Brief Report

Knowledge of blood pressure targets among patients with diabetes ☆

Usha Subramanian [a,b,c,*], *T.P. Hofer* [d,e], *M.L. Klamerus* [d],
B.J. Zikmund-Fisher [d,e], *M. Heisler* [d,e], *E.A. Kerr* [d,e]

[a] *Roudebush VA Medical Center, Indianapolis, IN, United States*
[b] *Division of General Medicine & Geriatrics, Department of Medicine, Indiana University School of Medicine, Indianapolis, IN, United States*
[c] *IU Center for Health Services & Outcomes Research, Regenstrief Institute, Inc., Indianapolis, IN, United States*
[d] *Veterans Affairs Health Services Research & Development Center of Excellence, Ann Arbor, MI, United States*
[e] *Department of Internal Medicine, University of Michigan, Ann Arbor, MI, United States*

ARTICLE INFO

ABSTRACT

Introduction: Tight blood pressure (BP) control is the single most important intervention to prevent cardiovascular mortality among patients with diabetes mellitus (DM). However, little is known about how many patients have specific target BP levels or the factors associated with patients' knowledge of these targets.

Objectives: (1) To determine what proportion of patients with diabetes have BP targets; (2) To determine patient characteristics associated with having a BP target.

Methods: Cross-sectional, anonymous survey of 500 randomly selected outpatients with hypertension and DM receiving care in any Veterans Health Administration outpatient clinic in 2003. We examined multivariate associations between patient characteristics and having targets for BP. Covariates included age, race, gender, and education level; and factors specific to diabetes and BP treatment, including medication use, diabetes duration, and number of visits to diabetes healthcare providers in the previous year.

Results: Three hundred and seventy-eight (80%) patients responded. Although most (91%) had blood glucose targets, fewer than 60% reported having a BP target. In multivariate analyses, college education was associated with having a BP target (AOR 1.97 [95% CI: 1.16–3.34]).

Conclusions: Less than two-thirds of diabetic, hypertensive patients had BP targets. Encouraging patients to set target BPs may promote hypertension self-management in this high-risk patient population. Less educated patients may especially benefit from interventions to increase awareness of BP targets.

Published by Elsevier Ltd.

1. Introduction

Meticulous blood pressure (BP) control is the most important way to reduce cardiovascular complications and overall mortality in patients with type 2 diabetes mellitus (DM) [1–3]. Yet, one in three DM patients has uncontrolled BP [4]. A recent study in the US Veterans Health Administration (VHA) found only 50% of DM patients had BP levels <140/90 mmHg [5]. Accordingly, the VHA National Clinical Practice Guidelines Council made improved BP control a priority for quality improvement [6].

Achieving BP control requires patient self-management and effective clinical management. Strategies such as goal setting and self-monitoring facilitate acquisition of desired behaviors [7]. Patients' lack of knowledge of their blood glucose target has been associated with worse control [8,9]. Similarly, having a BP target is the first step to involve patients in BP control. While previous studies have emphasized patients' self-management with respect to glucose control, less work has considered self-management to improve BP control. A recent meta-analysis has shown that self-monitoring also improves control of blood pressure by improving medication adherence, as patients become more involved in their care [10]. The study by Cheng et al. assessing BP awareness among hospitalized patients with coronary artery disease found that having DM was a risk factor for poor knowledge of BP targets [11]. However, we know little about whether patients with DM are as, more, or less likely to have BP targets than blood glucose targets, nor which patient factors are associated with patients' having BP targets. Understanding the characteristics of patients who currently have BP targets could identify factors for interventions to improve understanding of the importance of BP control. Our objectives, therefore, were to determine: (1) the proportions of DM patients with BP and glucose targets; and (2) factors associated with having BP targets.

2. Methods

2.1. Sample and recruitment

We conducted a cross-sectional anonymous survey; the survey sample, obtained using national VHA data, consisted of 500 randomly selected outpatients with both DM and hypertension who received outpatient primary care at any VHA outpatient clinic in fiscal year 2003. These outpatient clinics provide the majority of primary care to patients with DM. Hypertension was established by ICD-9 codes 401.xx [12], in FY02 or FY03; DM was established by ICD-9 codes 250.xx, 357.2, 362.0, 366.41 [13–15]; both associated with two outpatient visits (or 1 inpatient visit) and at least 1 non-ancillary outpatient visit in FY03 [16]. Study procedures were approved by the Institutional Review Board of the Ann Arbor VA Medical Center.

2.2. Procedures

In 2003, each patient was mailed a cover letter and survey. As per the modified Dillman technique [17], all patients received a reminder letter approximately 1 week later, and non-respondents were sent a second survey 2 weeks after the reminder. Upon return, surveys were immediately separated from envelopes, anonymizing all responses.

2.3. Survey questions

Patients were asked whether they had 'a target number for their BP to be at or below' (1 = yes, 0 = no). Patients responding 'yes' were asked to list their target. Patients were also asked if they had a target number for their blood glucose level to be at or below. Patients responding 'yes' were asked to list their target morning, pre-prandial blood glucose level. We also assessed socio-demographic characteristics including age, race, gender, and education level; and factors specific to diabetes and BP treatment, including medication use, diabetes duration, and number of visits to diabetes healthcare providers in the previous year. We asked patients to list their top three health concerns and to assess their agreement with the following question: "I do not understand what to do to control my BP" (rated from strongly disagree to strongly agree).

2.4. Statistical analysis

We constructed univariate, bivariate and multivariate models to examine our study findings. Our multivariate models were based on our a priori hypotheses and (did not use stepwise regression to determine what variables to include in the multivariate models) examined the association between patient characteristics and having a BP target, adjusting for age, race, education level, diabetes duration, insulin use, BP medication use, and number of provider visits. All analyses were conducted using Stata 9.0 (College Station, Texas).

3. Results

Overall response rate was 80% (378 returned; 94 not returned; 16 returned due to address problems; 10 denied having diabetes; 2 deceased). Rates of missing values were 16% for having a BP target and <8% for all other variables. Demographic characteristics are shown in Table 1. Less than half of the subjects had any college education. Eighty percent were or have been on, medications to treat both BP and diabetes, yet only 59% had a target level for BP. There were no differences in the demographic characteristics of patients who reported having a BP target versus those who did not [data not shown]. Of those who knew what blood glucose was, 91% had a glucose target level. Among those reporting a BP target, 84% had a self-reported VHA guideline-congruent systolic goal (≤135 mmHg) and 94% had a VHA guideline-congruent diastolic goal (≤80 mmHg) [7]. While 86% listed 'controlling blood sugar' among their top three health concerns, only 55% listed 'controlling BP' in their top three concerns. While just over half of the patients monitored their BP at home, 25% agreed or strongly agreed that they did not know what to do to control their BP.

In multivariate analyses, having a college education was associated with having a BP target (AOR = 1.97; 95% CI, 1.16–3.34) (Table 2).