Disclosures

My presentation will NOT include discussion of:

1) any commercial product or device with whom I have a relationship
2) any off-label or investigational use of a drug or device

More Disclosures & Biases

• I have told patients for years:
  “You’d be much better off to start exercising regularly, than to lose 30 pounds and not exercise.”
• My body mass index (BMI) is 32
Exercise & Health

- Physical inactivity has an astonishing breadth of harmful health implications.
- Exercise has a powerful effect on both treatment and prevention of chronic diseases, as well as on premature death.
  - Association holds for every subgroup of the population
- Physical inactivity is THE major public health problem of our time. (Based on Sallis, 2008)

Physical Activity at Work and Coronary Artery Disease; 31,000 London Transport Workers

- 1978: The Recommended Quantity/Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults (ACSM)
- 1993: ACSM/CDC Public Health Recommendations on Physical Activity
US Dept Health & Human Services (USDHHS) 2008 Recommendations

- All adults should perform:
  - 2.5 hrs/wk of moderate-intensity exercise, or
  - 1.25 hours of vigorous-intensity exercise, in
  - 10+ minutes spread through the week
  - Muscle strengthening exercises 2X per week
- Additional health benefits are provided by doubling the above recommendation

Exercise IS Medicine:
A Global Initiative

- Joint initiative in US: ACSM & AMA
- Major Corporate Sponsor: Coca-Cola
- Bob Sallis, MD, President ACSM 2008
- TM in US by ACSM
- GOAL: Every physician should assess Physical Activity (PA), as a vital sign, at every visit
Why Do It?

- Canada 2001 (Katzmarzyk, 2004)
  - Obesity and inactivity account for 5% of HC costs
  - Physical inactivity: $5.3 billion
  - Obesity: $4.3 billion
- US Data (Carlson et al, 2010)
  - Only 43.5% of adults are aerobically active
  - 18.2% of these also meet muscle strengthening guideline

Do We Already Do It? (NO)

- Australian Sports Med Providers (Ferney et al, 2009)
  - 70% aware of US Surgeon General Report
  - 87% considered advice on PA to be important
  - Only 19% could correctly answer 4/5 questions regarding specifics of the advice to be provided
- CDC Study (Lobelo et al, 2009)
  - Only 34% of US adults counseled at last PC visit
- Canadian Study (Sinclair et al, 2008)
  - Only 42% had frequently received advice on PA

Definitions

- PHYSICAL ACTIVITY (PA)
  - Any bodily movement which burns calories
- FITNESS
  - A condition which comes about via regular and/or progressive exercise
Measurement of PA & Fitness

- Both show significant correlations between all methods of measurement
  - Global self-report
  - Exercise history
  - Aerobic testing

Self-Reported Fitness

- Self-reported poor fitness is at least as strong a predictor of mortality as self-reported poor health (Phillips et al, 2010)
  - 858 Scottish men and women followed for 16 years beginning at age 59
  - They are independent risk factors
  - They are lethal when present together
**Cardiorespiratory Fitness (CRF) & All-Cause Mortality**

- 2009 Meta-Analysis (Kodama et al)
  - Reviewed 33 eligible studies of relation between baseline CRF and CHD events and/or all cause mortality in healthy participants
  - 102,000 participants total, 6900 events
  - 13% decrease in all cause mortality, & 15% decrease in CHD/CVD events, PER MET of MAX AEROBIC CAPACITY (MAC)

**What is a “MET”?**

- MET = Metabolic equivalent of task, a measure of intensity of aerobic exercise (3.5 ml O2/kg/min)
- 1 MET = Sitting quietly
- 3 METs = Walking a mile in 23 minutes
- 5 METs = Light stationary bicycling
- 8 METs = Running in place
- 18 METs = Running at 11 miles/hour (17.5 km/hr)
  - 1 MET inc = 1 km/hr increase in run/walk speed

**CANCER (CA) & PA/Fitness**

- Fittest 1/3 of subjects have:
  - 27% less overall cancer risk
  - 37% less overall mortality (Laukkanen et al, 2010)
  - Breast CA: 25% less risk, 30% less mortality
  - Colon CA: 20% less risk, 25% less mortality
  - Gastric CA: 50% less risk, 80% less mortality
  - Lung CA: ?15% less risk, ?30% less mortality
  - Endometrial CA: ??
Blood Sugar & Cancer
- Diabetics have 40% increase in CA mortality
  - Pre-diabetics 20%? (Landman et al, 2008)
- Specific cancers with increased mortality
  - Digestive
  - Breast
  - Endometrial
  - Kidney

