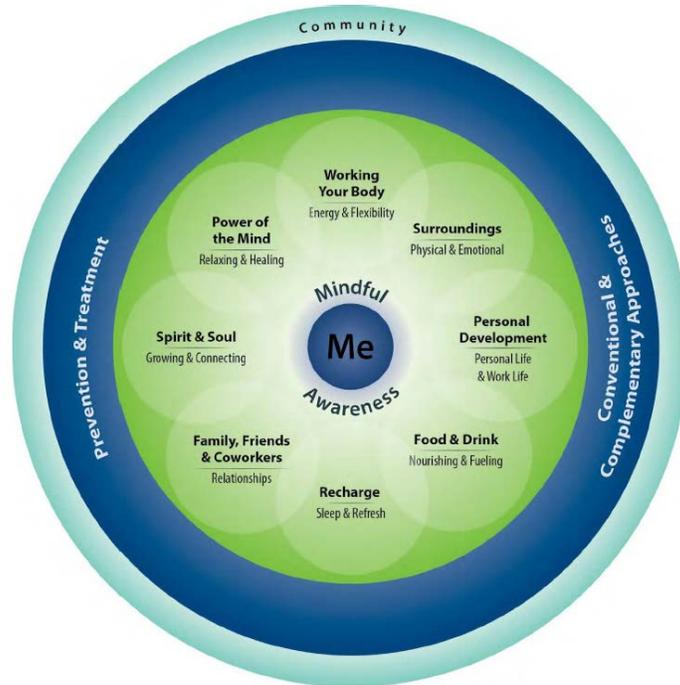


# WHOLE HEALTH: CHANGE THE CONVERSATION

Advancing Skills in the Delivery of  
Personalized, Proactive, Patient-Driven Care

## Heart Health: Educational Overview In Brief Clinical Tool



This document has been written for clinicians. The content was developed by the Integrative Medicine Program, Department of Family Medicine, University of Wisconsin-Madison School of Medicine and Public Health in cooperation with Pacific Institute for Research and Evaluation, under contract to the Office of Patient Centered Care and Cultural Transformation, Veterans Health Administration.

Information is organized according to the diagram above, the *Components of Proactive Health and Well-Being*. While conventional treatments may be covered to some degree, the focus is on other areas of Whole Health that are less likely to be covered elsewhere and may be less familiar to most readers. There is no intention to dismiss what conventional care has to offer. Rather, you are encouraged to learn more about other approaches and how they may be used to complement conventional care. The ultimate decision to use a given approach should be based on many factors, including patient preferences, clinician comfort level, efficacy data, safety, and accessibility. No one approach is right for everyone; personalizing care is of fundamental importance.

# **WHOLE HEALTH: CHANGE THE CONVERSATION**

## **Heart Health: Educational Overview in Brief**

### **Clinical Tool**

This clinical tool is a brief summary of the **Heart Health** educational overview from the Whole Health: Change the Conversation Heart Health module. See the full document for additional details, including all references.

### **Background**

Cardiovascular disease (CVD) remains leading cause of death worldwide and a major cause of disability.

### **Pathology of Atherosclerosis**

- Intravascular inflammation is driven by pro-inflammatory compounds
- Endothelial dysfunction occurs
- Intimal infiltration by LDL particles and immune system cells comes next
- Thrombus formation ensues
- Plaque disruption results

### **Risk Factors**

- Hypertension
- Dyslipidemia
- Smoking
- Physical inactivity
- Poor dietary habits
- Diabetes
- Overweight/obesity
- Family history of CVD

Healthy diet and lifestyle habits can significantly improve individual CVD risk

### **Proactive Self-Care and Heart Health**

#### **Working Your Body**

Sedentary lifestyle associated multiple cardiovascular (CV) risk factors including:

- Increased blood pressure
- Unhealthy weight gain
- High cholesterol levels
- Impaired glucose metabolism

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Regular physical activity reduces CVD and all-cause mortality, lessens risk across all body mass index (BMI) categories for:

- Coronary artery disease
- Heart attack
- Heart failure
- Hypertension
- Obesity
- Diabetes

The degree of physical activity required for healthy weight loss is relatively high

