

Hypertension in a Primary Care Setting: Control and Pattern of Prescribing

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Objective: To measure the level of blood pressure control among people with hypertension attending National Bank of Bahrain Health Center at Dair (NBB Dair) and to evaluate the pattern of prescribing by the treating physicians.

Design: A retrospective clinical study.

Setting: NBB Dair Health Center.

Method: The prescriptions of patients with chronic diseases from 1st of April till 30th of June 2009 were reviewed. All prescriptions of antihypertensive agents were included in the study. In addition, the patients' records were reviewed. The following data were recorded: recent blood pressure (BP) reading, presence of co-morbidities, dosage of drugs used and current regimen. Controlled hypertension is defined as systolic less than 140 mmHg and diastolic less than 90 mmHg in the absence of diabetes and/or Chronic Kidney Disease (CKD). BP less than 130/80 is used to define controlled BP in the presence of these conditions.

Result: Five hundred and seventy-three prescriptions were included in the study. Females constituted 61.6% of the total sample. About half of the patients 272 (47.5%) had concomitant diabetes and/or dyslipidemia. The overall control rate was 35.8%; it dropped to 26.6% in patients with diabetes. Gender difference was found in the level of control ($P=0.00002$). It was better in females, but was poor among patients above 60 in both sexes. Thirty-four percent of the patients were using a single free drug. The use of fixed drug combination was uncommon in the studied population.

Conclusion: Although BP control among the studied population is better than that found in several hypertension surveys, the control level is still far from ideal and it is important to improve it to reduce the burden of cardiovascular diseases and its complications.

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Hypertension is a highly prevalent chronic non-communicable disease, which has a significant impact on health. Globally, the estimated total number of adults with hypertension was 972 million in the year 2000. This number is expected to reach 1.56 billion by the year 2025¹. In its annual health report, World Health Organization identified high blood pressure as one of the top ten leading causes of disease burden worldwide².

Cardiovascular disease (CVD) is the leading cause of death in the world. Hypertension is a major contributor to CVD. Overall, it causes 7 million premature deaths a year which exceeds that caused by smoking or hypercholesterolemia². In addition, a strong association has been

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found between the level of blood pressure and the risk of stroke and coronary heart disease^{3,4}. Furthermore, the relative risk for congestive heart failure, peripheral vascular disease, and end stage renal disease increases two to three times in the presence of hypertension⁵. Nevertheless, these complications can be reduced significantly by the currently available antihypertensive agents as found in several landmark clinical trials⁶⁻¹².

Hypertension was found to be the most common diagnosis made in family practice settings¹³. Hence, family physicians play an important role in early detection and management to decrease the burden of its devastating complications. Unfortunately; however, the rate of control is still far from ideal¹⁴⁻¹⁹.

In Bahrain, a study found that the prevalence of hypertension was high and it increased by the presence of glucose intolerance and diabetes, but the rate of control was very low²⁰. Another recent study in diabetic people with hypertension revealed that more than 90% did not achieve their target blood pressure²¹. Hypertension control among people attending National Bank of Bahrain Health Center at Dair (NBB Dair) is unknown.

The aim of this study was to assess the level of control and pattern of prescribing for people with hypertension attending NBB Dair.

METHOD

The prescriptions for patients from 1st of April till 30th of June 2009 were reviewed. All prescriptions, which contained antihypertensive agents, were included in the study. It consisted of the four major groups of antihypertensive agents: Diuretics, Angiotensin Converting Enzyme Inhibitors (ACEI)/Angiotensin Receptor Blockers (ARB), β -Blockers, Calcium Channel Blockers (CCB) and others.

Patients' personal characteristic data were entered in an access sheet and the author reviewed their health records. Data collected include: age, sex, address, recent blood pressure (BP) reading (within the previous year), presence of co-morbidities, such as, diabetes, chronic kidney disease (CKD) which is defined as estimated glomerular filtration rate less than 60 ml/min/1.73 m², and dyslipidemia evidenced by the use of anti-lipid agents, the dosage of drugs used and current regimen²².

