

Addressing the pandemic of **physical inactivity** one patient at a time

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Introduction

1. Global pandemic of physical inactivity
2. Health benefits of physical activity
3. Public health initiatives and recommendations
4. Health care setting
5. Exercise on prescription
6. Effectiveness and cost effectiveness of the 'Green Prescription'
7. How are we prioritising our efforts (and funding)?

Global pandemic of physical inactivity

- Fourth leading risk factor for global mortality
- Accounts for 6-10% of all deaths (Lee 2012)
- Contributes towards multiple conditions:
 - Cardiorespiratory (heart disease and strokes)
 - Metabolic (diabetes and obesity)
 - Musculoskeletal (osteoporosis and osteoarthritis)
 - Cancer (breast and colon)
 - Functional decline and falls in older adults
 - Depression

Wen CP, Wu X (2012) Lancet 380: 192-193; Lee et al (2012) Lancet 380: 219-229; World Health Organisation (2010) Global recommendations on physical activity for health.

http://gamaserver.who.int/gho/interactive_charts/ncd/risk_factors/physical_inactivity/atlas.html

Definitions

- Physical activity:
 - Bodily movement produced by skeletal muscle that requires energy expenditure
- Exercise:
 - Planned and repetitive activity for physical fitness
- Recommended (at least):
 - 30 minutes moderate intensity 5 days / week
 - (e.g. brisk walking but can hold a conversation)
 - 3-4hrs/week for weight-loss or cancer risk
 - Less for other benefits (e.g. balance and function in older adults)

Health benefit of physical activity

- Also depends on:
 - Fitness of person (relative benefit most in sedentary)
 - Intensity, Duration and Frequency
 - Type of exercise (affects particular muscles, organs and bones/joints involved)
 - Length of “training”
 - Dose-response: (often) “Some is good, more is better”

Epidemiological evidence for recommended levels of physical activity:

- Associated with reduced risk of:

– All-cause mortality	20-30%
– CVD mortality	20-30%
– Colon cancer	30%
– Breast cancer	20-40%
– Lung, endometrial, ovarian cancer	20-30%
– Depression	15-30%
– Type 2 diabetes	40-60%
– Osteoporotic fracture	20-60%

Public health initiatives and recommendations

Lancet issue July 2012:

- Systems approach
 - inter-sectorial
 - individual, social, cultural and environmental level
- Including low income countries where transition:
 - from under-nutrition to obesity;
 - from active rural to sedentary urban

International Recommendations

- WHO Global Strategy on Diet, Physical Activity and Health (2004)
- WHO Non Communicable Disease (NCD) Action Plan (2008)
 - Transport policies to promote active commuting, such as walking and cycling,
 - Urban planning that promote space for recreational activity
 - Fostering inter-sectorial collaborations for physical activity promotion, and
 - Surveillance of population physical activity levels

International Recommendations

- International Society for Physical Activity and Health (GAPA) – Toronto Charter (2009):
 - Evidence-based strategies to target whole population
 - Address environmental, social and individual determinants of physical inactivity
 - Equity approaches, reduce disparities, cultural sensitivity
 - Sustainable partnerships at all levels
 - Build capacity and support research, practice, policy, evaluation and surveillance
 - Life-course approach; 'Make healthy choices, easy choices'
 - Advocate to decision makers and communities

International Recommendations

- **Exercise is Medicine:**
 - “Calling on all health care providers to assess and review every patient’s physical activity program at every visit”
- **Charter (2010) and guiding principles:**
 - Exercise and physical activity important to health and prevention and treatment of many chronic diseases
 - More should be done to address physical activity and exercise in healthcare settings
 - ACSM and AMA making efforts to bring a greater focus on physical activity and exercise in healthcare settings

International Recommendations

- NCDs committee of the United Nations (2011) discussed ways to promote healthy lifestyles, including increasing physical activity levels
- Non-communicable diseases (NCD) responsible for >60% global deaths:
 - Cardiovascular diseases
 - Cancer
 - Chronic respiratory diseases
 - Diabetes

Public Policy and Planning: Regional

Urban and regional planning:

- Street connectivity and walkability
- Safe streets,
- Lower speeds and volume of traffic,
- Proximity of recreational areas
- Proximity to shops
- Aesthetics
- Bike paths
- Good public transport systems
- Sports and recreational programs

Healthcare setting

- Physical Activity in the Prevention and Treatment of Disease

Swedish NIPH 2010, ISBN 978-91-7257-715-2

http://www.fyss.se/wp-content/uploads/2011/02/fyss_2010_english.pdf

Exercise-based cardiac rehabilitation following heart attack (MI)

- Reduced odds of:
 - repeat MI by 47%,
 - fatal MI by 37%
 - all-cause mortality by 26%

- Compared with statins:
 - repeat MI by 31%
 - fatal MI by 43%
 - CVD mortality by 25%
 - (all-cause mortality by 16%*)

* Primary and secondary prevention. Lawler PR et al (2011) Am Heart J 162: 571-584.e572; Ward S, et al. (2007) A systematic review and economic evaluation of statins for the prevention of coronary events. Health Technology Assessment (Winchester, England) 11: 1-160 <http://www.umm.edu/graphics/images/en/19389.jpg>

How does Physical Activity do it?

- Blood pressure (3/2 – 7/5mmhg)
- Lipids (triglycerides)
- PA improves:
 - cardiorespiratory fitness,
 - cardiac muscle size and efficiency
 - oxygen use from blood
 - micro-vascular development + heart blood supply
 - peripheral vessel responsiveness
- PA reduces:
 - peripheral vascular resistance
 - platelet clotting and risk of coagulation
 - arterial stiffness and atherosclerosis formation

Whelton et al (2002) *Ann Intern Med* 136: 493-503; Kelley & Kelley (2008) *Prev Cardiol* 11: 71-75; Chudyk et al (2011) *Diabetes Care* 34: 1228-1237; U.S. DHHS (2008), Physical Activity Guidelines; Swedish NIPH (2010) Physical Activity in the Prevention and Treatment of Disease; Elley et al (2006) *N Z Med J* 119: U1996.