- Motivation to exercise may wane in absence of rapid weight loss
- Regular exercise provides significant health benefits even in absence of weight loss (some that reduce risk for CVD)
- Overweight people reduce risk for CVD when physically fit
- Majority of research focused on aerobic activity, yet combination of aerobic exercise and resistance training is appropriate for most
- How much activity each day?
  - Minimum of 15 minutes (example, brisk walking)
  - Subjects participating in low volume physical activity for an average of 15 minutes daily experienced a 14% reduced risk of death and a median three-year increased life expectancy
  - Each additional 15 minutes of activity further reduced mortality rates, even in those with pre-existing CVD

#### **Surroundings**

- A stressful, unhealthy home environment contributes to CVD risk
  - There are associations between high ambient noise, poor air quality (particulate matter) and incident CVD
- Music pleasant to the listener, especially when the listener is given his/her choice of music, reduces anxiety and may improve blood pressure, pulse rate, and sleep quality

#### **Personal Development**

- Job stressors related to risk
  - Long work hours (more than 55 hours/week)
  - Perceived job insecurity
  - Financial concerns
  - High work demands with little control
- Positive job factors act as buffers against CVD risk
  - Supportive co-workers, family
- Healthy diet and lifestyle habits reduce job-related CVD risk by about 50%

#### **Food and Drink**

- The Dietary Approaches to Stop Hypertension (DASH) diet and a Mediterranean pattern of eating

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- Both emphasize foods that may lower cholesterol and reduce inflammation and development of atherosclerosis
  - Vegetables, fruits, whole grains, and nuts
  - Limited saturated fat, red meat, and processed meat intake
- The DASH diet encourages low fat dairy products, aggressive reduction in sodium intake, no sugar-sweetened beverages
- Following the DASH diet can reduce systolic and diastolic blood pressure and improve lipid levels. It can decrease CVD incidence, heart failure, and (possibly) acute CV mortality
- Mediterranean diet
  - Traditional dietary pattern found in Greece, Southern Italy, and Spain in the early 1960s
  - Includes moderate alcohol intake alongside generous amounts of fish
  - Effective for preventing CVD, reducing incidence of fatal/non-fatal acute CV events
    - Considered more cardioprotective than statins
- Lyon Diet Heart Study
  - Secondary prevention trial (focused on survivors of first myocardial infarction)
  - Participants randomized to a Mediterranean-style diet or low-fat diet (American Heart Association prudent diet)
    - Trial stopped early at 27 months
      - 73% reduction in CV deaths and non-fatal heart attack in Mediterranean diet group
      - Protective effect persisted (t = 46 months)
- Prevenció'n con dieta mediterránea (PREDIMED) trial
  - Primary prevention study with over 7,000 Spanish subjects at high risk for, but who did not have active, CVD
  - Participants randomly assigned to one of three diets
    - Mediterranean diet rich in nuts
    - Mediterranean diet rich in extra-virgin olive oil (EVOO)
    - Active control group (prudent reduction in dietary fat)
  - Trial stopped early after median 4.8 years
    - Combination of stroke, heart attack, and cardiovascular deaths reduced by:
      - 30% in group randomized to Mediterranean diet + EVOO
      - 28% for those on Mediterranean diet + nuts
      - Marked reduction in peripheral artery disease for Mediterranean diet supplemented with nuts (50%) and EVOO (34%)