Controlled hypertension was defined as systolic less than 140 mmHg and diastolic less than 90 in the absence of diabetes and/or CKD. BP less than 130/80 was used to define controlled BP in the presence of these conditions²³.

Data were analyzed by using the Epi-info Program (version 6). Chi-squared test was used to assess the significant gender differences in the rate of control and types of regimens used. P value of 0.05 or less was considered to be statistically significant.

RESULT

Five hundred and seventy-three prescriptions were included in the study. Distribution of cases by age groups and sex is presented in Table 1.

Table 1: Age Groups and Sex

Age Group (years)	Males Number (% from male total)	Females Number (% from female total)	Number of Cases by Age Group No. (% from total)
< 40	25 (11.4)	23 (6.5)	48 (8.3)
40-49	54 (24.5)	97 (27.5)	151 (26.4)
50-59	66 (30)	112 (31.7)	178 (31.1)
60-69	43 (19.5)	70 (19.8)	113 (19.7)
≥ 70	32 (14.6)	51 (14.5)	83 (14.5)
Total	220 (100)	353 (100)	573 (100)

Chi= 51.05, *P*= 0.00

Table 1 shows that the percentages of age groups are almost equally distributed for both sexes except in patients less than 40 years where males predominate. The table also shows that nearly two-thirds of the total sample (65.8%) are age-working adults (less than 60 years). Blood pressure control in patients with or without diabetes is presented in Table 2.

Table 2: Hypertension Control in Patients with and without Diabetes

Age Group (years)	Hypertension Only n=302	Controlled (BP < 140/90) Hypertension n=133 (%)	Hypertension with Diabetes n=271	Controlled Hypertension with Diabetes (BP < 130/80) n=72 (%)	Number of Cases by Age Group
<40	37	13 (9.8)	11	3 (4.2)	48
40-49	87	46 (34.6)	64	16 (22.2)	151
50-59	91	47 (35.3)	87	36 (50)	178
60-69	46	17 (12.8)	67	11 (15.3)	113
≥70	41	10 (7.5)	42	6 (8.3)	83
Total	302	133 (100)	271	72 (100)	573

Table 2 shows that the overall control rate was 35.8% (205/573). The percentage has dropped to 26.6 (72/271) in patients with co-morbid diabetes. It also shows that the rate of control is low in patients above 60 years in the presence or absence of diabetes.

It was found that 272 patients (272/573; 47.5%) had concomitant dyslipidemia and 10 were having concomitant CKD; seven out of the 10 were diabetics. The status of control by age and sex is shown in Table 3.

Table 3: Status of Control by Age and Sex

Age Group (years)	Males n=220	Controlled Male Cases No. and %	Females n=353	Controlled Female Cases No. and %
< 40	25	5 (8.3)	23	11 (7.6)
40-49	54	23 (38.3)	97	39 (26.9)
50-59	66	17 (28.4)	112	66 (45.5)
60-69	43	6 (10)	70	22 (15.2)
≥70	32	9 (15)	51	7 (4.8)
Total	220	60 (100)	353	145 (100)

Chi= 26.90, *P*= 0.00002

Table 3 shows that the overall control of hypertension is better in females (145/353, 41.1%) compared to males (60/220, 27.3%). The difference is statistically significant ($P=0.00002$). However, the control rate is low in patients above 60 in both sexes (25% for males and 20% for females). Prescribed drugs are shown in Table 4.