Management and prevention of type 2 diabetes

- Exercise improves glucose control (HbA1c -0.6 to -0.9%)
- Exercise + diet reduces progression from pre-diabetes to T2DM by 50-60%
 - Malmo
 - Da Qing
 - DPP

Bone, muscle and joint health

Physical activity improves:

- Osteo- and rheumatoid arthritis:
 - Function & pain without increase in adverse effects
- Osteoporosis:
 - Bone mineral density (weight bearing /resistance PA)
 - Reduced osteoporotic fractures (vertebral)
- Risk of falls in older adults:
 - Balance, fitness and muscle strength
 - Reduced risk and rate of falls (by 15-40%)

Evidence for many other conditions

- Depression
- Anxiety
- Sleep
- Quality of life
- Immune response
- Cognitive and physical function in dementia
- “Everything that gets worse when you grow older gets better when you exercise” (Lee, 2012)

The hazards of physical activity

- More severe injuries/events more common:
 - Contact sports (football, ice hockey, boxing, judo)
 - Vigorous exercise (running, squash, gymnastics)
 - Added hazards (horse-riding, skiing, road cycling)
- Minor musculoskeletal injuries/falls:
 - Moderate exercise (walking, golf, swimming)
 - ‘Untrained’ or frail
- Benefits outweigh adverse effects

Health care settings

- Family practice:
 - In Canada, adults visit their family physician 3.1 visits/year, annually
 - The most sedentary & those with most to gain (e.g. chronic disease) tend to attend more often
 - People expect to receive health advice from their doctor
 - High levels of trust in advice
 - Ideal place to promote physical activity

Promoting physical activity through family practice

- What may improve effectiveness?
 - Behavioural approaches
 - Patient goal setting
 - Written exercise prescription
 - Individually-tailored follow-up by trained staff
- Exercise on prescription?
 - Green prescription program in New Zealand
 - Motivational interviewing and goal setting
 - Exercise script from family physician or nurse
 - Telephone and mail support from exercise facilitators
 - Started 1998; rolled out nationally 2000

HILLARY HEALTH
Green Prescription
The active way to health

Patient's Name: _____ Date: _____
Phone: () _____

I recommend that for your health you should go for a brisk walk
for a least _____ minutes _____ times per week

For a least _____ minutes _____ times per week

For review: _____ For help and advice call: **0800 ACTIVE**
Signed: _____ **0800 224462**
G.P. _____ **0800**

Practice Name: _____

Effectiveness of the Green Prescription

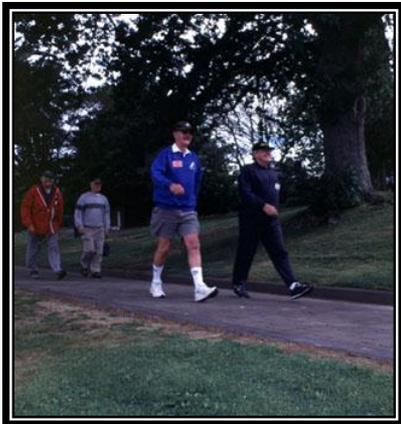
- Aim: Assess effectiveness of Green Prescription
- Design: Cluster randomized controlled trial 2000-2003
- Study population:
 - 'less active'
 - 40-80 years
- Setting:
 - all urban and rural family practices
 - central Waikato
- Outcome measures (over 12 months):
 - physical activity
 - quality of life
 - blood pressure
 - adverse events
 - cost effectiveness

Screening for 'less active'

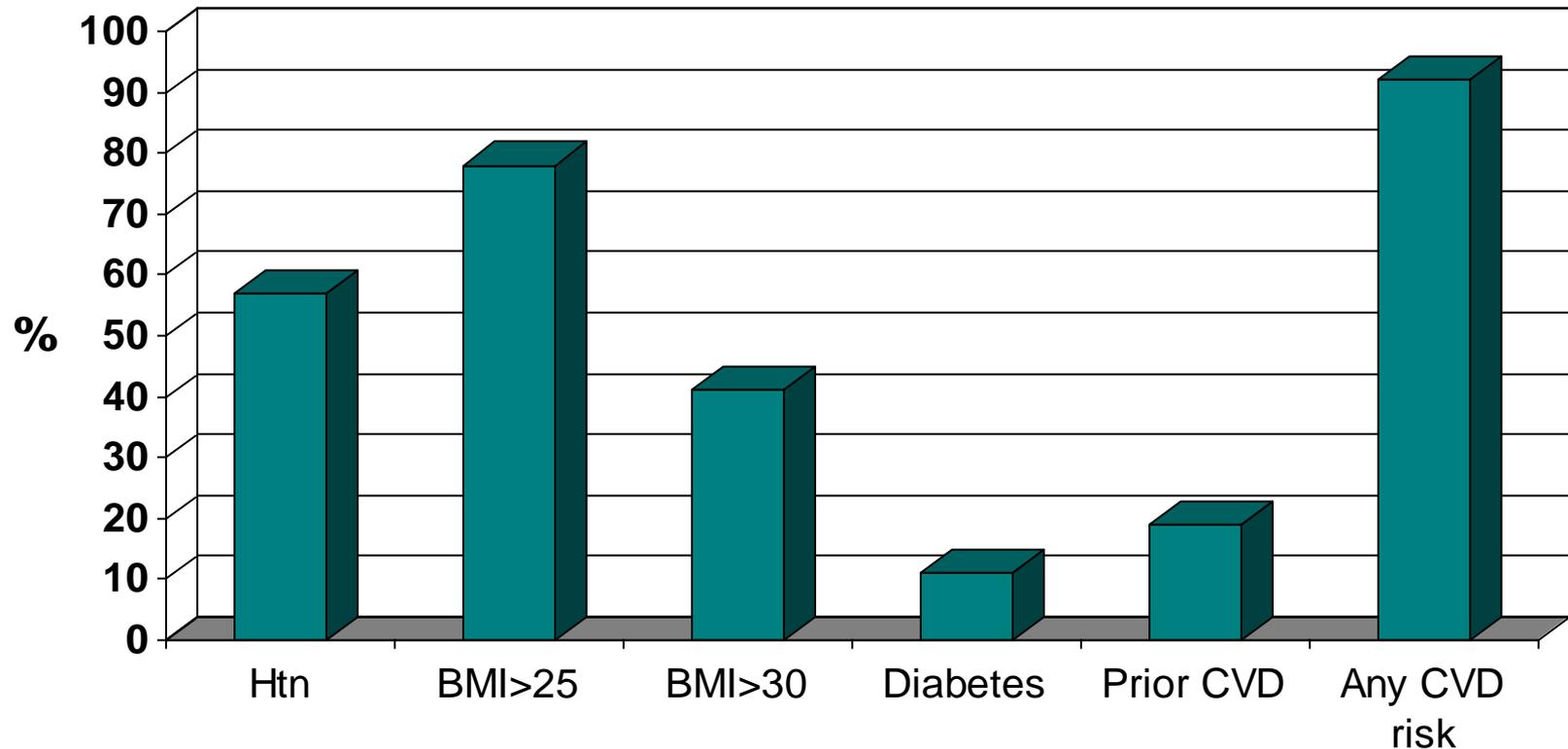
- As a rule, do you do at least half an hour of moderate or vigorous exercise (such as walking or a sport) on five or more days of the week?