### ***Specific Foods***

#### **• Carbohydrates**

- Quality and type critically important

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- High glycemic load foods (processed carbohydrates) stimulate insulin secretion, promote insulin resistance, and induce pro-inflammatory mediator release
- **High-fiber foods**
  - Improve insulin sensitivity and reduce cholesterol absorption and lipid levels. They lead to reduced risk of CVD, including heart attack, and they may reduce C-reactive protein (CRP)
  - Leafy greens, oats, beans, peas, psyllium and fruits are good examples
- **Polyphenol-rich foods** (tea, chocolate, extra virgin olive oil, dark berries, etc.) and their metabolites
  - May lower blood pressure
  - Improve markers of oxidation and inflammation
- **Sterols and stanols**
  - Fats found in variety of fruits, vegetables, nuts, seeds, cereals, and legumes
    - Reduce gut cholesterol absorption
  - Emphasized in Portfolio Diet plan (which effectively lowers LDL-C)
- **Fats**
  - Type of fat more important than total fat intake
    - EVOO
      - Primary fat in Mediterranean diet
      - High polyphenol content (cardioprotective)
      - Oleocanthal
        - Natural anti-inflammatory compound found in high quality EVOO
  - Omega-3s
    - Inconsistent evidence for CV health benefits
    - Gruppo Italiano per lo Studio della Sopravvivenza nell'infarto Miocardico (GISSI) Prevenzione trial
      - Large study; people who had recently had their first heart attack
      - Additional gram of fish oils per day reduced sudden death by 45% over 42-month period
    - Omega-3s do not play a significant role in:
      - Protection against other major CV events
      - Treatment or secondary prevention of atrial fibrillation
      - Prevention of heart failure
      - Some experts report no CV benefits at all
        - Recent findings could be muddied by simultaneous use of maximal medical therapy (statins, ACE inhibitors, etc.)
  - Saturated fat
    - Substituting mono- and polyunsaturated fat for saturated fat reduces CVD risk

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- However, recent findings suggest little or no association between saturated fat intake and coronary artery disease, stroke, or incident CVD
- Trans fats
  - Produced by heating + hydrogenating liquid vegetable oils
    - More stable, conferring added shelf life to foods; they also become suitable for repeated heating without degradation (fried foods)
  - Implicated in atherosclerosis
    - Adverse effects on inflammation, lipid levels
  - Food and Drug Administration (FDA) to ban trans fats
    - Will prevent 20,000 heart attacks + 7,000 deaths yearly
- **Beverages**
  - Alcohol
    - Moderate intake decreases risk for CVD, heart attack
    - Antithrombotic and antioxidant effects
  - Tea
    - Limited evidence for beneficial effect on CVD risk factors
      - Caution: green tea interferes with action of nadolol
  - Coffee
    - Daily ingestion of up to 2-3 cups of coffee safe for most
    - Potential protective effects against atrial fibrillation
- **Chocolate**
  - Dark chocolate (greater than 70% cocoa) healthier than milk chocolate
    - Contains cardioprotective polyphenols

Some foods considered part of the standard Mediterranean diet are widely available, inexpensive, and relatively easy to prepare, including:

- Whole grains (steel cut oats, barley and brown rice)
- Leafy greens
- Beans
- Sweet potatoes
- Bananas
- Nuts
- Whole soy foods as an alternative to meat, including tofu
- Canned sardines or salmon

### Recharge

- Sleep and rest are necessary components of an optimal health program
  - Insomnia is associated with worsened CV morbidity and mortality, especially with hypertension, dyslipidemia, or obesity
  - Extremes of sleep duration (less than or equal to 5-6 hours, or greater than or equal to 10 hours) is associated with increased risk for hypertension, coronary artery disease and CVD

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- Sleep Disordered Breathing (SDB), such as Obstructive Sleep Apnea (OSA), disrupts normal cardiovascular function by inducing:
  - Episodic hypoxia
  - Frequent waking
    - Bradycardia is followed by rapid rise in sympathetic tone
  - Exaggerated negative intrathoracic pressure
    - SDB is more prevalent among those with PTSD

### **Family, Friends, and Co-workers**

- There is a strong influence of social relationships on CVD risk
  - Common adult stressors include:
    - Social isolation and loneliness\*
    - Work-related stress\*
    - Marital stress
    - Death of spouse or child
    - Care for sick spouse living at home
- Those with established CVD have significantly worse prognosis if they also experience social isolation or loneliness
  - Magnitude of risk comparable to smoking
  - Degree of social isolation predictive of mortality
  - Lack of group memberships predicts mortality in men
  - Infrequent social contact predicts mortality among women

*\* most commonly studied*

### **Spirit and Soul**

- Most studies show inverse relationship between religiosity/spirituality (R/S) and:
  - Substance abuse
  - Unhealthy dietary practices
  - Hypertension
  - Psychological stress
  - Hostility
  - Depression and anxiety
  - Cardiovascular reactivity, disease and mortality
- Linear relationship between R/S and happiness, well-being, and satisfaction
  - Taking a spiritual history helps practitioners better understand patient's values and gauge available support systems
    - Enhances the practitioner-patient relationship
    - Consider prompt referral to a local chaplain
    - Do not attempt to influence patient's belief system
- Regular volunteer work strongly associated with enhanced self-rated health and reduced mortality risk.