Table 4: Antihypertensive Drugs Prescribed

Medication Class	Total Number of Prescriptions	Most Common Agent (Generic)	Number of Prescriptions (% from total)	Most Common Dose (%)
ACEI	165	Perindopril (Coversyl)	108 (65.5)	4 mg OD 65/108 (60.2)
ARB	61	Valsartan (Diovan)	61 (100)	80mg OD 54/61 (88.5)
β -Blockers	188	Atenolol (Tenormin)	159 (84.6)	100 mg OD 80/159 (50.3)
CCB	193	amlodipine besylate (Norvasc)	149 (77.2)	5 mg OD 99/149 (66.4)
Diuretics (D)	194	Indapamide (Natrilix)	161 (83)	1.5 mg OD (100)
<u>Fixed Combination</u>		Perindopril 4+ Indapamide		1 tablet OD
ACEI+D	76	1.25 (Bipreterax)	59 (77.6)	59/76 (77.6)
		Valsartan 80+hydrochlorthiazide 12.5	40 (58.8)	1 tablet OD 40/68 (58.8)
ARB+D	68			
Others	27	Methyldopa (Aldomet)	9 (33.3)	250 mg BD (3/9; 33.3)

It was found that 215 (215/271; 79.3%) patients who had comorbid diabetes were on either ACEI or ARB. Thirty-six patients (36/573; 6.3%) developed cough related to perindopril and were switched to other agents.

Twenty-four (4.2%) patients were found to be using a combination of diuretic and β -blocker. Forty-four patients (7.7%) were on β -blockers only (atenolol); two of them (4.5%) had compelling indications.

The current regimen of drugs used by the patients is presented in Figure 1.

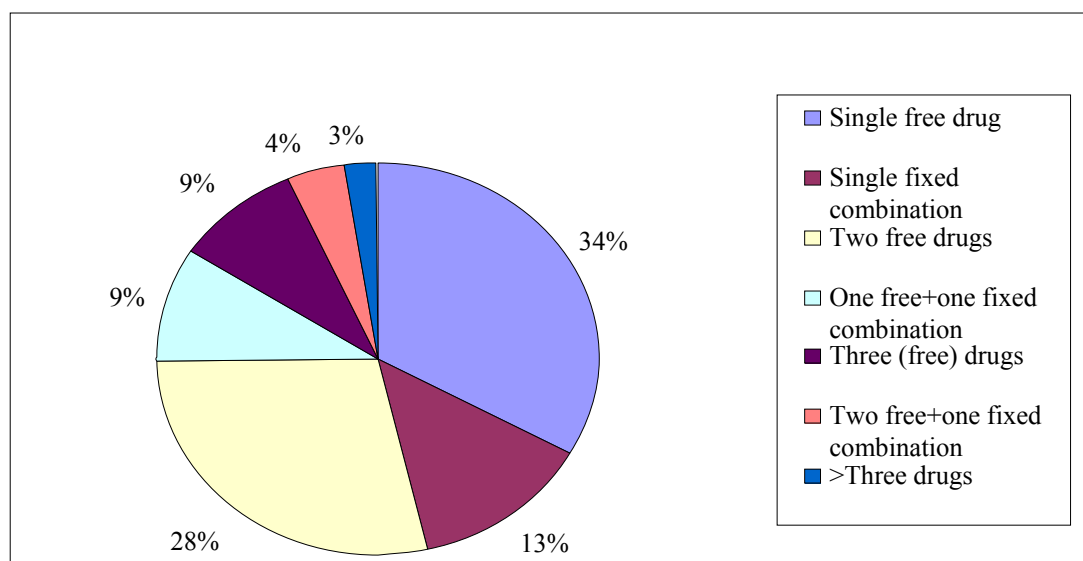


Figure 1: Regimens Used by the Patients

The types of regimens used in controlled cases for both sexes are presented in Table 5.