Participation rates

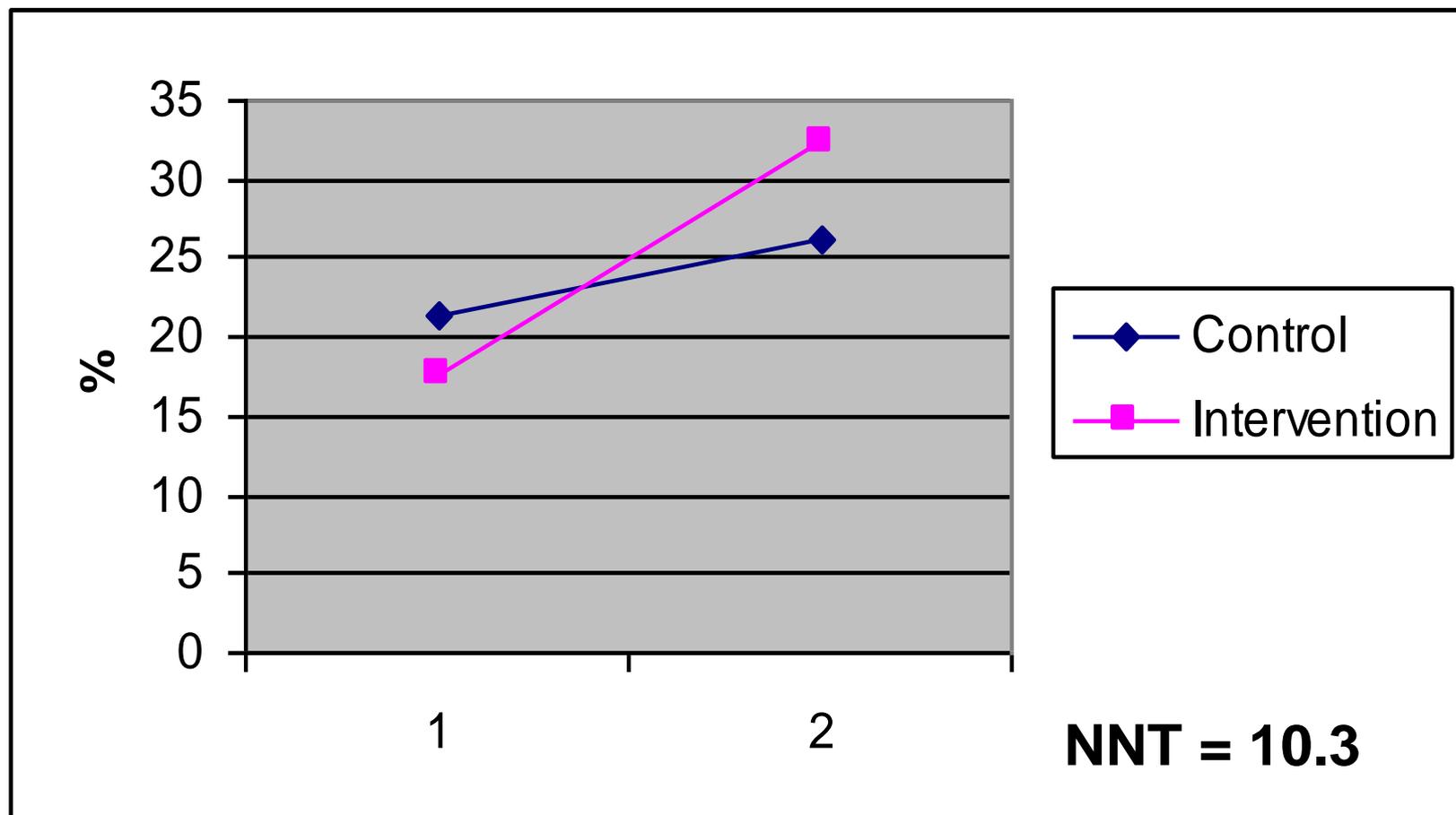
- 74% family physicians (n = 117)
- 42 family practices
- 2,984 adult patients screened
- 45% screened as 'insufficient' activity
- 67% of eligible participated (n = 878)
- 85% completed 12 month follow-up (n = 750)



