

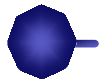
The Whole System Demonstrator (WSD) Project on Telehealth and Telecare – an update

Stanton P Newman,
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Terminology - Assistive Technologies

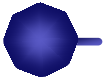
- Telehealth (TH): The remote exchange of data between a patient and health care professional(s) to assist in the diagnosis and management of a health care condition(s).
Examples include blood pressure monitoring, blood glucose monitoring and medication reminders.
- Telecare (TC): Remote and automatic (passive) monitoring of changes in an individual's condition or lifestyle, including emergencies, to manage the risks of independent living.
Examples: movement sensors, falls sensors, and bed/chair occupancy Sensors.
- Telemedicine (TM): Remote transmission of patient information to a clinician for an expert diagnosis and/or management
Examples: MRI, x-rays, symptom reports

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Early days – unrealistic optimism

Rate of Publications in TH & Chronic Disease

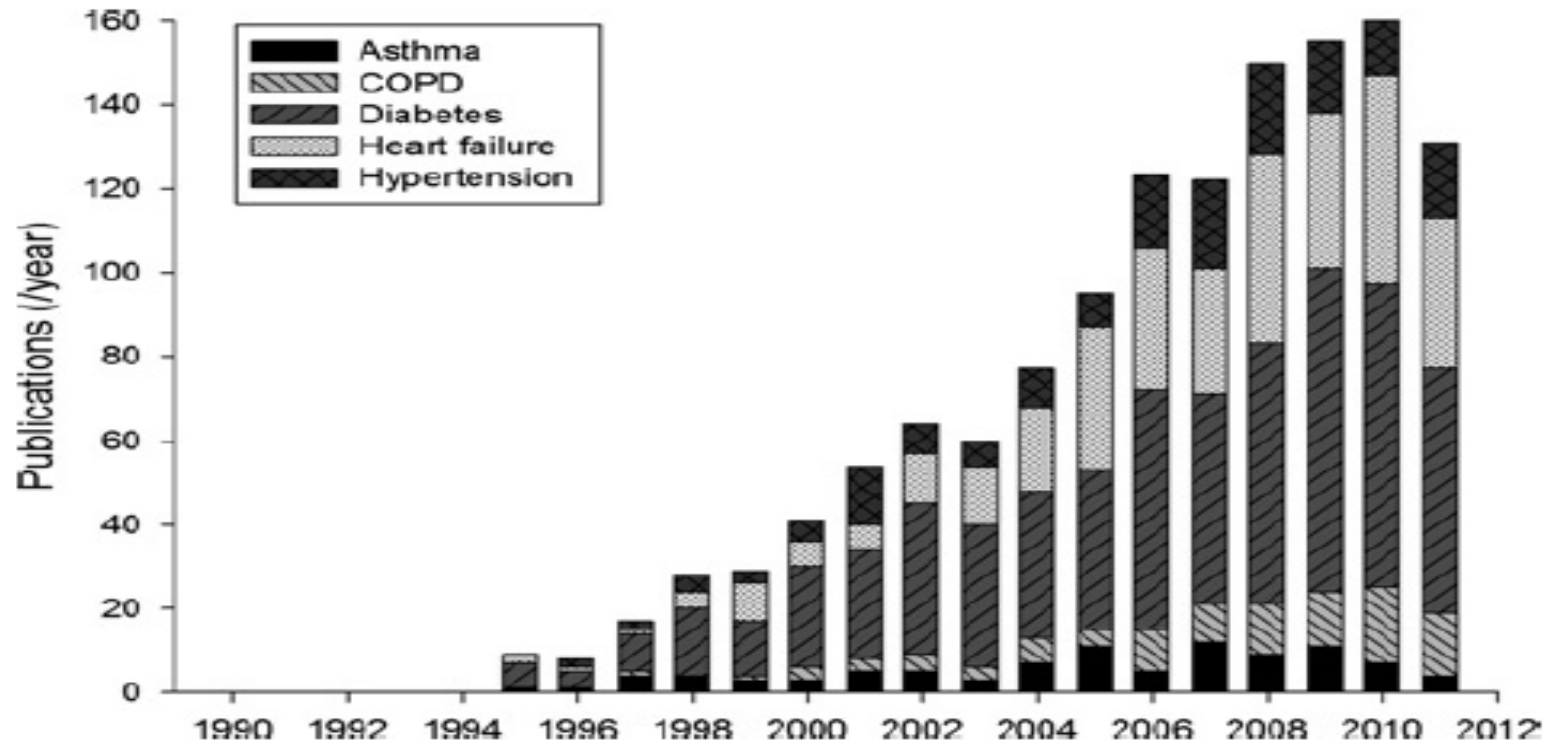


Figure 1 Medline publications on telemedicine and five chronic diseases. There were 1324 publications between 1990 and 2011.