Table 5: Gender-based Regimens in Controlled Cases

Regimen	Controlled Hypertension*		Controlled Hypertension**	
	Males (%)	Females (%)	Males (%)	Females (%)
Single free drug	7 (17.5)	44 (47.3)	5 (25)	16 (30.8)
Single fixed combination	10 (25)	8 (8.6)	3 (15)	10 (19.2)
Two free drugs	13 (32.5)	27 (29)	3 (15)	9 (17.3)
One free+ one fixed combination	3 (7.5)	5 (5.4)	5 (25)	8 (15.4)
Three free drugs	3 (7.5)	5 (5.4)	2 (10)	4 (7.7)
Two free +one fixed	3 (7.5)	4 (4.3)	1 (5)	2 (3.8)
> three drugs	1 (2.5)	0	1 (5)	3 (5.8)
Total	40 (100)	93 (100)	20 (100)	52 (100)

* Without diabetes Chi= 15.44, $P= 0.017$, ** With diabetes Chi= 3.69, $P= 0.71$

Table 5 indicates that controlled female cases without diabetes were more likely to be on single drugs when compared to males (55.9% versus 42.5%; $P=0.017$).

DISCUSSION

The study showed that the overall control rate was less than 40 percent, the control was better in females. The level of control was low in elder population. Around one-third of the patients were using a single free drug. The use of fixed combination was less common among the studied population. While about half of the patients have concomitant dyslipidemia, very few have CKD.

Although the level of control is far from ideal, it is better than that seen in several previous studies in hypertensive populations^{14-16,20,21,24}. However, it is less than that found in recent North American studies^{19,25}. The low control rate seen in this study could be attributed to several factors:

1. Thirty-four percent of patients were on a single free drug. The majority of hypertensive patients need two or more drugs to achieve their BP target²³. In a landmark study, 29% of the patients needed 3 or more drugs to achieve BP of 144/82 after 9 years of follow up⁸. Similarly, in a large clinical trial, it was found that about 40% of the patients needed 2 or 3 drugs at 5 years to achieve BP less than 140/90⁹.
2. The uncommon use of fixed drug combinations as shown in the figure 1. Fixed combination was found to be more effective than the use of free drugs and has lower incidence of adverse reactions that can thereby improve patients' adherence. Adherence is a common problem among people with hypertension²⁶⁻³¹.
3. Despite the presence of well-established evidence-based clinical guidelines, studies have found that many physicians do not comply, fail to intensify treatment when needed, and/or are not aware of the guidelines^{23,32-37}.

Statistically gender difference was found in the rate of control (Table 3). Females utilize health services more than males³⁸. This could explain the better control among females found in the study as this increases the opportunity for their blood pressure to be monitored and the

physician to modify their regimens. Another factor could be medication adherence. This is evident from Table 5 which shows that around 56% of controlled female cases were using single drug (either free or fixed combination). This may have increased their adherence to the regimen as direct relationship has been found between adherence and regimen schedule^{30,39}.

This study showed that the rate of BP control was low among patients 60 years or above in both sexes (Table 2 and 3). This is an important finding as this age group constitutes 34.2% of the total sample (Table 1). However, this is consistent with several other studies¹⁴⁻¹⁶. Control of hypertension could significantly reduce the risk of stroke and other major cardiovascular events even in patients above 80 years^{6,40,41}. Despite the previous findings, the treating physicians are reluctant to intensify treatment and/or increase the dosage when needed because of the fear of adverse events^{36,42}.

Few patients were found to have CKD. This could be attributed to the fact that these patients were not screened routinely for CKD because of physician reliance solely on serum creatinine, which could be very misleading because it can be affected by many variables⁴³. Screening for CKD is important in hypertensive patient in order to identify them early because those patients are at higher risk for CVD and should be treated aggressively.

Atenolol was commonly used in this study. It was used for 159 patients, 85% of used β -blockers (Table 4) and it was the only drug used in 7.7% of the total sample. The efficacy of all major antihypertensive groups was found to be comparable⁴⁴. In addition, Atenolol was found to be as effective as Captopril, one of ACEI⁸. However, the efficacy of β -blockers, especially Atenolol, has been questioned because they might increase the risk of stroke^{45,46}. Furthermore, Atenolol was found to have similar efficacy to placebo or no treatment in other studies⁴⁷. This may have led some authorities to change their recommendations regarding that group of medications; however, this is a debatable issue^{32,48,49}. Regardless, in a country with a high prevalence of diabetes, it may be unwise to use this drug as a first choice because it increases the risk for diabetes, especially when combined with diuretics^{32,50,51}.