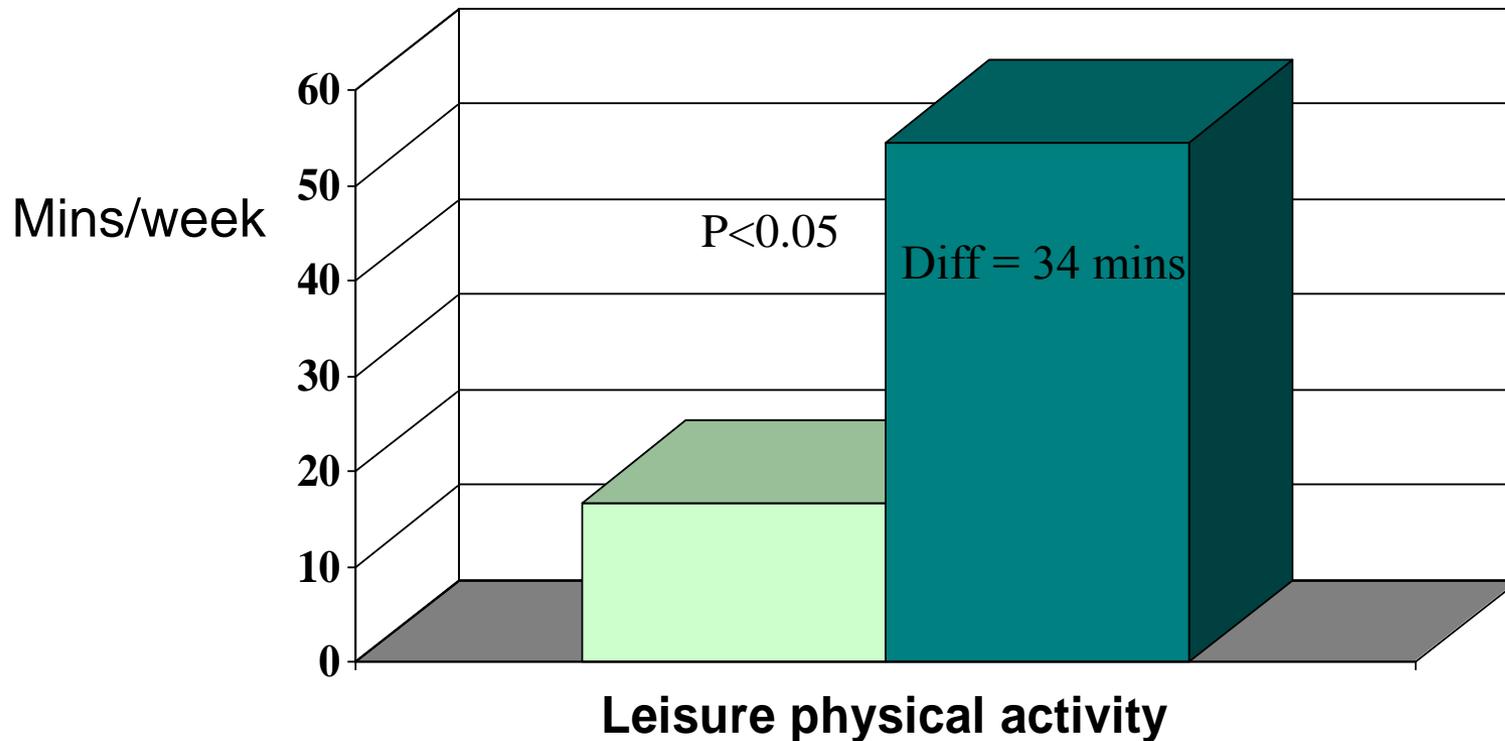
CVD Characteristics of Less Active Adults in Primary Care



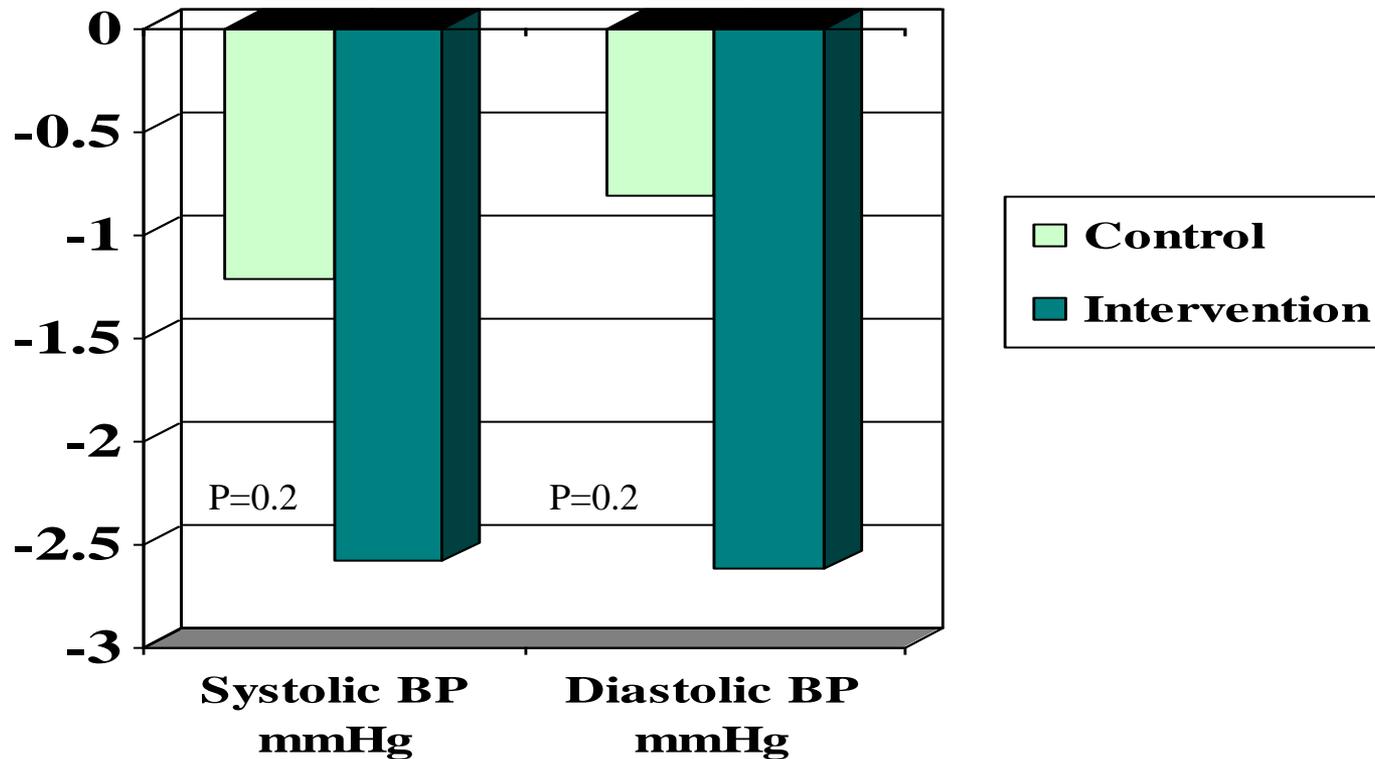
Proportion of participants achieving 2.5 hours per week of moderate or vigorous leisure activity