Wootten J Tel & Tcare 2012

Methodological Problems Persist

The evidence about cost savings and cost-effectiveness analysis (CEA) is meagre and debilitated by methodological problems

Acelrod J TelM and TCare 2014

Vast majority of the studies are small and lack a control group
(Pedone et al 2013)

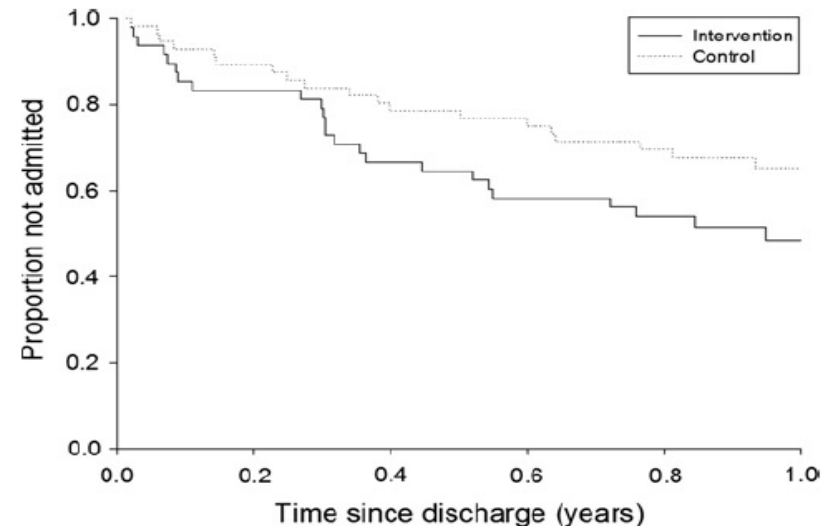
Does Tele-health improve patient outcomes - A Question of evidence eg COPD

Vast majority of the studies are small and lack a control group (Pedone et al 2013)

Larger studies with telephone support +/- 180 Smaller studies where home telemonitoring and transmission +/- 90

t-test on a continuous outcome such as the dyspnea scale of the CRQ producing an effect size of 0.3 (medium-small effect size), we would require **176 per group (352 total)**.

Dinesen 2012 (n=105)



