Collaborating for Quality Care
Blood Pressure Control in Patients with Diabetes:
Healthy Heart Program Approaches

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Disclosures:

No business or financial relationships with the pharmaceutical or medical technology industry.

Course Objectives:

At the conclusion of this activity the participant should be able to:

- Discuss the diagnosis of hypertension and state the blood pressure goals for diabetics.
- Recognize the importance of appropriate treatment and management of blood pressure in reducing CVD risk in diabetic patients.
- Identify guidelines and algorithms provided by the I.H.S. for treatment of hypertension and CV risk reduction in diabetic patients.
- Discuss the role of patient self-management support in achieving clinical goals.

Priority Care for Diabetics:

- "Unlike other ethnic groups, the incidence of coronary heart disease is increasing in American Indians and Alaska Natives, possibly because of the increasing prevalence of diabetes in this population."
- Cardiovascular disease is the major cause of morbidity and mortality in the diabetic patient.
- Achieving blood pressure goals reduces the risk of both macro-vascular (CVD) and micro-vascular complications in diabetes.

I.H.S. *Standards of Care for Adults with Type 2 Diabetes.* March 2009.

I.H.S. *Cardiovascular Disease and Diabetes Best Practice.* July 2009.

Healthy Heart:
Reducing CVD in AI/AN

- Competitive Grant Process.
- Intensive case management of diabetic patients.
- Standardized approach to education, monitoring and treatment.
- Recognition that BP, Lipids, anti-platelet therapies and lifestyle play a larger role in CVD risk than glycemic control.

Healthy Heart Goals:

1. BP <130/80mmHg consistently.
2. LDL <100mg/dl; <70mg/dl (cardiac).
3. HDL >50mg/dl women; >40mg/dl men.
4. TG <150mg/dl.
5. HbA1c <7%.
6. 7% reduction in weight from baseline.
7. 150 minutes or more of documented exercise/ week.
8. Low-fat, low-sodium, nutrient rich diet.
9. Smoking cessation.
10. Daily anti-platelet therapy.

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Healthy Heart Outcomes:

- 95 participants retained
- Program entry 34% of participants BP was not at goal.
- Currently ~12% of participants BP goals remain elusive (22% improvement overall).
- 80% of all participants use either an ACE-I or ARB medication.
- General diabetes audit BP at goal improved from 40% to 51% of all Native American Diabetics in clinic (11% improvement since implementing HH strategies).

Hypertension:
The Disease Process

Essential (aka primary; “benign”)

- ICD-9: 401.1
- Begins insidiously and may progress to “malignant” state if left untreated.
- Pathophysiology:

1. Changes in the arteriolar bed causing increased vascular resistance.
2. Increased blood volume resulting from renal or hormonal dysfunction.
3. Abnormal **renin** release resulting in the formation of **angiotensin** II, which constricts the arterioles and increases blood volume.
4. Lifestyle.

Adapted from Pathophysiology Made Incredibly Easy. Springhouse, PA: Springhouse Corporation; 1998: 227-234.

Technique

Sub-Optimal Technique:

- Inaccurate approach and inconsistencies in technique are the most common cause of inaccurate readings.
- Implications of minimal error:

  ..."even a 5 mm Hg error either above or below the actual BP could inappropriately mislabel up to 48 million people."

Jones D, Appel L, Sheps S, et al. Measuring blood pressure accurately: new and persistent challenges. JAMA. *2003;289:1027-1030.*

Common Errors:

1. Inaccurate cuff size, positioning and application.
2. Inadequate rest before measurement.
3. Too rapid cuff deflation.
4. Lack of repeated measurements.

Jones D, Appel L, Sheps S, et al. Measuring blood pressure accurately: new and persistent challenges. JAMA. *2003;289:1027-1030.*

Diagnostic Criteria:

- Blood pressure measurements meeting criteria of pre-hypertensive, stage 1 or stage 2 elevations as defined by the JNC 7, measured at lease twice during two separate examinations after the initial screening.

Braunwald et al. *Harrison's 15th Edition, Principles of Internal Medicine, Volume 1.* New York, NY: McGraw-Hill; 2001: 211.

JNC VII

- Normotensive: <120mmHg systolic and <80mmHg diastolic.
- Pre-hypertensive: systolic pressure 120-139 mmHg and/or diastolic pressure 80-89mmHg.