Blood Sugar & Cancer
- CA mortality proportional to cumulative insulin use; 2X for <3 yrs, 6X for >12 years (Bowker et al, 2010)
- Metformin is partially protective
- 5 months of aerobic AND resistance training decreased HgbA1c by 1% (Sigal et al, 2007)
- Diabetes and obesity are independent risk factors for cancer

Obesity and Cancer
- Obese have 25% increase in cancer mortality (Teucher et al, 2010)
- Specific cancers with increased mortality
  - Digestive
  - Post-menopausal Breast
  - Endometrial
  - Kidney
  - Prostate
Common Pathway?

- Inflammatory mediators alter the promotion and progression of cancer
- Obesity, diabetes, inactivity, and other risk factors are associated with higher levels of inflammatory mediators
- Aerobic and resistance training decrease inflammatory mediators in specific ways

The “Obesity Paradox”

- Lower mortality in overweight/obese patients
- First observed in obese patients with CHF
- Extended to those with CAD, peripheral vascular disease (PVD), and hypertension (HBP)
- Then to atrial fib, dialysis, general surgery, and “suspected” CAD with normal nuclear studies
- VA study of 12,000 men aged 40-70 referred for suspected CAD shows “paradox” is mediated by fitness (McAuley et al, 2010)

Deaths Preventable by PA/Fitness

- If all Canadians followed PA Guidelines:
  - CHD 33%
  - Stroke 25%
  - Hypertension 20%
  - Breast CA 14%
  - Colon CA 20%
  - Type 2 DM 20%
  - Osteoporosis 25% (Warburton et al, 2007)
Cardiac Risk Factors & PA/Fitness

- Most active/fittest subjects have (compared to least active) AT LEAST 50% less incidence:
  - Metabolic syndrome
  - Type 2 diabetes
  - Hypertension (19% per MET)

Cardiac Risks & PA/Fitness

- 1 MET increase in fitness is equivalent to:
  - 7 cm decrease in abdominal girth
  - 5 mm Hg decrease in systolic BP
  - 20 mg/dL decrease in FBS
- All risk factors act, in significant part, through inflammatory mediators
- PA/Fitness decrease inflammatory mediators
PA Late Breaker

- Erickson et al, 2010 (Oct Neurology)
  - 299 elderly adults (mean age 78)
  - Estimated weekly walking distances
  - Those who walked at least 6 miles/week (top quartile) had:
    - Better maintenance of gray cell volume
    - 50% less cognitive impairment over 13 years

PA/F and Work-Related
Musculoskeletal (MS) Injury

- Nonspecific upper limb disorder
  - Subjects with poor self-reported physical fitness have increased severity and functional disability
- Whiplash injury (Geldman et al, 2008)
  - Subjects with medium/high fitness have earlier recovery and 2X better RTW
PA/F & Work-Related MS Injury
• Subacute LBP (Storheim et al, 2005)
  • Less RTW with poor fitness
• Chronic LBP (Sculco et al, 2001)
  • Low-mod aerobic exercise improves work status and decreases pain med prescriptions 80% over 2.5 years

PA/F & Work-Related MS Injury
• Swedish dental hygienists with “active leisure” have fewer MS disorders (Ylipaa et al, 1999)
• Aerobic conditioning leads to decreased pain & disability in chronic LBP
• Leisure-time PA decreases MS pain in sedentary workers
• Leisure-time PA decreases neck pain & disability (Hanney et al, 2010)

Role of Modified/Transitional Work
• Modified/Transitional work assignments, in low back injuries, are associated with:
  • More rapid RTW full duty
  • Decreased pain & disability
  • Decrease in back injury rate (Williams et al, 2007)
Heritability of Exercise Participation

- 50-70% in twin studies of Europe and Australia
- May involve genes influencing:
  - Acute mood effects of exercise
  - High exercise/weight loss abilities
  - Personality (De Moor et al, 2007)
  - Chromosome 19, areas with genes which influence muscle performance and blood flow

Does Exercise Improve Fitness?