Change in moderate or vigorous leisure physical activity over one year



Change in blood pressure



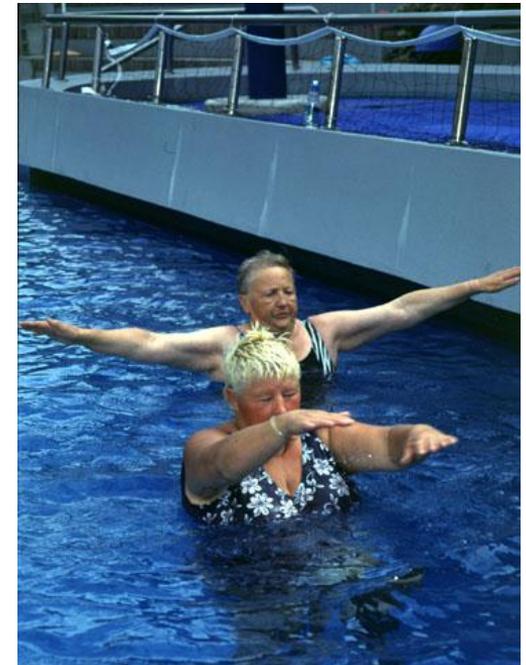
Quality of life and adverse effects

- Significant improvement in 'role physical, bodily pain, general health and vitality' of the SF36 QOL parameters
- No significant increase in falls or injuries



Costs (societal perspective)

- Direct costs of programme delivery
- Participant costs of exercise participation
- Costs of primary and secondary care utilisation
- Allied health therapies
- Time off work (lost productivity)



Cost Effectiveness of the Green Script

- Program cost/participant: \$NZ170
- Cost of converting one 'sedentary' adult to 'active' state and sustained at 12 months: \$NZ1,756

Barriers and enablers to exercise

- Barriers:
 - lack of time (e.g. priorities of work or family);
 - health and psychological limitations;
 - bad weather;
 - unsuitable local environment (e.g. lack of sidewalks or places to walk)
- Enablers:
 - internal motivators, spiritual benefits, commitment, guilt;
 - ‘significant others’ , continuing support;
 - social interaction during exercise;
 - commitment or contracts made to others

Effectiveness of the enhanced Green Script

- Design: Individual RCT over 2 years (2005-2008)
- Study population:
 - 1089 less active 40-75 year old women
- Setting:
 - Women's Health Research Centre, University of Otago
 - 17 Wellington family practices
- Outcome measures (over 2 years):
 - physical activity
 - quality of life
 - clinical parameters
 - adverse events
 - cost effectiveness

Rose SB, Lawton BA, Elley CR, et al (2007) *BMC Public Health* 7: 166; Lawton BA, Rose SB, Elley CR et al. (2008) *BMJ* 337: a2509;

The Intervention

- 10 minutes brief exercise advice and 'Green Script' from family practice nurse
- Exercise facilitator telephone support for 9 months (av. 5 calls)
- Face-to-face follow-up with nurse at 6 months
- Motivational interviewing techniques and moderate intensity exercise (e.g. walking, swimming, other community activities)

 **HILLARY**
COMMISSION
Supporting Sport
www.hillary.org.nz

 **Green Prescription**
the active way to health

Patient's Name:
Phone: (0) Date:

I recommend that for your health you should go for a brisk walk
for a least minutes times per week

OR

for a least minutes times per week

For review:

Signed:

G.P.:

Practice Nurse:

For help and advice call
0800 ACTIVE
0800 228483
(it's free)

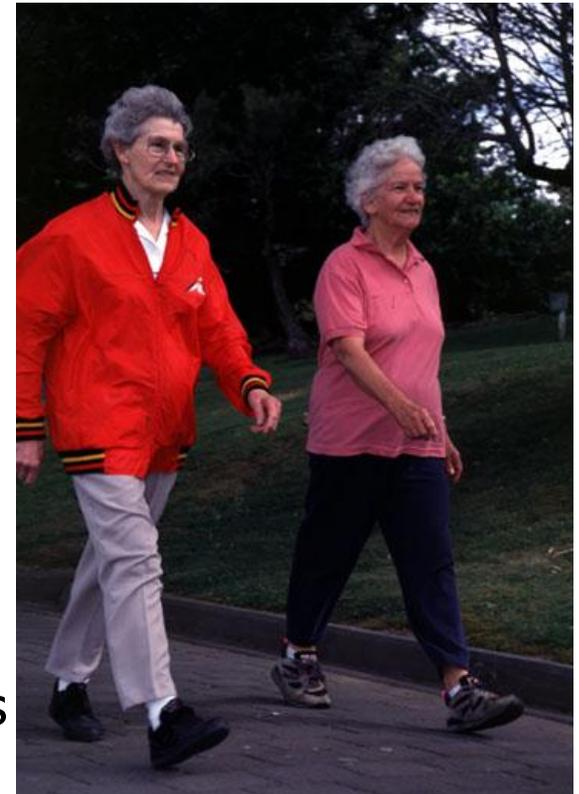
 **MINISTRY OF HEALTH**
MANAHIKI 46, 5184