U.S. Department of Health and Human Services, The National Institute of Health, The National Heart Lung and Blood Institute and the National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.* August 2004.

JNC VII

Stages of Hypertension:

- Stage 1: systolic pressure 140-159mmHg and/or diastolic pressure 90-99mmHg.
- Stage 2: systolic pressure ≥160mmHg and or diastolic pressure ≥100mmHg.

U.S. Department of Health and Human Services, The National Institute of Health, The National Heart Lung and Blood Institute and the National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.* August 2004.

JNC VII Key Messages:

- In those older than age 50, systolic blood pressure (SBP) of >140 mmHg is a more important cardiovascular disease (CVD) risk factor than diastolic BP (DBP).
- Beginning at 115/75 mmHg, CVD risk doubles for each increment of 20/10 mmHg.
- Those who are normotensive at 55 years of age will have a 90 percent lifetime risk of developing hypertension.
- Prehypertensive individuals (SBP 120–139mmHg or DBP 80–89 mmHg) require health promoting lifestyle modifications to prevent the progressive rise in blood pressure and CVD.

UKPDS Findings:
Each 10mmHg Decrease in SBP

- 15% reduction in overall mortality in diabetic patients.
- 11% reduction in myocardial infarction in diabetic patients.
- 13% reduction in microvascular diabetic complications of retinopathy and nephropathy.

U.S. Department of Health and Human Services, The National Institute of Health, The National Heart Lung and Blood Institute and the National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.* August 2004.

I.H.S. Approach

Cardiovascular Disease and Diabetes Best Practice 2009

- BP measurement with each clinical visit.
- If BP >130mmHg systolic or >80mmHg diastolic reconfirm BP on separate day.
- DM patients with systolic 130-139mmHg and or diastolic 80-89mmHg should be treated with lifestyle and behavioral therapy for a **maximum** of 3 months. If BP goal is not achieved and sustained treatment with medication is to be initiated.

Treatment Algorithm:

First Line:

1. ACE-I:
   a) Lisinopril: start 2.5-5mg daily; usually 20-40mg daily.
   b) Captopril: Start 12.5mg bid-tid; max 150mg tid.
1. ARB (if cough/angioedema on ACE-I):
   a) Losartan: Start 25-50mg daily; usually 100mg daily.
   b) Telmisartan: Start 20-40mg daily; usually 40-80mg daily.

ACE-I:

- Primary indications: hypertension, heart failure, chronic kidney disease and micro and macro-albumineria.
- Mechanism of Action: ACE-I exert their hemodynamic effect mainly by inhibiting the renin-**angiotensin** system. They also modulate sympathetic nervous system activity and increase prostaglandin synthesis. They cause mainly vasodilatation and mild **natriuresis** without affecting heart rate and contractility.

http://www.fpnotebook.com/CV/Pharm/AcInhbtr.htm

ACE-I Adverse Effects:

- Cough (5-20%)
- **Hyperkalemia** (5%)
- Teratogenecity
- Renal Insufficiency
- Hypotension

http://www.fpnotebook.com/CV/Pharm/AcInhbtr.htm

ACE-I Monitoring:

- Serum Potassium
- Serum Creatinine
  - Timing
    - Baseline
    - Recheck in 4 days to 2 weeks
  - Expect an increase in Chronic Kidney Disease
    - Despite this, renal protective effect outweighs mild to moderate Creatinine increase
  - Indication to consider stopping ACE Inhibitor
    - Serum Creatinine increased >20% in 4 days
  - Additional precautions when increasing dose
    - Serum Creatinine should not increase >30%

http://www.fpnotebook.com/CV/Pharm/AcInhbtr.htm

ARB:

- Primary Indications: Hypertension; chronic kidney disease; proteinuria; CHF.
- Mechanism of Action: An antagonist of ANGIOTENSIN TYPE 1 RECEPTOR with antihypertensive activity due to the reduced **pressor** effect of ANGIOTENSIN II.

http://www.fpnotebook.com/CV/Pharm/Angtnsn2RcptrBlckngAgnt.htm

ARB Adverse Effects:

- Similar to ACE-I with the exception of cough.

