Developing the evidence base for cardiac rehabilitation: a 30 year & 6 cities journey

Rod Taylor MSc, PhD

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& Director of Exeter Clinical Trials Unit
University of Exeter Medical School. Exeter, UK
& Adjunct Professor, University of Southern Denmark

June 9th 2017, REHPA, Nyborg, Denmark.

UNIVERSITY OF EXETER | MEDICAL SCHOOL

REHPA
Videncenter for Rehabilitering og Palliation

UNIVERSITY OF SOUTHERN DENMARK

"The treatment itself has no side effects - but the number of statisticians needed to prove its value may cause dizziness and nausea"

1980-1984

Running heart research

Volunteers are being sought for a unique investigation into coronary illness. STEWART McINTOSH explains how the Scottish People's Marathon will help study the problem.

HEART ATTACKS are a major risk for men aged between 35 and 50. But thanks to an unusual initiative involving doctors, scientists, and the Glasgow Herald, a major study is to be carried out on 40 participants in this year's Scott's Porage Marathon measuring the effects of marathon training — how does it reduce body fat? How does it change the level of fitness? What is the effect on the heart?

Male volunteers between 35 and 59 who intend to run in the marathon on September 30 are being urgently sought for the experiment. The only condition is that they should have little or no running experience. Those who are physically fit need not apply. The object is to measure the effect of training on unfit people.

Volunteers should immediately contact Rod Taylor at the Institute of Physiology, Glasgow University, (telephone 041 339 8855, ext. 497 or 812, or 041 637 1321 in the evenings).

Despite the impact of the marathon boom, research on the physical effects of constant training on unfit people has been limited. The study which will be carried out by Glasgow University scientists and the Western Infirmary's cardiac unit will provide one of the most extensive studies so far.

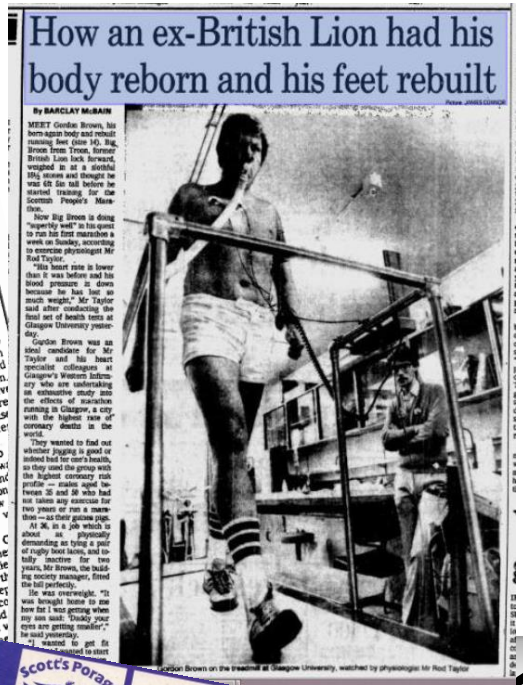
The volunteers will be subjected to a rigorous battery of tests, including sessions on exercise bikes to measure the effects of training on the ability of the lungs to consume and process oxygen. Doctors from the cardiac unit will be monitoring changes in the strength of the subjects' hearts as their training builds up.

Meanwhile, scientists from the University's physiology department will carry out a wide range of physical measurements to ascertain any changes in height, weight, limb circumference, bone diameter, and body fat.

The high incidence of cardiac problems in areas like the West of Scotland is sometimes put down to the levels of cholesterol (which comes from dairy foods and animal fats) in the bloodstream. The Herald volunteers will have their cholesterol levels monitored to find out whether increased fitness reduces the cholesterol level.

Volunteers will have to be highly motivated town finishing the marathon and prepared to turn up on occasions between now and September 30 for the various tests.

Stan Grant, of the University's department of physical education, believes the experiment will be the first of its kind. "This study represents a unique level of co-operation between doctors and scientists which will provide us with a better picture of the physical fitness that we previously.



How an ex-British Lion had his body reborn and his feet rebuilt

By BARCLAY McBAIN

MEET Gordon Brown, his born-again body and rebuilt running feet (size 16). Big Broon from Troon, former British Lion lock forward, weighed in at a slothful 18½ stones and thought he was 6ft 5in tall before he started training for the Scottish People's Marathon.

Now Big Broon is doing "superbly well" in his quest to run his first marathon a week on Sunday, according to exercise physiologist Mr Rod Taylor.

"His heart rate is lower than it was before and his blood pressure is down because he has lost so much weight," Mr Taylor said after conducting the final set of health tests at Glasgow University yesterday.

Gordon Brown was an ideal candidate for Mr Taylor and his heart specialist colleagues at Glasgow's Western Infirmary who are undertaking an exhaustive study into the effects of marathon running in Glasgow, a city with the highest rate of coronary deaths in the world.

They wanted to find out whether jogging is good or indeed bad for one's health, so they used the group with the highest coronary risk profile — males aged between 35 and 56 who had not taken any exercise for two years or run a marathon — as their guinea pigs.

At 36, in a job which is about as physically demanding as tying a pair of rugby boot laces, and totally inactive for two years, Mr Brown, the building society manager, fitted the bill perfectly.

He was overweight. "It was brought home to me how fat I was getting when my son said: 'Daddy your eyes are getting smaller'," he said yesterday.

"I wanted to get fit

Gordon Brown on the treadmill at Glasgow University, watched by physiologist Mr Rod Taylor

