more acceptable and effective than clinic-based monitoring and management. The use of telecommunications has been increasing but is still comparatively rare and few trials have assessed the efficacy of such technology for improving BP control in patients.<sup>46</sup>

A number of Internet and web-based information management tools have emerged in the health care marketplace enabling communication between patients and providers and among providers.<sup>47</sup> Web-based monitoring may be more acceptable and effective than clinic-based monitoring and management as well as more scalable and cost effective than traditional disease management programs. The American Heart Association has developed a web-based interactive communication tool, Heart360 (<http://www.heart360.org>), based on Microsoft's HealthVault (<http://www.healthvault.com>) electronic health record platform. Heart360 is designed to facilitate better information exchange among patients and their providers as well as to promote patient engagement in their own disease management. We are currently conducting a novel study, Secondary Prevention Risk Interventions via Telemedicine and Tailored Patient Education (SPRITE), to simultaneously evaluate two CHD risk reduction

interventions via a randomized controlled trial. One group will receive ambulatory BP monitors and will be enrolled into Heart360 for web-based data transmission, tracking and communication of BP measurements with a nursed-based, tailored education and disease management via telephone. A second group will also receive home BP monitors to use with Heart 360, but instead will receive tailored education and disease management in a web-based format. This study design will provide information on whether web-based communication coupled with a web-based, tailored disease management and education program improves risk factor control beyond telemedicine disease management provided by health care personnel as well as consider the costs of implementing this program.

### Who delivers self-management support?

Many different individuals can take part in self-management support. In the health system, the patients' primary care or specialty care provider play central roles in defining the care plan. Office nursing staff typically provides much of the educational components and strategies for success. The patients' social network, particularly those living in the home, are also central components. More recently, healthcare coaches and even lay personnel (e.g., community health workers) may engage patients in effective self-management. Despite the fact that a traditional office visit may not be the best place to conduct all self-management practices, an effective patient-provider relationship is a central component of effective self-management. There must be a commitment to self-management on the part of the individual and the provider, trust that decisions are being made with requisite information, and a willingness to make adjustments in the treatment plan to achieve optimal care and appropriate hypertension management. Thus, the patient-provider relationship is based on shared decision making between patients and other members of the healthcare team.

Alternative members of the health care team may be more effective in improving patients' self-management practices than clinicians.<sup>48</sup> The use of non-physicians to implement interventions may enhance ability to achieve high quality care. Nurses as interventionists in clinical trials, for example, have been found to be more effective than physicians at bringing hypertensive individuals in concordance with national guideline goals<sup>49-54</sup> and can improve patient adherence to BP medications and improve BP control.<sup>55-58</sup> Nurses have also been shown to significantly improve self-management practices and improve blood pressure control, even when their only interaction with patients' is over the telephone.<sup>31, 59</sup>

Self-management education programs led by lay leaders (rather than health professionals such as doctors or nurses) are becoming common as a way of trying to promote self-care for people with chronic conditions. In a Cochrane review of lay-led self-management programs for people with chronic conditions, 7 studies showed a small, statistically significant increase in self-reported aerobic exercise (standardized mean difference -0.20 (95% CI -0.27 to -0.12)). There were also no statistically-significant differences between groups for hospital visits (6 studies). Patients' confidence to manage their condition showed a small statistically-significant improvement (10 studies; standardized mean difference -0.30, 95% CI -0.41 to -0.19). Lay-led self-management education programs may lead to small, short-term improvements in participants' self-efficacy, self-rated health, cognitive symptom management, and frequency of aerobic exercise.<sup>60</sup>

Self management programs that do not include members of patients' social network typically exhibit changes that are short lived, with less healthy behaviors returning after brief periods of time.<sup>61-63</sup> This is particularly true when behaviors such as diet, exercise, and smoking are the focus of self-management. What is needed, then, are interventions that can enhance the social support provided by spouses/significant others in order to help patients adhere better to treatment recommendations.

## What is the evidence supporting self-management interventions?

In general, self-management interventions have achieved modest success in clinical trials. In the most recent updated Cochrane review of hypertension self-management interventions, 56 randomized controlled trials met inclusion criteria and assessed mean systolic and diastolic blood pressure, control of blood pressure and the proportion of patients followed up at clinic. The range of interventions used included (1) self-monitoring, (2) educational interventions directed to the patient, (3) health professional (nurse or pharmacist) led care, (5) organizational interventions that aimed to improve the delivery of care, (6) appointment reminder systems. Self-monitoring was associated with moderate net reductions in diastolic blood pressure, but not significant relationships with systolic blood pressure or blood pressure control. Trials of educational interventions directed at patients or health professionals appeared unlikely to be associated with large net reductions in blood pressure by themselves. Health professional (nurse or pharmacist) led care appears to be a promising way of delivering care but requires further evaluation. The authors conclude that an organized system of registration, recall and regular review allied to a vigorous stepped care approach to antihypertensive drug treatment appears the most likely way to improve the control of high blood pressure.<sup>64</sup>

## Summary and Conclusions

The daily decisions patients make regarding what to eat, whether to exercise, or take medications substantially impact blood pressure, and ultimately quality and quantity of life. Supporting patient self-management is therefore one of the most important aspects of high quality hypertension care. The patient must be a collaborator in this process and methods of improving patients' ability and confidence for self-management are needed. Successful self-management programs have often supplemented the traditional patient-physician encounter by using non-physician providers, remote patient encounters (telephone or internet), group settings, and peer support for promoting self-management. Implementing effective self-management support within the current health care system remains an important challenge for improving hypertension and cardiovascular disease care.

A majority of work to date has focused on how people initiate change in health behaviors. Only rarely has research considered the factors that promote long-term maintenance of these behavioral changes. New approaches are needed to address maintenance of behavior change. Innovative methods are needed to identify the mechanisms that lead to long-term maintenance of the change produced by health interventions.

Factors to consider in self-management include staffing, content of the program, patient population served, supporting material, protocols for how staff members are to provide support, staff training, communication with patients, communication between health care providers and self-management support. For a program that seeks to change patient behavior, a key underlying consideration is the need to include both supportive coaching interventions and educational interventions along with incorporating the patient's social network as part of the program content. Rather than being prescriptive or hierarchical, self-management programs should be patient-centered and tailored to the needs and concerns defined by the patient and their situation.

Given our healthcare systems' inability to achieve a number of quality indicators using traditional office-based physician visits, interventions that use novel methods for the delivery of quality healthcare could increase the quality of care, potentially at lower cost than our current methods of care. Research is needed to determine the degree to which these interventions can be integrated into primary care, their effectiveness in different groups, and their sustainability for improving chronic disease care.

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