Results: Completing 2½ hours/week

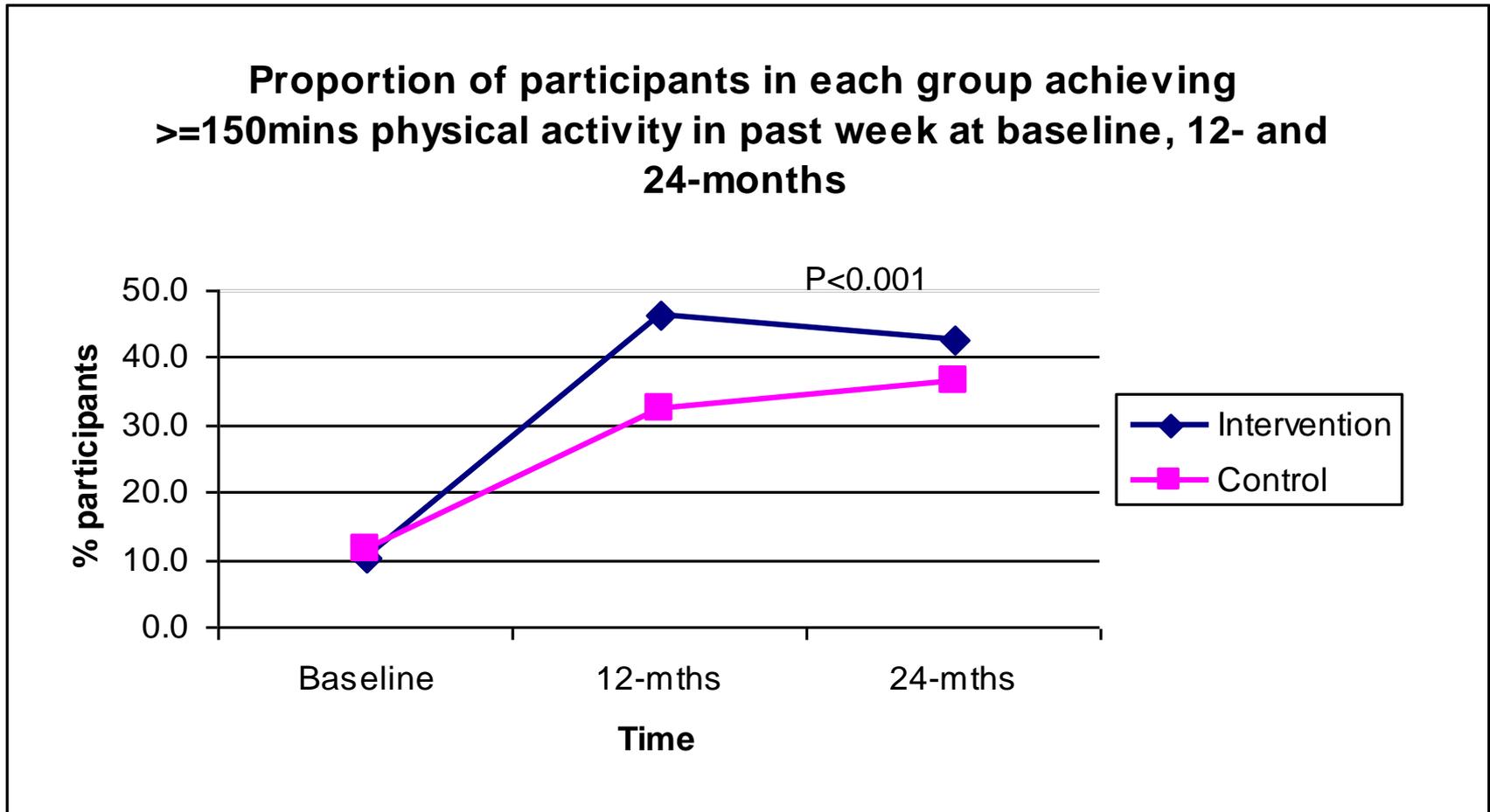
	Intervention	Control
Baseline	10.3%	11.4%
12 months	42.8%	30.3%
24 Months	39.3%	32.8%

(p < 0.0001)

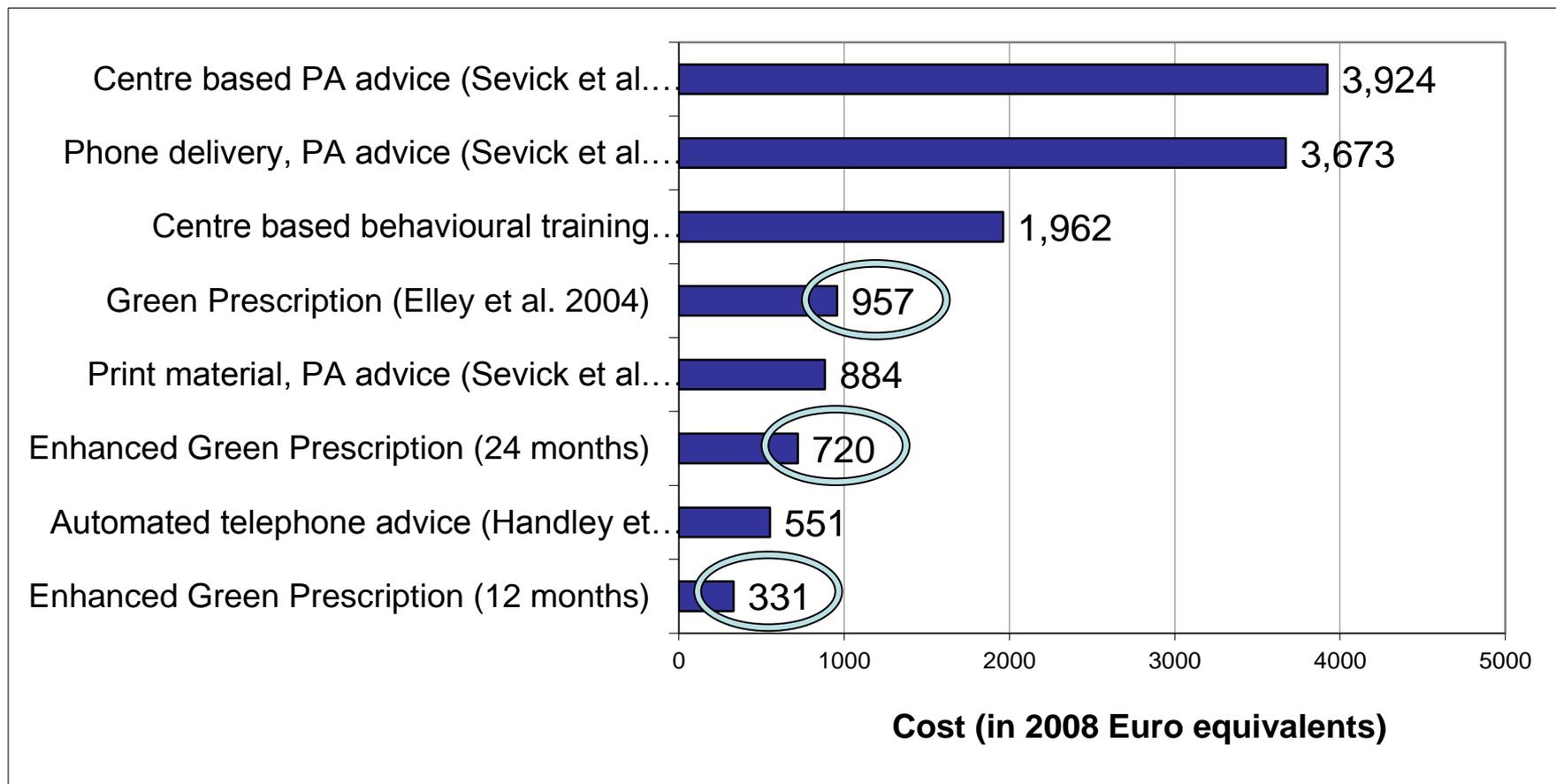
- Some improved quality of life parameters
- But 'role physical' worse
- Increased falls and minor injuries
- No difference in health care utilisation