1985-1997

Br. J. Nutr. (1974), **32**, 77

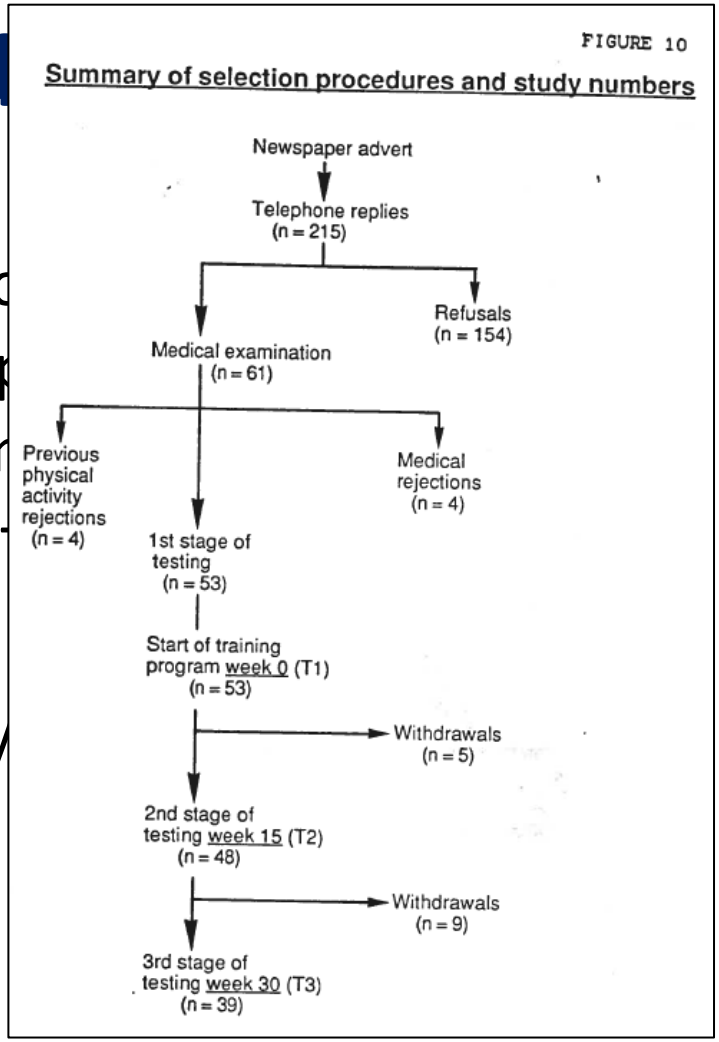
Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years

By J. V. G. A. DURNIN and J. WOMERSLEY

Institute of Physiology, The University, Glasgow G12 8QQ

PhD - “Physical Training in Middle Aged

- Examine the physiological effect c
  strenuous program of strenuous p
  training in group of middle aged r
- Assessments at prior to training (T
  and 30 wks (T3) training
- 53 sedentary males; aged 35-50 y



Results

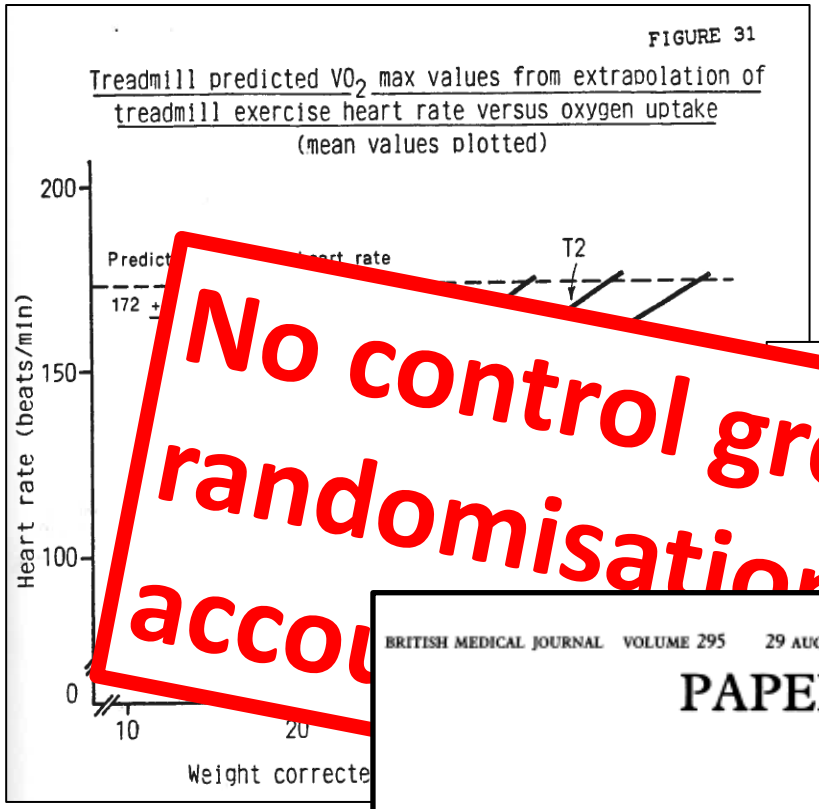


FIGURE 31

Treadmill predicted VO_2 max values from extrapolation of treadmill exercise heart rate versus oxygen uptake (mean values plotted)

Heart rate (beats/min)