Benefits:

- Bind to **angiotensin** I receptor blocking the activity of **angiotensin** II which has been shown to preserve renal function and reduce proteinuria.

Smith, T.W. and Morgan, J.P. *Differences between angiotensin converting enzyme inhibitors and receptor blockers.* www.uptodate.com

ACE-I and ARB Combination Therapy?

Limited data currently:

- Theory proposes that over time chronic use of an ACE-I may lose efficacy in blocking **angiotensin** II and aldosterone.
- COOPERATE Trial (non-diabetic kidney disease).
- CALM (type 2 DM and hypertension).

Drug Topics. *Continuing Education @ www.drugtopics.com*. January 2008.

Treatment Algorithm:

Second Line:

1) Diuretic:
   a) HCTZ: Start 12.5mg- 25mg daily; usually 25mg daily.
   b) **Maxzide (Triamterene** 75mg/ HCTZ 50mg): Dose at ½ tab in order to maintain HCTZ at 25 mg.

Treatment Algorithm:

Third Line:

***Beta Blocker (BB) *or* Calcium Channel Blocker (CCB)

1) BB:
   a) Atenolol: Start 25-50mg daily-BID; usually 50-100mg daily.
   b) Metoprolol: Start 50-100mg BID; usually 100mg-450mg daily in divided dose.
   c) Carvedilol: Start 3.125-6.25mg BID; usual dose is 25mg BID.
2) CCB:
   a) **Diltiazem** CD: Start 120mg daily; usually 120-420mg daily.
   b) Amlodipine: Start 2.5-5mg daily; usually 5-10mg daily.
   c) **Nifedipine** XL: Start 30mg daily; usually 30-120mg daily.

Treatment Algorithm:

Fourth Line:

***Clonidine *or* Alpha Blocker

1) Clonidine: Start o.1mg BID; usually 0.1-0.3mg BID.
2) Alpha Blockers:
   a) Doxazosin: Start 1mg immediate release HS; max dose 16mg daily.
   b) Terazosin: Start 1mg HS; max dose 20mg daily.

Realities of Disease Management:

- Patients with chronic diseases often only take 50% of prescribed doses.
- ½ of all patients will stop blood pressure treatment within the 1st year of treatment.
- In the U.S. medication “non-compliance” costs over 1 billion dollars each year.
- 36% of all failed kidney transplants are due to patients not taking their medications correctly.
- Improper use leads to greater risk.

Empowering Patients:
"Self-Management Support"
Patient-Centered Goals:

<u>Education with each visit</u>:

1. Disease risk.
2. Treatment modalities.
3. Medications: name, dose and timing with emphasis on purpose.

Empowering Patients:
"Self-Management Support"

<u>Assistance:</u>

1. Purpose of medication written on prescription.
2. Provide medication boxes and encourage use.
3. Use of CHR services.
4. All medications brought to all visits and reviewed with patient and medical record for accuracy.

Empowering Patients:
"Self-Management Support"

<u>Guidance:</u>

1. "Open door policy" for questions and concerns.
2. Emphasize role of pharmacist and encourage patient to consult regarding every new medication as well as all medications they are taking.

JNC VII Key Findings:

- Hypertension will only be controlled if patients are motivated to stay on their treatment plan.
- Positive experiences, trust in the clinician, and empathy improve patient motivation and satisfaction.

U.S. Department of Health and Human Services, The National Institute of Health, The National Heart Lung and Blood Institute and the National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.* August 2004.

Resources:

- Treatment Algorithm Cards:

  http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=resourcesDTTreatmentAlgorithm
- Clinical Guidelines 2009:

  http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=toolsClinicalGuidelines
- Best Practices:

  http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=toolsBPList

Recommendations:

- Article: Davidson, MB. *Detailed treatment algorithms for effective nurse and pharmacist-directed diabetes care. A personal approach.* The Diabetes Educator, vol. 35, #1, January/February 2009.
- Dash diet online: www.dashdiet.org
- JNC7: http://www.nhlbi.nih.gov/guidelines/hypertension/
- Medication bags RRIHC uses: http://www.baileymed.com/

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- I.H.S. *Standards of Care for Adults with Type 2 Diabetes.* September 2006.
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RRIHC Medication Bags
(yes, we know it's for breast pumps but it works so well for medications!!)