'Enhanced' Green Prescription



Cost of moving one person from 'inactive' to 'active' primary care/community exercise interventions



Muller-Riemenschneider et al. (2009) *Br J Sports Med* ;43:70-76; Lawton et al. (2008) *BMJ* 337: a2509; Elley CR, Garrett S, et al. (2011) *Br J Sports Med* 45: 1223-1229; Garrett S, Elley CR et al. (2011) *Br J Gen Pract* 61: e125-133

Cost Utility

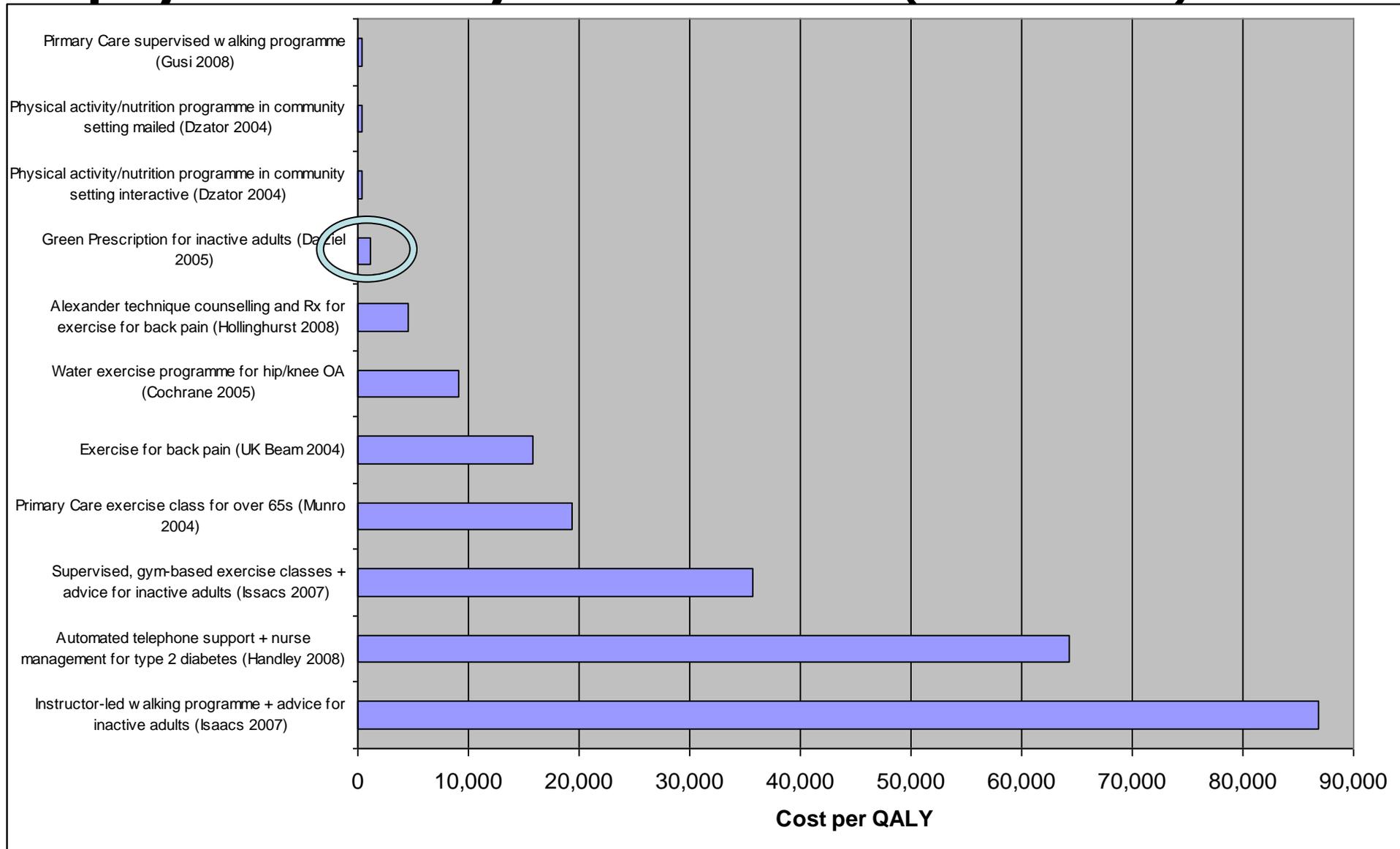
- Quality Adjusted Life Year (QALY)
 - International standard measure that takes into account the impact a pharmaceutical or other medical intervention has on quality and quantity of life.
- Cost per QALY gained (cost-utility)
 - Based on economic analyses of RCTs
 - Criteria for funding pharmaceutical interventions
 - $< \$20,000/\text{QALY}$ gained is considered good value
 - $> \$100,000/\text{QALY}$ is considered very poor value

Cost per QALY gained comparisons*

- Green prescription PA program:
 - \$1,677 per QALY (range \$675 to \$30,644)
- Statins (cholesterol-lowering drugs):
 - \$15,956 - \$27,125 (2^o prevention)
 - \$15,956 - \$76,590 (1^o prevention high-risk)

* Converted to Canadian dollars

Cost utility (cost per QALY) for different physical activity interventions (2008 Euros)



How are we prioritising our efforts (and funding)?

	2003
ACE inhibitors	\$23.0 million
Alpha-blockers	\$4.5 million
Beta-blockers	\$9.2 million
Ca channel blockers	\$13.7 million
Other CVD meds	\$10.6 million
Total on CVD meds	\$64 million
Green Prescription	\$825,000

(Pharmac website, 2004)

How are we prioritising our efforts (and funding)?