200
150
100
0

T2

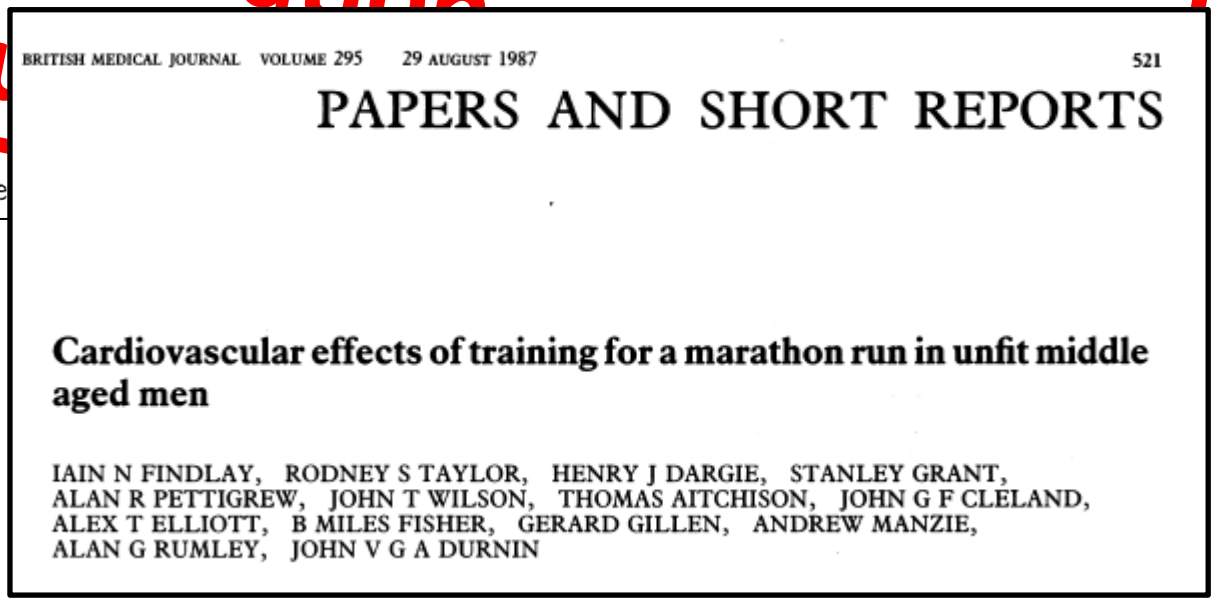
10
20

Weight correcte

No control group, no randomisation accou

FIGURE 27

diac output and arterio-venous
th training


BRITISH MEDICAL JOURNAL VOLUME 295 29 AUGUST 1987 521

PAPERS AND SHORT REPORTS

Cardiovascular effects of training for a marathon run in unfit middle aged men

IAIN N FINDLAY, RODNEY S TAYLOR, HENRY J DARGIE, STANLEY GRANT, ALAN R PETTIGREW, JOHN T WILSON, THOMAS AITCHISON, JOHN G F CLELAND, ALEX T ELLIOTT, B MILES FISHER, GERARD GILLEN, ANDREW MANZIE, ALAN G RUMLEY, JOHN V G A DURNIN

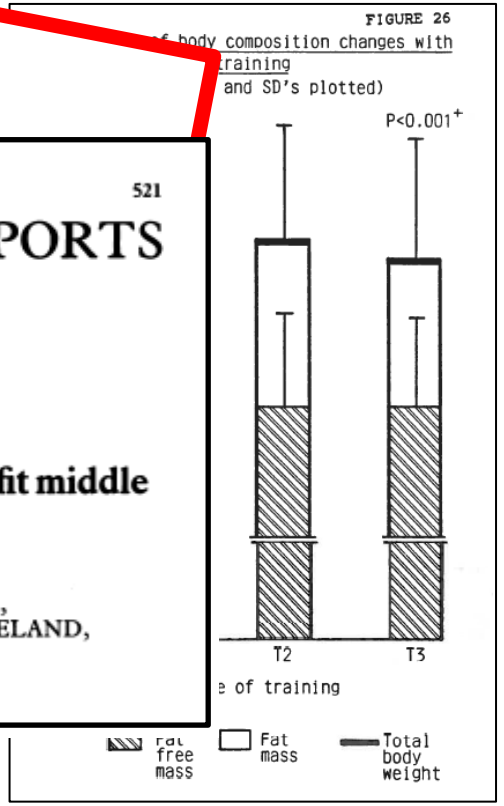


FIGURE 26

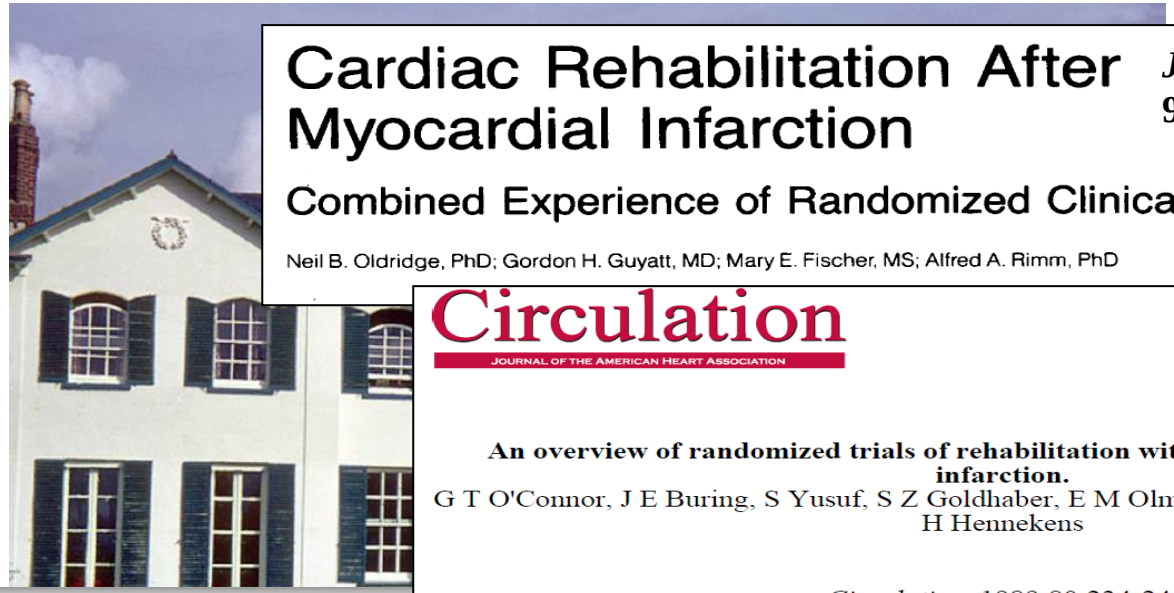
f body composition changes with
training
and SD's plotted)

P<0.001+

T2
T3

e of training

Fat free mass
Fat mass
Total body weight



Cardiac Rehabilitation After Myocardial Infarction

JAMA 1988;260: 945-50.

Combined Experience of Randomized Clinical Trials

Neil B. Oldridge, PhD; Gordon H. Guyatt, MD; Mary E. Fischer, MS; Alfred A. Rimm, PhD

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association

An overview of randomized trials of rehabilitation with infarction.