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#### **Power of the Mind**

- INTERHEART trial
  - Psychosocial factors, including stress and depression, are responsible for 32.5% of population-attributable risk for heart attack across 52 countries
    - Only slightly less than population-attributable risk for lifetime smoking (35.7%)
    - Greater than risk associated with hypertension (17.9%) or obesity (20.0%)
- Stress induces elevated cortisol and catecholamine levels that result in the following, among other physiologic changes:
  - Increases in blood pressure, heart rate, cardiac output, and myocardial electrical impulse conduction
  - Sustained pro-inflammatory cytokine production
  - Endothelial dysfunction
  - A chronic low grade hyper-coagulable state
- Stress, anger, severely depressed mood may trigger acute CV events
  - Stress (takotsubo) cardiomyopathy
    - Release of catecholamines during periods of intense emotional or physical stress “stuns” myocardium
    - Acute left ventricular dysfunction that resembles acute anterior heart attack on EKG
- Unmanaged anxiety and/or depression is associated with increased participation in unhealthy behaviors and reduced heart rate variability
  - Mediterranean pattern of eating can mitigate increased risk in CVD that would otherwise be associated with depression and anxiety
- Optimists have improved vascular health, reduced heart attack risk, and lessened CV mortality relative to pessimists
  - Optimism can be learned

#### ***Post-Traumatic Stress Disorder (PTSD)***

- Associated with:
  - Sympathetic response to trauma-reminiscent stimuli
  - Chronic hypothalamic-pituitary-adrenal axis dysregulation
  - Pro-inflammatory changes
  - Reduced heart rate variability
  - Increased prevalence of cardiometabolic disorders
  - Higher risk for incident CVD, even after controlling for presence of depression
    - Long-term study of middle-aged, Vietnam-era Veteran twins<sup>13</sup>
      - Those with PTSD almost twice as likely (22.2% vs. 12.8%) to develop CVD
      - Those with PTSD had significant impairments in heart muscle perfusion (PET scanning)
  - Increased prevalence of sleep disorders
    - Chronic state of hyperarousal

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- PTSD severity correlated with degree of sleep disturbance
- See also the **PTSD** module

#### ***Mind/Body Interventions***

- Complementary therapies may reduce sympathetic tone, increase parasympathetic activity, and improve baroreceptor activity. Examples include:
  - Biofeedback
  - Yoga therapy
  - Tai chi
  - Qi gong
  - Transcendental (TM) and mindfulness meditation
  - Clinical hypnosis
  - Guided imagery
  - Breath work
  - Relaxation therapy
  - Counseling
  - Cognitive behavioral therapy (CBT)

#### **General Health – Smoking**

- Smoking remains the leading cause of preventable death worldwide
- Non-smokers regularly exposed to secondhand smoke have 25-30 % increased risk of CVD morbidity and mortality
  - Cigarette smoke:
    - Induces endothelial injury
    - Promotes atheroma formation
    - Superimposes prothrombotic influence on the vascular tree
    - Creates relative hypoxemia leading to increased red blood cell mass and hyperviscosity
  - Nicotine
    - Binds to central nervous system nicotinic cholinergic receptors
      - Potential for addiction
    - Stimulates catecholamine release
- Almost half of excess CVD risk is eliminated within two years of quitting
  - To quit, smoker must manage nicotine withdrawal and extinguish learned behaviors with smoking
    - Together, psychosocial support (counseling) and pharmacotherapy promote successful smoking cessation
      - Enhance motivation to quit
      - Build coping skills to avoid relapse
      - Relief of withdrawal symptoms
- Strong evidence of efficacy for nicotine replacement products, bupropion, and varenicline (nortriptyline and clonidine considered second-line agents)
  - Safety concerns with varenicline

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- Behavior changes including hostility, agitation, depressed mood, and suicidal ideation
- Increased risk of acute CV events with established CVD
- Electronic cigarettes (e-cigarettes)
  - Not an effective adjunct towards smoking cessation
  - Often deliver nicotine
  - Dual use (tobacco where smoking permitted, e-cigarette where not)
- Neither clinical hypnosis nor acupuncture effective for long-term cessation
- Small amount of data suggest mindfulness meditation can help reduce cravings and number of cigarettes smoked
  - Leads to increased self-control, reduced anxiety and decreased impulsivity
- Even brief advice to quit smoking when offered by clinician is effective
- See the module on **Substance Use**.