Table 4 shows that Amlodipine is used increasingly which is consistent with findings from recent trials^{11,12}. Another reassuring finding in the study is that around 80% of patients with co-morbid diabetes are on ACEI or ARB which is consistent with American Diabetes Association recommendations as these agents have renoprotective effects in addition to their role as antihypertensive medications⁵².

CONCLUSION

Although the rate of BP control among the studied population is better than that found in several hypertension surveys, the control level is still far from ideal and it is important to improve it to reduce the burden of cardiovascular diseases and its complications.

REFERENCES

1. Kearney PM, Whelton M, Reynolds K, et al. Global Burden of Hypertension: Analysis of Worldwide Data. *Lancet* 2005; 365: 217-23.
2. WHO. The World Health Report 2002: Reducing Risks, Promoting Healthy Life. www.who.int/whr/2002/en/index.html. Accessed on 01.01.2010.
3. Lawes CM, Bennett DA, Feigin V, et al. Blood Pressure and Stroke. An Overview of Published Reviews. *Stroke* 2004; 35: 1024-33.

4. Lawes CM, Bennett DA, Lewington S, et al. Blood Pressure and Coronary Heart Disease: A Review of the Evidence. *Seminars in Vascular Medicine* 2002; 2: 355-68.
5. Padwal R, Straus SE, McAlister FA. Cardiovascular Risk Factors and Their Effects on the Decision to Treat Hypertension: Evidence Based Review. *BMJ* 2001; 322: 977-80.
6. SHEP Cooperative Research Group. Prevention of Stroke by Antihypertensive Drug Treatment in Older Persons with Isolated Systolic Hypertension. Final Results of the Systolic Hypertension in the Elderly Program (SHEP). *JAMA* 1991; 265: 3255-64.
7. Hannson L, Zanchetti A, Carruthers SG, et al. Effects of Intensive Blood-pressure Lowering and Low-dose Aspirin in Patients with Hypertension: Principal Results of the Hypertension Optimal Treatment (HOT) Randomized Trial, HOT Study Group. *Lancet* 1998; 351: 1755-62.
8. The United Kingdom Prospective Diabetes Study (UKPDS) Research Group. Tight Blood Pressure Control and Risk of Macrovascular and Microvascular Complications in Type 2 Diabetes (UKPDS38). *BMJ* 1998; 317: 703-13.
9. The ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. Major Outcomes in High-Risk Hypertensive Patients Randomized to Angiotensin-Converting Enzyme Inhibitor or Calcium Channel Blocker Versus Diuretic. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002; 288(23): 2981-97.
10. Dahlöf B, Devereux RB, Kjeldsen SE, et al. Cardiovascular Morbidity and Mortality in the Losartan Intervention for Endpoint Reduction in Hypertension Study (LIFE): A Randomized Trial against Atenolol. *Lancet* 2002; 359: 995-1003.
11. Julius S, Kjeldsen SE, Weber M, et al. Outcomes in Hypertensive Patients at High Cardiovascular Risk Treated with Regimens Based on Valsartan or Amlodipine: The VALUE Randomised Trial. *Lancet* 2004; 363: 2022-31.
12. Dahlf B, Sever PS, Poulter NR, et al. Prevention of Cardiovascular Events with an Antihypertensive Regimen of Amlodipine Adding Perindopril as Required Versus Atenolol Adding Bendroflumethiazide as Required, in the Anglo-Scandinavian Cardiac Outcomes Trial-Blood Pressure Lowering Arm (ASCOT-BPLA): A Multicentre Randomised Controlled Trial. *Lancet* 2005; 366: 895-906.
13. Sloane PD, Ebell MH. Introduction to Common Problems. In: Sloane P, Slatt LM, Ebell MH, Jacques LB, Smith MA, eds. *Essentials of Family Medicine*. 5th edn. USA: Lippincott Williams & Wilkins, 2008; 119-29.
14. Hyman DJ, Pavlik VN. Characteristic of Patients with Uncontrolled Hypertension in the United States. *N Engl J Med* 2001; 345: 479-86.
15. Hajjar I, Kotchen T. Trends in Prevalence, Awareness, Treatment, and Control of Hypertension in the United States, 1988-2000. *JAMA* 2003; 290: 199-206.
16. Patel R, Lawlor DA, Whincup P, et al. The Detection, Treatment and Control of High Blood Pressure in Older British Adults: Cross-Sectional Findings from the British Women's Heart and Health Study and the British Regional Heart Study. *Journal of Human Hypertension* 2006; 20: 733-41.
17. Scheltens T, Bots ML, Numans ME, et al. Awareness, Treatment and Control of Hypertension: The 'Rule of Halves' in an Era of Risk-based Treatment of Hypertension. *Journal of Human Hypertension* 2007; 21: 99-106.
18. Godwin M, Pike A, Kirby A, et al. Prehypertension and Hypertension in a Primary Care Practice. *Can FAM Physician* 2008; 54: 1418-23.
19. Simpson S, Cave AJ, Flook NW, et al. Hypertension Treatment and Control Rates. Chart Review in an Academic Family Medicine Clinic. *Can FAM Physician* 2009; 55: 735-41.
20. Al-Mahroos F, Al-Roomi K, McKeigue P. Relation of High Blood Pressure to Glucose Intolerance, Plasma Lipids and Educational Status in an Arabian Gulf Population. *International Journal of Epidemiology* 2000; 29: 71-6.