G T O'Connor, J E Buring, S Yusuf, S Z Goldhaber, E M Olms
H Hennekens

Circulation. 1989;80:234-244

Cochrane Heart

1985-1997

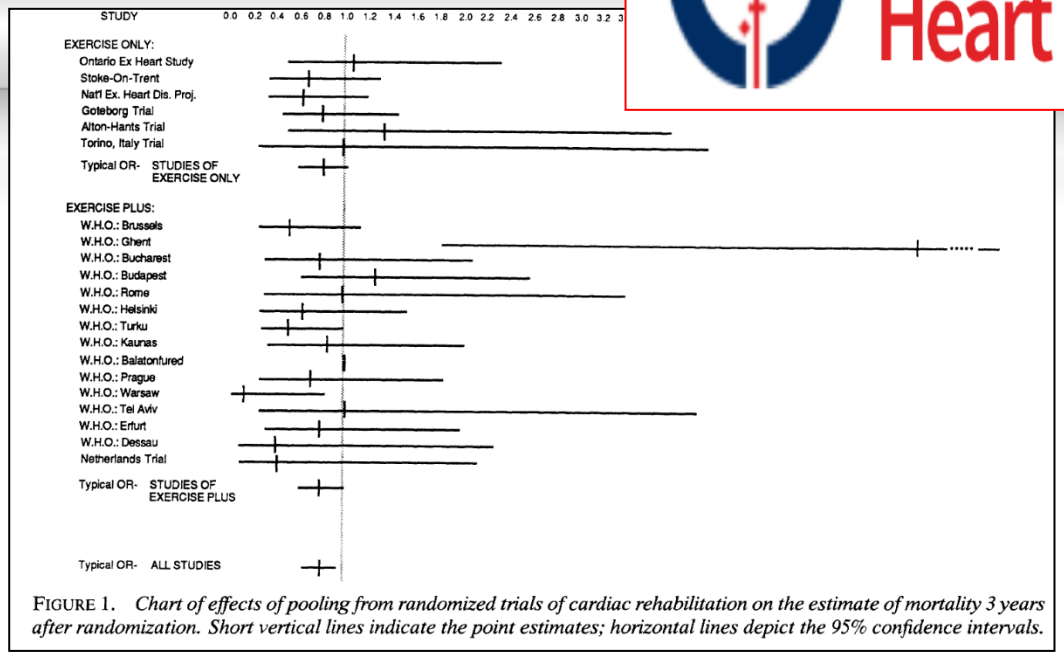
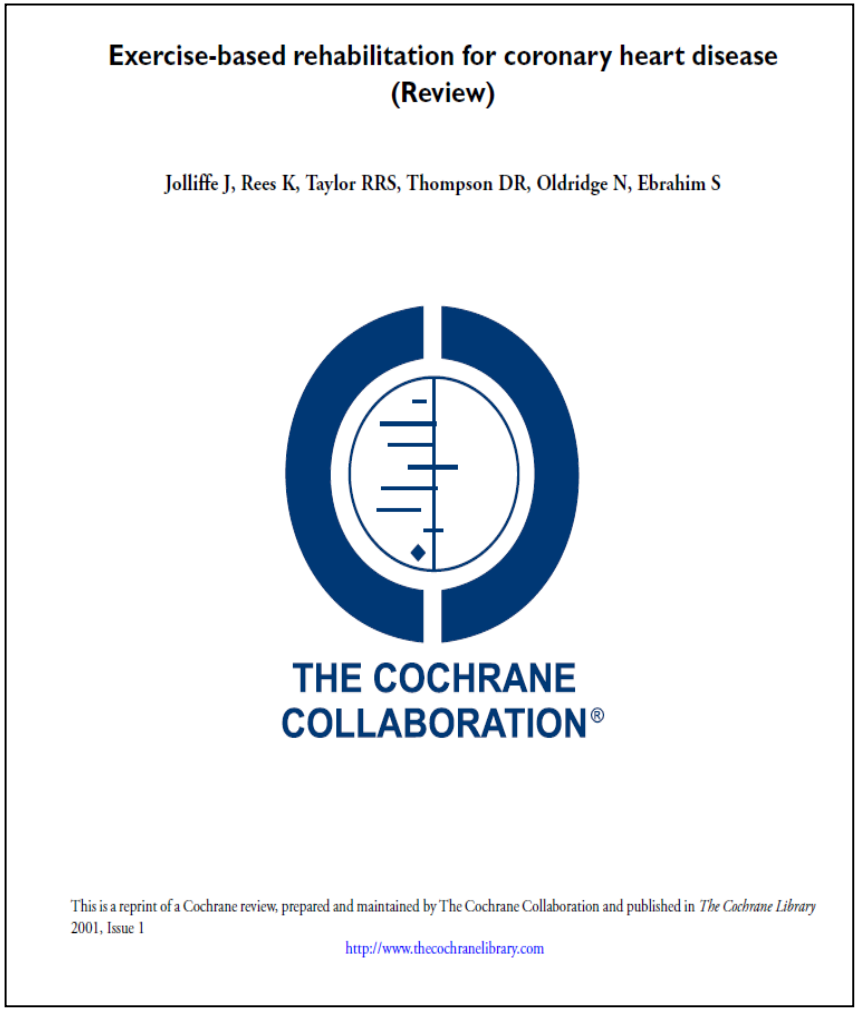


FIGURE 1. *Chart of effects of pooling from randomized trials of cardiac rehabilitation on the estimate of mortality 3 years after randomization. Short vertical lines indicate the point estimates; horizontal lines depict the 95% confidence intervals.*

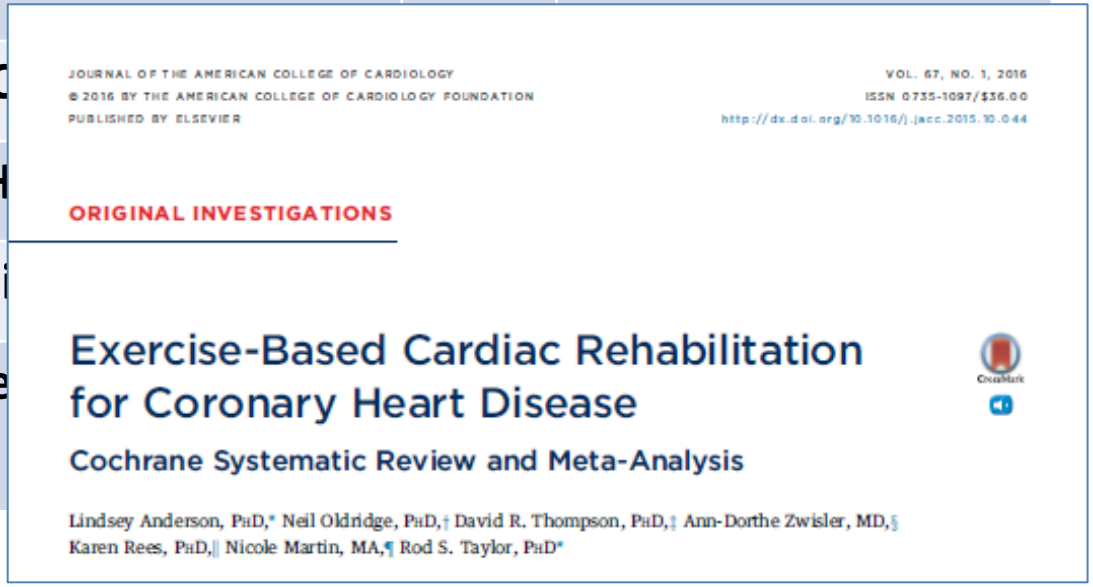
Exercise-Based CR for CHD

- 36 RCTs in 8440 post MI and revascularisation patients
- Compared to control, CR reduced risk of all cause death by 19% (Odds Ratio: 0.81, 95% 0.72, 0.91)
- Improvements in lipids, and BP
- Limited data on HRQoL
- Quality of reporting poor