- Middle-aged adults
  - 0-20% increase in MAC over 6-12 months
  - At 100% of CDC recs, MAC increases 6% in 6 mos
  - At 50%, MAC increases 4%; at 150%, MAC increases 8%
  - Walking 15 min bid about as effective as 30 qd
  - Overall, expect 0.5 MET improvement at 6 months
- Healthy 70 year-olds
  - 10% increase in 6MWD over 1 year of exercise

Does Improved Fitness Have Benefits?

- Carnethon et al, 2007
  - 4000 Exercise treadmill tests (ETTs) in healthy 18-30 year-olds
  - Low fit subjects had 2X risk of developing HBP, DM, and metabolic syndrome
  - ETTs repeated after 7 years
    - Subjects with improved fitness lowered risks
    - Subjects with reduced fitness increased risks
HOW Do We Increase PA/Fitness?

• Some programs work best for males, and especially those with higher initial fitness
• Pedometer programs are appreciated by women, and often more effective in those with lower initial fitness
  • PA increased by average 27% over 3-6 months
  • Step goals increase effectiveness
  • 10,000+ steps/day = ACTIVE

Counseling to Increase Activity

• May increase PA over 3-12 months, especially if written materials and telephone follow-up
• Counseling for higher-intensity exercise may be more effective in increasing activity and adherence
  (Stensel, 2010)
• Counselors who themselves exercise are more effective
  (Lobelo et al, 2009)

How Increasing PA Benefits Employers

• Inactive employees have higher health care costs ($1500 more per year)
  (Loeppke et al, 2009)
• Productivity losses (disability, absenteeism, & presenteeism) are at least twice as large
• A recent Dutch study concludes that efforts to stimulate PA are more effective in reducing absenteeism in obese workers than dieting (25% decrease)
  (van Strien & Koenders, 2009)
Exercise and Workplace Health Promotion

- Employees prefer to exercise on site and to be paid for exercising
- Employers want objective measures of results of initiatives
- May be cost-effective to provide paid exercise time, & salary increases for improved fitness
- Group medical/workers’ comp insurers should share in costs based on evidence

Objective Measurement of Fitness in Workplace Health Promotion (WHP)

- ETT is expensive and inaccurate – overestimates MAC by 10-30%
- 6-Minute Walk Test (6MWT)
  - Easy and well-tolerated, extensively researched
  - Best brief estimate of MAC (correlation 0.51-0.90)
  - Test-retest reliability 0.95
  - Change of 54-56 M is significant
  - Distance increases up to 30 M with encouragement, or with oval track (ATS, 2002)

6-Minute Walk Test Technique

- “The object of this test is to walk as far as possible for 6 minutes.”
- “Remember that the object is to walk AS FAR AS POSSIBLE for 6 minutes, but don’t run or jog.”
- “Start now, or whenever you are ready.”
- “You are doing well. You have 5 minutes to go.”
- “Keep up the good work. You have 4 minutes to go.”
- “In a moment I’m going to tell you to stop. When I do, just stop right where you are and I will come to you.”
Prediction Equations for 6MWT

- 6MWD (Males, meters) =
  7.57(Ht, cm) – 5.02(Age) – 1.76(Wt, kg) – 309
  &
- 6MWD (Females, meters) =
  2.11(Ht, cm) – 5.78(Age) – 2.29(Wt, kg) + 667
  Enright & Sherrill (1998)

Issues in Obesity Treatment

- Felitti et al, 2010 (KP San Diego)
  - Obesity is not the core problem
    - It’s a symptom and/or solution
  - Weight-loss programs must include:
    - Exploration of underlying psychodynamic issues (often childhood sexual abuse)
    - Consideration of protective effects, or unrecognized and unspoken benefits

EXERCISE is MEDICINE

- Exercise is powerful medicine, and has few side effects
- It is much simpler to address than obesity/BMI
- It should be prescribed more often, and managed better
- It should be addressed by every provider, and at every visit
Thank you for participating in today’s webinar. At the conclusion of this call you will receive an email with a link to a post-webinar questionnaire.

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Sinclair J; Lawson B; Burge F. Which patients receive advice on diet and exercise? Do certain characteristics affect whether they receive such advice? *Can Fam Physician*. 2008;54(3):404-12.