21. Damanhori AHH, Al Khaja KAJ, Sequeira RP. Gender-based Treatment Outcomes in Diabetic Hypertension. *J Postgrad Med* 2008; 54(4): 252-58.
22. Crowe E. Early Identification and Management of Chronic Kidney Disease in Primary Care. *Primary Health Care* 2008; 18(10): 29-33.
23. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. The JNC 7 Report. *JAMA* 2003; 289: 2560-72.
24. Lemmer B, Middeke M, Schaaf B, et al. Prescribing Practices and Morning Blood Pressure Control: Results of a Large-Scale, Primary-Care Study Conducted in Germany. *Journal of Human Hypertension* 2008; 22: 295-7.
25. Jackson JH, Sobolski J, Russ Krienke R, et al. Blood Pressure Control and Pharmacotherapy Patterns in the United States: Before and After the Release of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) Guidelines. *J Am Board FAM Med* 2008; 21: 512-21.
26. Law MR, Wald NJ, Morris JK, et al. Value of Low Dose Combination Treatment with Blood Pressure Lowering Drugs: Analysis of 354 Randomised Trials. *BMJ* 2003; 326: 1427-31.
27. Chrysant SG. Using Fixed-Dose Combination Therapies to Achieve Blood Pressure Goals. *Clin Drug Invest* 2008; 28(11): 713-34.
28. Bangalore S, Kamalakkannan G, Parkar S, et al. Fixed-Dose Combinations Improve Medication Compliance: A Meta-Analysis. *The American Journal of Medicine* 2007; 120: 713-19.
29. Gascón JJ, Sánchez-Ortuño M, Llor B. Why Hypertensive Patients Do Not Comply with the Treatment. Results from a Qualitative Study. *Family Practice* 2004; 21: 125-30.
30. Osterberg L, Blaschke T. Adherence to Medication. *N Engl J Med* 2005; 353: 487-97.
31. Cooper LA. A 41-Year-Old African American Man with Poorly Controlled Hypertension: Review of Patient and Physician Factors Related to Hypertension Treatment and Adherence. *JAMA* 2009; 301(12): 1260-72.
32. National Institute for Health and Clinical Excellence. Hypertension: Management of Hypertension in Adults in Primary Care (2006). www.nice.org.uk. Accessed on 28.12.2009.
33. 2009 Canadian Hypertension Education Program Recommendations. An Annual Update. *Canadian Family Physician* 2009; 55: 697-700.
34. Hyman DJ, Pavlik VN. Self-reported Hypertension Treatment Practices among Primary Care Physicians. Blood Pressure Thresholds, Drug Choices, and the Role of Guidelines and Evidence-Based Medicine. *Arch Intern Med* 2000; 160: 2281-86.
35. Spranger CB, Ries AJ, Berge CA, et al. Identifying Gaps between Guidelines and Clinical Practice in the Evaluation and Treatment of Patients with Hypertension. *Am J Med* 2004; 117: 14-8.
36. Bolen SD, Samuels TA, Yeh HC, et al. Failure to Intensify Antihypertensive Treatment by Primary Care Providers: A Cohort Study in Adults with Diabetes Mellitus and Hypertension. *J Gen Intern Med* 2008; 23(5): 543-50.
37. Wexler R, Elton T, Taylor CA, et al. Physician Reported Perception in the Treatment of High Blood Pressure Does Not Correspond to Practice. *BMC Family Practice* 2009; 10: 23.
38. Bertakis KD, Azari M, Callahan EJ, et al. Gender Differences in the Utilization of Health Care Services. *J FAM Pract* 2000; 49: 147-52.
39. Snadden D. Taking Medicines. In: Dowell J, Williams B, Snadden D, eds. *Patient-Centered Prescribing: Seeking Concordance in Practice*. Oxford, UK: Radcliffe Publishing, 2007; 9-28.