Cochrane CR 'Portfolio'

Title	Version	Publication status
Exercise based rehabilitation for….		
CHD [9811]	v3	Jan 2016
Stable angina [1612]	v1	Ongoing (Q2 2017)
Heart failure [0025]	v3	Ongoing (Q4 2017)
Atrial fibrillation [1401]	v1	Feb 2017
Post valve surgery [1301]	v1	Mar 2016
Implantable cardiac defibrillators [1409]	v1	Ongoing (Q3 2017)
Cardiac transplantation [1506]	v1	Apr 2017
Psychological interventions for C		
Educational interventions for CH		
Home vs centre based interventi		
Interventions to increase uptake [0422]		



JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
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http://dx.doi.org/10.1016/j.jacc.2015.10.044

ORIGINAL INVESTIGATIONS

Exercise-Based Cardiac Rehabilitation for Coronary Heart Disease

Cochrane Systematic Review and Meta-Analysis

Lindsey Anderson, PhD,* Neil Oldridge, PhD,† David R. Thompson, PhD,‡ Ann-Dorthe Zwisler, MD,§ Karen Rees, PhD,‖ Nicole Martin, MA,¶ Rod S. Taylor, PhD*

European Heart Journal (2012) **33**, 1787–1847
doi:10.1093/eurheartj/ehs104

ESC GUIDELINES

ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012

The Task Force for the Diagnosis and Treatment of Acute
Chronic Heart Failure 2012 of the European Society of Car
Developed in collaboration with the Heart Failure Associatio
of

European Heart Journal (2012) **33**, 1635–1701
doi:10.1093/eurheartj/ehs092

JOINT ESC GUIDELINES

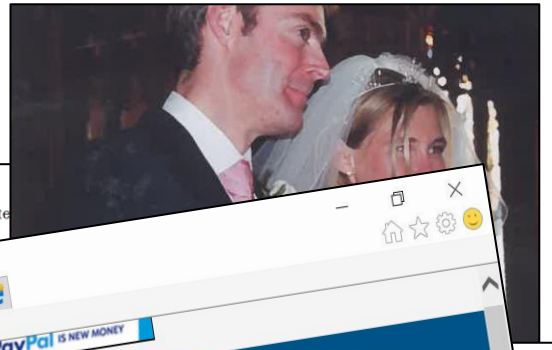
European Guidelines on cardiovascular disease prevention in clinical practice (version 2012)

The Fifth Joint Task Force of the European Societ
and Other Societies on Cardiovascular Disease Prev
Practice (constituted by representatives of nine so
and by invited experts)

Recommendations for exercise prescription and multidisciplinary management

	Class[a]	Level[b]	Ref[c]
gular aged re to y and	I	A	262, 263
tients			

Recommendations	Class[a]	Level[b]	GRADE	Ref[c]
Patients with previous acute myocardial infarction, CABG, PCI, stable angina pectoris, or stable chronic heart failure should undergo moderate-to-vigorous intensity aerobic exercise training ≥3 times a week and 30 min per session. Sedentary patients should be strongly encouraged to start light-intensity exercise programmes after adequate exercise-related risk stratification.	I	A	Strong	309, 310



Family Practice
© Oxford University Press 2000

Printe

A preliminary study of the decision
within general

https://www.theguardian.com/business/1999/oct/10/observerbusiness.theobserver13

A sniffle, perhaps, but not th...

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Business
The Observer

A sniffle, perhaps, but not the flu for Glaxo

Oliver Morgan on a disingenuous attempt to thwart the regulators

0

Sunday 10 October 1999
03.01 BST

As usual, the small print contradicted the headlines. A glance at the latter last week would have left the impression that the British pharmaceuticals industry was about to go down the tubes.

In stating that Glaxo's flu treatment ,Relenza, would not be paid for by the National Health Service, the government-appointed National Institute for Clinical Excellence (Nice) was destroying the market for the flagship product of one of Britain's flagship companies.

Glaxo's chairman, Sir Richard Sykes, fired off an angry letter to Health Secretary

...for children, new treatments quickly across the NHS," he said. "It will help that there may be occasions when NICE guidelines would

199

UNIVERSITY OF BIRMINGHAM

2000-2005

Health Technology Assessment 2007; Vol. 11: No. 35

The Birmingham Rehabilitation Uptake Maximisation Study (BRUM). Home-based compared with hospital-based cardiac rehabilitation in a multi-ethnic population: cost-effectiveness and patient adherence

K Jolly, R Taylor, GYH Lip, S Greenfield, J Raftery, J Mant, D Lane, M Jones, KW Lee and A Stevens

European Journal of Heart Failure (2009) **11**, 205–213
doi:10.1093/eurjhf/hfn029

A randomized trial of the addition of home-based exercise to specialist heart failure nurse care: the Birmingham Rehabilitation Uptake Maximisation study for patients with Congestive Heart Failure (BRUM-CHF) study

Kate Jolly[1]*, Rod S. Taylor[2], Gregory Y.H. Lip[3], Mick Davies[4], Russell Davis[5], Jonathan Mant[6], Sally Singh[7], Sheila Greenfield[6], Jackie Ingram[6], Jane Stubley[5], Stirling Bryan[8], and Andrew Stevens[1]

Cardiac Rehab
The Evidence
Implications fo

Rod Taylor R
Dept of Public Health & E
University of Birmin

Bisperbjerg Hospital, Co
11th & 12th Decembe

iac Rehabilitation: The
nce from the Cochrane
Reviews

Rod Taylor, MSc PhD
Public Health & Epidemiology,
niversity of Birmingham

ilitering I Denmark, Copenhagen,
28th October 2004

I met Ann-Dorthe Zwisler and then….