### Select Dietary Supplements

***Note:** Please see the module on **Dietary Supplements** for more information about how to determine whether or not a specific supplement is appropriate for a given individual. Supplements are not regulated with the same degree of oversight as medications, and it is important that clinicians keep this in mind. Products vary greatly in terms of accuracy of labeling, presence of adulterants, and the legitimacy of claims made by the manufacturer.*

- **Coenzyme Q10 (CoQ10)**
  - Partially produced through pathways shared with cholesterol synthesis\*
  - Important for cellular energy production
    - Potential role in heart failure management
      - Conflicting data—no consensus
    - Possible complement to conventional hypertension treatment (Again, research findings contradictory)
      - Caution: case reports of possible pro-coagulant activity in patients taking warfarin
    - Consideration for those on statin/red yeast rice\*
- **Niacin (nicotinic acid, vitamin B3)**
  - Long considered effective for increasing HDL-C levels while also lowering LDL-C, total cholesterol and triglyceride levels
  - However, results from AIM-HIGH trials raised concerns
    - Addition of niacin to statin therapy does not provide incremental reduction in CVD risk
    - Increased risk for infection, bleeding, myopathy and diabetes
      - Doubt cast on use of niacin at all

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- **Calcium**
  - Could supplementation increase CVD risk (no concerns about dietary calcium intake)?
  - Current guidelines: Most adults should get 1000 - 1200 milligrams of elemental calcium daily *from all sources*
    - By consuming healthy, varied diet most people should be able to reach these thresholds
  - Some investigations suggest significant increased risk of heart attack and CV death with use of calcium supplements
    - Seems to be a correlation between serum levels/vascular calcification
  - General recommendations:
    - Supplementation should only be for those not consuming adequate dietary calcium
    - Added consideration for men. There is a possible association between calcium supplementation and later development of high-grade, advanced, and fatal prostate cancer
- **Vitamin D**
  - Low levels predispose to hypertension, heart attack, and myositis-myalgias with statin therapy
    - Supplement with vitamin D3 (cholecalciferol) to get 25-hydroxy vitamin D1 (2-OH D) levels to a level of at or greater than 40 ng/ml (75 nmol/L).
    - 1000 IU/day vitamin D3 raises 25-OH D levels about 8-10 points
- **Magnesium**
  - Smooth muscle relaxer that affects endothelial function, blood pressure, and inflammation
  - Low circulating levels are associated with increased risk of hypertension, CVD and stroke
    - Caution with use in people with impaired renal function
- **Red yeast rice (RYR)**
  - Produced by culturing rice with *Monascus purpureus*
    - Yields mixture of monacolins that inhibit HMG-CoA reductase
    - One of the monacolins is monacolin K (lovastatin)
  - Studies suggest RYR is effective cholesterol-lowering agent
    - Associated with fewer side effects than prescription statins
    - Viable option for those unable to tolerate statin therapy
    - Cautions: hepatotoxicity; must identify quality products
      - There is variability in monacolin content among products
      - Some products contain a potentially nephrotoxic component (citrinin)
- **Hawthorn (*Crataegus oxyacantha* or *Crataegus monogyna*)**
  - Cardiac tonic sometimes used as adjunct with heart failure
  - Modest hypotensive effect

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- Recent data suggest little benefit, potential to cause worsening of heart failure

### **Additional Considerations**

- Discontinue proton pump inhibitors where appropriate, as they have potential role in development of CVD
- Provide annual flu vaccine (may reduce risk of heart attack or stroke by 50%) and varicella vaccine (herpes zoster associated with increased CVD risk, especially stroke)
- Encourage proper dental hygiene, since periodontal disease linked to atherosclerosis

### **Whole Health: Change the Conversation Website**

Interested in learning more about Whole Health?  
Browse our website for information on personal and professional care.

<http://projects.hsl.wisc.edu/SERVICE/index.php>

*This clinical tool was written by Russell H. Greenfield, MD, Director of Greenfield Integrative Healthcare, PLLC, and President of Greenfield Consulting, LLC.*