- NZ in 2011:
 - \$706 million on drugs
 - \$53 million on statins
 - >\$121 million on CVD drugs
 - Capped at \$4 million on Green Script PA promotion
 - (\$2.8 million on exercise cardiac rehabilitation in 2009)
- Canada 2011:
 - \$32 billion on drugs
 - \$4 billion on statins (13%)

Interdisciplinary chronic disease collaboration: 2011 exec summary – new research on statins...

http://icdc.ca/media/ICDC%20Statins_Executive%20Summary_Final_13Sept2011-1.pdf

Pharmac annual report 2011, Wellington, New Zealand

Utilisation of PA interventions

- PA interventions in primary care in Canada
 - 16% of family physicians use exercise scripts
 - <50% of patients ever recall their doctor advising PA
- Exercise cardiac rehabilitation:
 - 20-30% post MI in Canada, UK, Aus (target 70%)
 - 17-18% in NZ and US

Petrella et al (2010) *Can Fam Physician* 56: e191-200; Petrella et al *Arch Intern Med* 167: 1774-1781;
Grace S, (2011) Canadian Association of Cardiac Rehabilitation

http://www.ccs.ca/advocacy/WTA/CMA_WTAI_CR-wait-time_data_available.pdf

Research: Evidence for prevention of events?

- Statins:
 - 170,000 participants followed ≥ 2 years (26 RCTs)
- Blood pressure lowering meds:
 - 464,000 participants (>150 RCTs)
- Exercise-based cardiac rehabilitation:
 - 6,111 participants (34 RCTs)
- Exercise to lower BP:
 - 2,419 participants from (54 RCTs)
- More exercise interventions research in health care settings is needed

Cholesterol Treatment Trialists Collaboration, (2010) Lancet 376: 1670-1681; Law et al (2009) BMJ 338: b1665; Lawler et al (2011) Am Heart J 162: 571-584.e572; Whelton et al (2002) Ann Intern Med 136: 493-503.

“FLIP”
Facilitated Lifestyle Intervention
Prescriptions

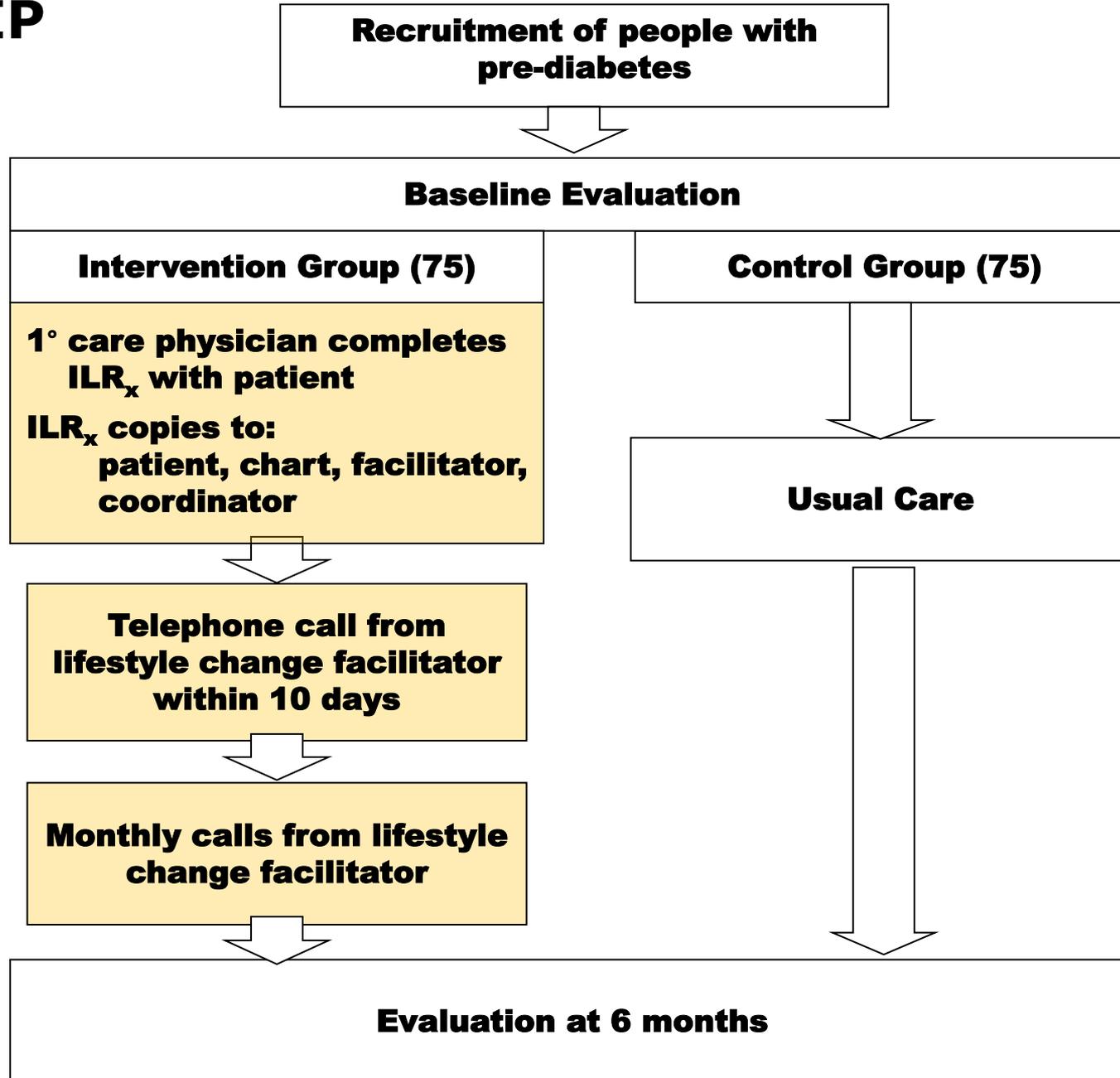
Prof Martin Dawes and Diana Dawes and colleagues
Depts Family Practice and Physical Therapy, UBC

Intensive Lifestyle Prescription ILRx

- Completed by patient and family physician
- Signed by patient and physician - contract

Weight Activity
 (getting stronger) Healthy Eating

FLIP



Conclusions:

1. Global pandemic of physical inactivity
2. Health benefits of physical activity
3. Public health initiatives and recommendations
4. Healthcare settings- complementary to policy
5. Exercise prescription – effectiveness and cost-effectiveness
6. More research is needed
7. Could we improve the way we prioritise our efforts (and funding) at the individual, community and national level to help address the pandemic of physical inactivity?