UNIVERSITY OF EXETER

Table 2
Mean changes in primary outcomes from baseline to 9 months for patients randomized to hospital-based or home-based cardiac rehabilitation

Outcome characteristic	Hospital-based group ($n=44$)[a]			Home-based group ($n=60$)[a]			95% confidence interval for difference in means between home and hospital groups	p Value for analysis of covariance[b]
	Baseline	Mean (SD) value at 9 months	Mean change within group	Baseline	Mean (SD) value at 9 months	Mean change within group		
HADS								
Anxiety	5.67 (3.83)	4.74 (4.01)	−0.93 (−1.78 to −0.08)	7.27 (4.39)	6.27 (4.34)	−1.00 (−2.07 to 0.071)	−0.07 (−1.42 to 1.28)	0.50
Depression	2.84 (2.25)	2.61 (2.29)	−0.23 (−0.89 to 0.43)	4.05 (3.41)	3.82 (3.5)	−0.23 (−1.16 to 0.69)	0 (−1.12 to 1.12)	0.26
MacNew								
Emotional	5.14 (1.29)	5.78 (1.05)	0.64 (0.36 to 0.93)	4.77 (1.11)	5.48 (1.22)	0.71 (0.37 to 1.04)	0.07 (−0.37 to 0.50)	0.63
Physical	4.68 (1.33)	5.46 (1.22)	0.79 (0.43 to 1.14)	4.58 (1.08)	5.54 (1.12)	0.96 (0.59 to 1.32)	0.17 (−0.33 to 0.67)	0.68
Social	4.79 (1.45)	5.77 (1.23)	0.98 (0.60 to 1.36)	4.63 (1.21)	5.78 (1.14)	1.15 (0.77 to 1.54)	0.17 (−0.36 to 0.71)	0.79
Global	4.87 (1.30)	5.67 (1.12)	0.80 (0.48 to 1.12)	4.66 (1.06)	5.60 (1.12)	0.94 (0.60 to 1.28)	0.14 (−0.35 to 0.62)	0.94
Total cholesterol (mmol/l)	5.38 (1.22)	4.45 (1.01)	−0.93 (−1.26 to −0.61)	5.72 (1.24)	4.60 (1.12)	−1.11 (−1.42 to −0.80)	−0.18 (−0.62 to 0.27)	0.66

Exercise based rehabilitation for heart failure (Review)

Davies EJ, Moxham T, Rees K, Singh S, Coats AJS, Ebrahim S, Lough F, Taylor RS

BMJ open accessible medical research

Why do so few patients with heart failu… rehab… from… Irela…

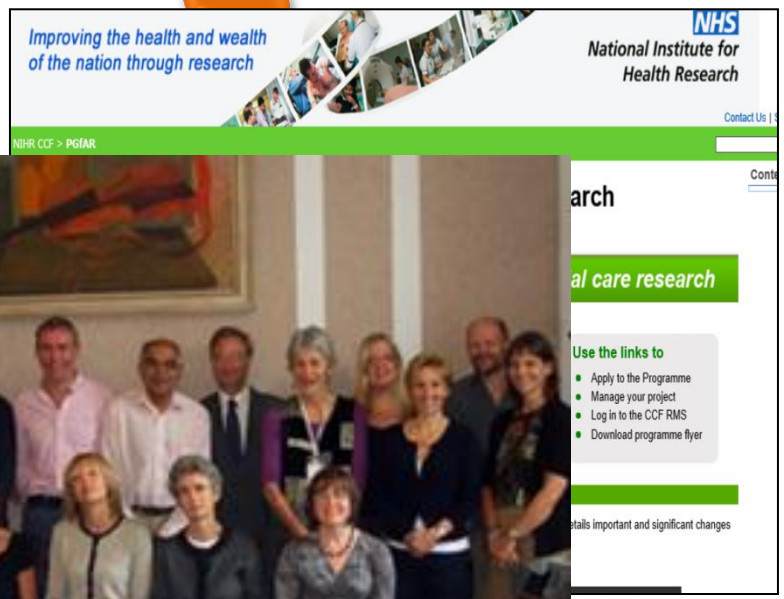
Hasnain M…
Corrina Pe…

Rehabilitation **NICE C…**

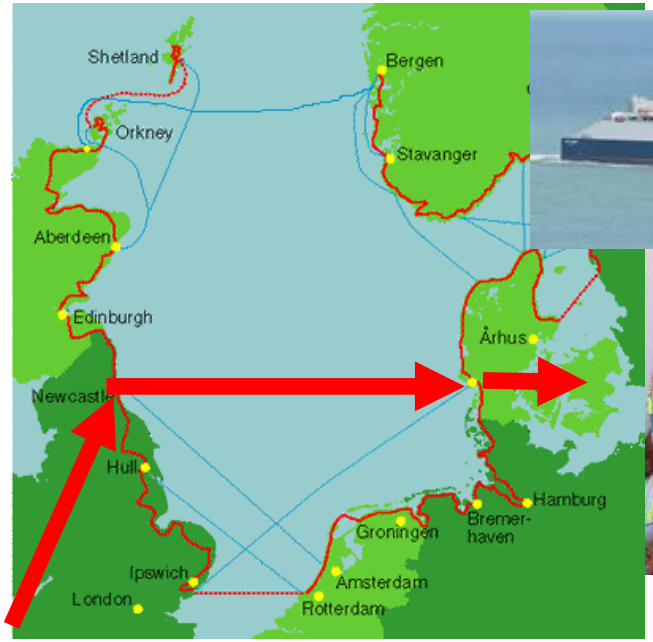
7. Offer a supervised group exercise-based rehabilitation progra… with heart failure.
   - Ensure the patient is stable and does not have a cond… preclude an exercise-based rehabilitation programme.
   - Include a psychological and educational component in the programme.
   - The programme may be incorporated within an existing cardiac rehabilitation programme **[new 2010]**

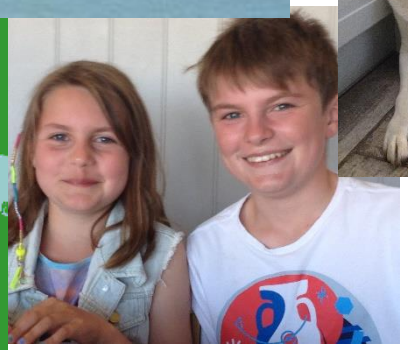
	Number (%) or Median (range)
Exercise-only CR	10 (30%)
Centre-based	**27 (85%)**
Sample size	53 (19 to 2331)
Gender (% male)	61 (0 to 100)
Age (years)	60.5 (51 to 81)
LVEF(%)	29 (21 to 41)
Included NYHA IV	6 (18%)

reachHF
Rehabilitation Enablement in Chronic Heart Failure



28th July 2014!