40. Beckett NS, Peters R, Fletcher AE, et al. Treatment of Hypertension in Patients 80 Years of Age or Older. *N Engl J Med* 2008; 358: 1887-98.
41. Gibson MV, Fritz J, Kachur V. Practical Strategies for Management of Hypertension in the Elderly. *Geriatrics* 2009; 64(10): 10-9.
42. Phillips LS, Branch W, Cook CB, et al. Clinical Inertia. *Ann Intern Med* 2001; 135: 825-34.
43. Paige N, Nagami GT. The Top 10 Things Nephrologists Wish Every Primary Care Physician Knew. *Mayo Clin Proc* 2009; 84(2): 180-6.
44. Turnbull F, Neal B, Algert C, et al. Effects of Different Blood Pressure-lowering Regimens on Major Cardiovascular Events in Individuals with and without Diabetes Mellitus: Results of Prospectively Designed Overviews of Randomized Trials. Blood Pressure Lowering Treatment Trialists' Collaboration. *Arch Intern Med* 2005; 165(12): 1410-9.
45. Lindholm LH, Carlberg B, Samuelsson O. Should [beta] Blockers Remain First Choice in the Treatment of Primary Hypertension? A Meta-Analysis. *The Lancet* 2005; 366: 1545-53.
46. Khan N, McAlister F. Re-examining the Efficacy of β -Blockers for the Treatment of Hypertension: A Meta-Analysis. *CMAJ* 2006; 174(12): 1737-42.
47. Carlberg B, Samuelsson O, Lindholm LH. Atenolol in Hypertension: Is It a Wise Choice? *Lancet* 2004; 364: 1684-9.
48. Grant R, Procter-King J, and Higgins B. Pharmacological Therapies for Essential Hypertension: Updated NICE Guidance. *Primary Health Care* 2008; 18(7): 32-4.
49. Khan N, McAlister FA, McCormack JP. Do β -Blockers Have a Role in Treating Hypertension? *Canadian Family Physician* 2007; 53(4): 614-7.
50. Al Mahroos F, Mckeigue P. High Prevalence of Diabetes in Bahrainis. *Diabetes Care* 1998; 21: 936-42.
51. Gress TW, Neito J, Shahar E, et al. Hypertension and Antihypertensive Therapy as Risk Factors for Type 2 Diabetes Mellitus. *N Engl J Med* 2000; 342: 905-12.
52. American Diabetes Association. Standards of Medical Care in Diabetes. *Diabetes Care* 2010; 33(Suppl 1): S11-61.