SDU
STATENS INSTITUT FOR FOLKESUNDHED

Heart Online First, published on August 4, 2016 as 10.1136/heartjnl-2016-309414

ORIGINAL ARTICLE

Cardiac rehabilitation increases physical capacity but not mental health after heart valve surgery: a randomised clinical trial

Kirstine L Sibilitz,[1,2] Selina K Berg,[1,3] Trine B Rasmussen,[1,3] Signe Stelling Risom,[1] Lau C Thygesen,[2] Lars Tang,[1,5,6] Tina B Hansen,[1,7] Pernille Palm Johansen,[1,8] Christian Gluud,[9] Jane Lindschou,[9] Jean Paul Schmid,[10] Christian Hassager,[1] Lars Køber,[1] Rod S Taylor,[2,11] Ann-Dorthe Zwisler[1,2,12,13]

CopenHeart

Open Access

BMJ open accessible medical research

A randomised clinical trial of comprehensive cardiac rehabilitation versus usual care for patients treated for ctive endocarditis—the CopenHeart$_{IE}$ protocol

nholdt Rasmussen,[1,2] Ann-Dorthe Zwisler,[1,3] Kirstine Lærum Sibilitz,[1] elling Risom,[1] Henning Bundgaard,[1] Christian Gluud,[4] Philip Moons,[1,5] el,[4] Lau Caspar Thygesen,[3] Jane Lindschou Hansen,[4] rete Norekvål,[6,7] Selina Kikkenborg Berg,[1,2] the CopenHeart$_{IE}$ Group[8]

Open Access Protocol

BMJ Open

The CopenHeartSF trial—comprehensive sexual rehabilitation programme for male patients with implantable cardioverter defibrillator or ischaemic heart d and impaired sexual function: p of a randomised clinical trial

Pernille Palm Johansen,[1,2] Ann-Dorthe Zwisler,[2,3] Jesper Hastru Marianne Frederiksen,[1] Jane Lindschou,[5] Per Winkel,[5] Christian Annamaria Giraldi,[6] Elaine Steinke,[7] Tiny Jaarsma,[8] Selina Kikk

European Journal of Cardiovascular Nursing

EUROPEAN SOCIETY OF CARDIOLOGY®

Original Article - Journal Club

Comprehensive cardiac rehabilitation improves outcome for patients with implantable cardioverter defibrillator. Findings from the COPE-ICD sed clinical trial

European Journal of Cardiovascular Nursing
2015, Vol. 14(1) 34–44

DOI: 10.1177/1474515114521920
cnu.sagepub.com
SAGE

Cardiac rehabilitation versus usual care for patients treated with catheter ablation for atrial fibrillation: Results of the randomiz CopenHeart$_{RFA}$ trial

CrossMark

Signe S. Risom, RN, PhD,[a,b,c] Ann-Dorthe Zwisler, MD, PhD,[a,d,c] Trine B. Rasmussen, R Kirstine Lærum Sibilitz, MD, PhD,[a,b] Trine L. S. Madsen, RN, MScN,[c] Jesper Hastrup Sv Christian Gluud, MD, DMSc,[h] Jane Lindschou, MSc,[h] Per Winkel, MD, DMSc,[h] and Selina Kikkenborg Berg, RN, MScN, PhD[a,b,c] *Copenhagen, Odense C, Hellerup, and Cop Hospital, Denmark*

Open Access Protocol

BMJ open accessible medical research

A randomised clinical trial of comprehensive cardiac rehabilitation versus usual care for patients treated for infective endocarditis—the CopenHeart$_{IE}$ trial protocol

Trine Bernholdt Rasmussen,[1,2] Ann-Dorthe Zwisler,[1,3] Kirstine Lærum Sibilitz,[1] Signe Stelling Risom,[1] Henning Bundgaard,[1] Christian Gluud,[4] Philip Moons,[1,5]

European Journal of
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Cardiology
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Original sc

Pred … ing
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failu

Jama … ter[3],
Moh … 6,7,8 a
Rod

MEMORANDUM OF UNDERSTANDING

FOR JOINT COLEBORATION AND SUPPORT IN ENHANCING KNOWLEDE & SKILLS IN THE FIELD OF CARDIAC PREVENTATION & REHABILITATION.

BETWEEN

Professor Ann-Dorthe Zwisler from Danish Knowledge Center for Rehabilitation for Palliative Care (REHPA), Clinical Institute, University of Southern Denmark, DENMARK

----- 1st Party.

AND

Professor Rod Taylor, Chair of Health Service Research, from University Of Exeter Medical School, Exeter, UNITED KINGDOM

----- 2nd Party.

AND

Professor Dr. Fazila-Tun-Nesa-Malik, Director-Academic affairs, from National Heart Foundation Hospital & Research Institute (NHF&RI), Dhaka, BANGLADESH.

----- 3rd Party.

BETWEEN

1st & 2nd Party (REHPA & UNIVERSITY OF EXETER)

AND

3rd Party (National Heart Foundation Hospital & Research Institute)

REACH HF

NHS National Institute for Health Research

reachHF Rehabilitation Enablement in Chronic Heart Failure

- Funded by NIHR Programme Grant, 2012-7
- Programme consists of linked work packages to:
  - develop, a **home based, self-help CR programme** ('the HF Manual') for people with HF and their caregivers
  - **pilot trial** assess feasibility of definitive trial of the HF Manual in HFPEF
  - **multi-centre RCT** to assess effectiveness and cost effectiveness of HF Manual *vs.* usual care in people with **HFREF** and their caregivers
  - evidence synthesis/modelling of the effectiveness and cost effectiveness of the **HF Manual *vs.* centre-based** CR in HFREF and HFPEF

University of Exeter Medical School | Plymouth University Peninsula Clinical Trials Unit | NHS Tayside | University of Birmingham | GIG Cymru NHS Wales – Bwrdd Iechyd Aneurin Bevan Health Board | NHS Lothian | Peninsula Community Health | Coventry University | Royal Cornwall Hospitals NHS Trust | Sandwell and West Birmingham Hospitals NHS Trust | The University of York

REACH-HF contributors

reachHF
Rehabilitation Enablement in Chronic Heart Failure

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York

Professor Patrick Doherty

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Dr Jackie Austin

Dundee

Prof Chim Lang
Dr Karen Smith

Edinburgh

Heart Manual office

REACH HF PROGRAMME

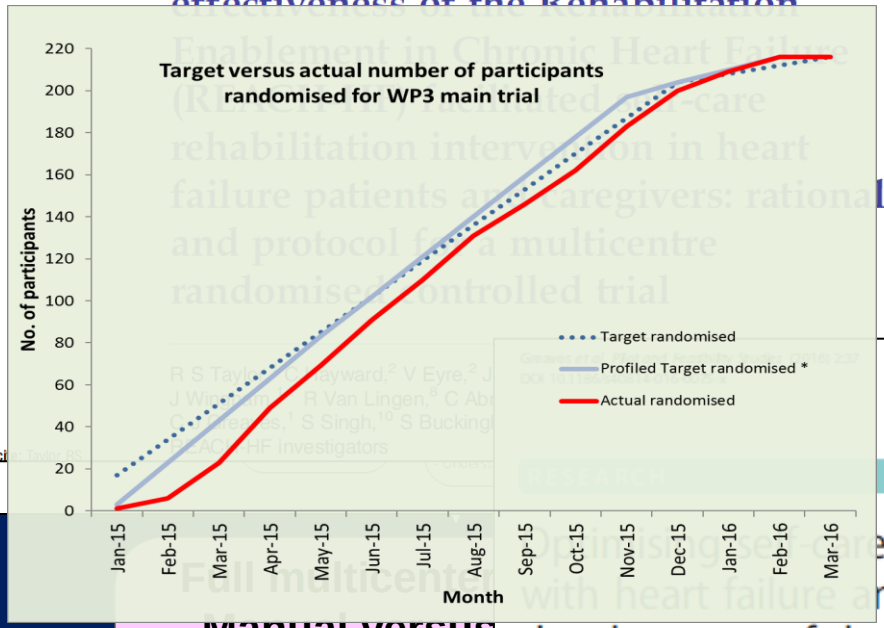
reachHF
Rehabilitation Enablement in Chronic Heart Failure

NHS

Development of home-based

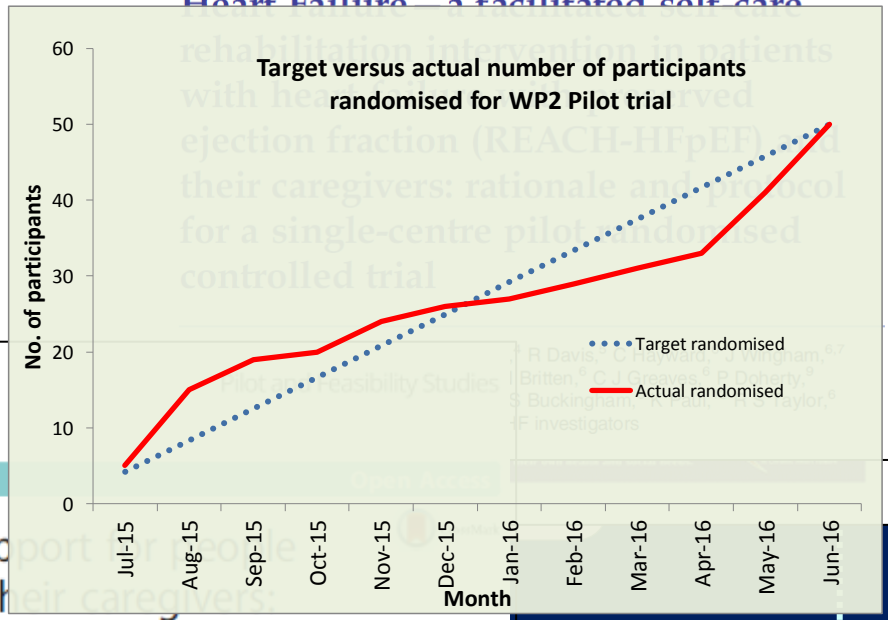
Open Access Protocol

BMJ Open Clinical effectiveness and cost-effectiveness of the Rehabilitation Enablement in Chronic Heart Failure (REACH-HF) rehabilitation intervention in heart failure patients and caregivers: rationale and protocol for a multicentre randomised controlled trial



Open Access Protocol

BMJ Open Rehabilitation Enablement in Chronic Heart Failure – a facilitated self-care rehabilitation intervention in patients with heart failure and reduced ejection fraction (REACH-HFpEF) and their caregivers: rationale and protocol for a single-centre pilot randomised controlled trial



Manual versus … with parallel p… economic ev… in HFr…

development of the Rehabilitation Enablement in Chronic Heart Failure (REACH-HF) intervention using intervention mapping

Colin J. Greaves[1*], Jennifer Wingham[1,2], Carolyn Deighan[3], Patrick Doherty[4], Jennifer Elliott[3], Wendy Armitage[3,5], Michelle Clark[3], Jackie Austin[6], Charles Abraham[1], Julia Frost[1], Sally Singh[7], Kate Jolly[8], Kevin Paul[9], Louise Taylor[3], Sarah Buckingham[2], Russell Davis[10], Hasnain Dalal[11], Rod S. Taylor[1], on behalf of the REACH-HF investigators

…nalytic …odelling

The researches of many commentators have already thrown much darkness on this subject, and it is probable that if they continue, we shall soon know nothing at all about it.

Mark Twain

And the next (last) 5 yrs…

- **Danish Heart Foundation**
  - Review of reviews [Sept!]
- **UK MRC Global Challenges**
  - Implementing cost-effective CR in Bangladesh & Malaysia [Q1 2018]
- **REACH-HFpEF**
  - Full trial application to NIHR HTA [Q3 2017]
- **REACH-AF**
  - UK NIHR Programme Grant Application [Q3 2017]


順路
THIS WAY