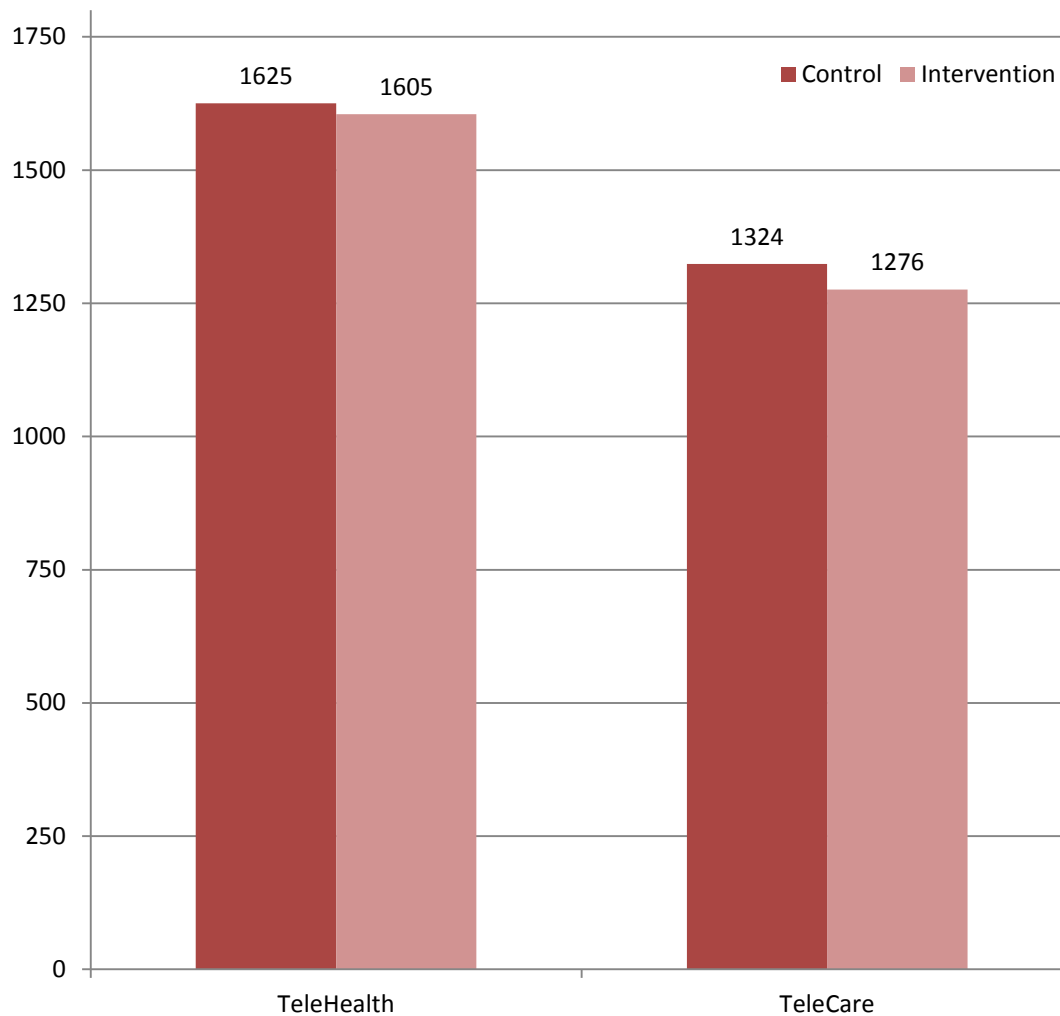
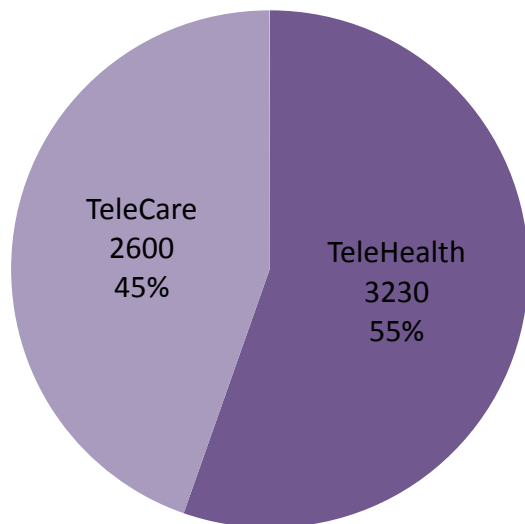
Pedone et al 2013

Table 2 Respiratory events during follow-up

	SweetAge (N = 50)	Controls (N = 49)
Cumulative incidence of events	18%	31%
Cumulative incidence of multiple events	4%	8%
Incidence rate	28/100 person-year	42/100 person-year
Incidence rate ratio	0.67 (95% CI: 0.32 – 1.36)	

WSD Telehealth findings in Brief

Total Numbers recruited



Results – Hospital Use and Mortality

Table 3 | Hospital use and mortality during trial (unadjusted for clustering and covariates). Data are mean (standard deviation) unless stated otherwise

	Control group (n=1584)	Intervention group (n=1570)	Absolute difference (95% CI)	Percentage difference (95% CI)
Admission proportion (%)	48.2 (n=763)	42.9 (n=674)	-5.2 (-8.7 to -1.8)	-10.8% (-18.1% to -3.7%)
Mortality (%)	8.3 (n=131)	4.6 (n=72)	-3.7 (-5.4 to -2.0)	-44.5% (-65.3% to -23.8%)
Emergency admissions per head	0.68 (1.41)	0.54 (1.16)	-0.14 (-0.23 to -0.05)	-20.6% (-33.8% to -7.4%)
Elective admissions per head	0.49 (1.31)	0.42 (0.99)	-0.07 (-0.15 to 0.01)	-14.3% (-30.6% to 2.0%)
Outpatient attendances per head	4.68 (6.81)	4.76 (6.74)	0.08 (-0.39 to 0.55)	1.7% (-8.3% to 11.8%)
Emergency department visits per head	0.75 (1.58)	0.64 (1.26)	-0.11 (-0.21 to -0.01)	-14.7% (-28.0% to -1.3%)
Bed days per head	5.68 (15.10)	4.87 (14.35)	-0.81 (-1.84 to 0.22)	-14.3% (-32.4% to 3.9%)
Tariff costs per head (£)	2448 (4099)	2260 (4117)	188 (-474.9 to 98.8)	-7.7% (-19.4% to 4.0%)

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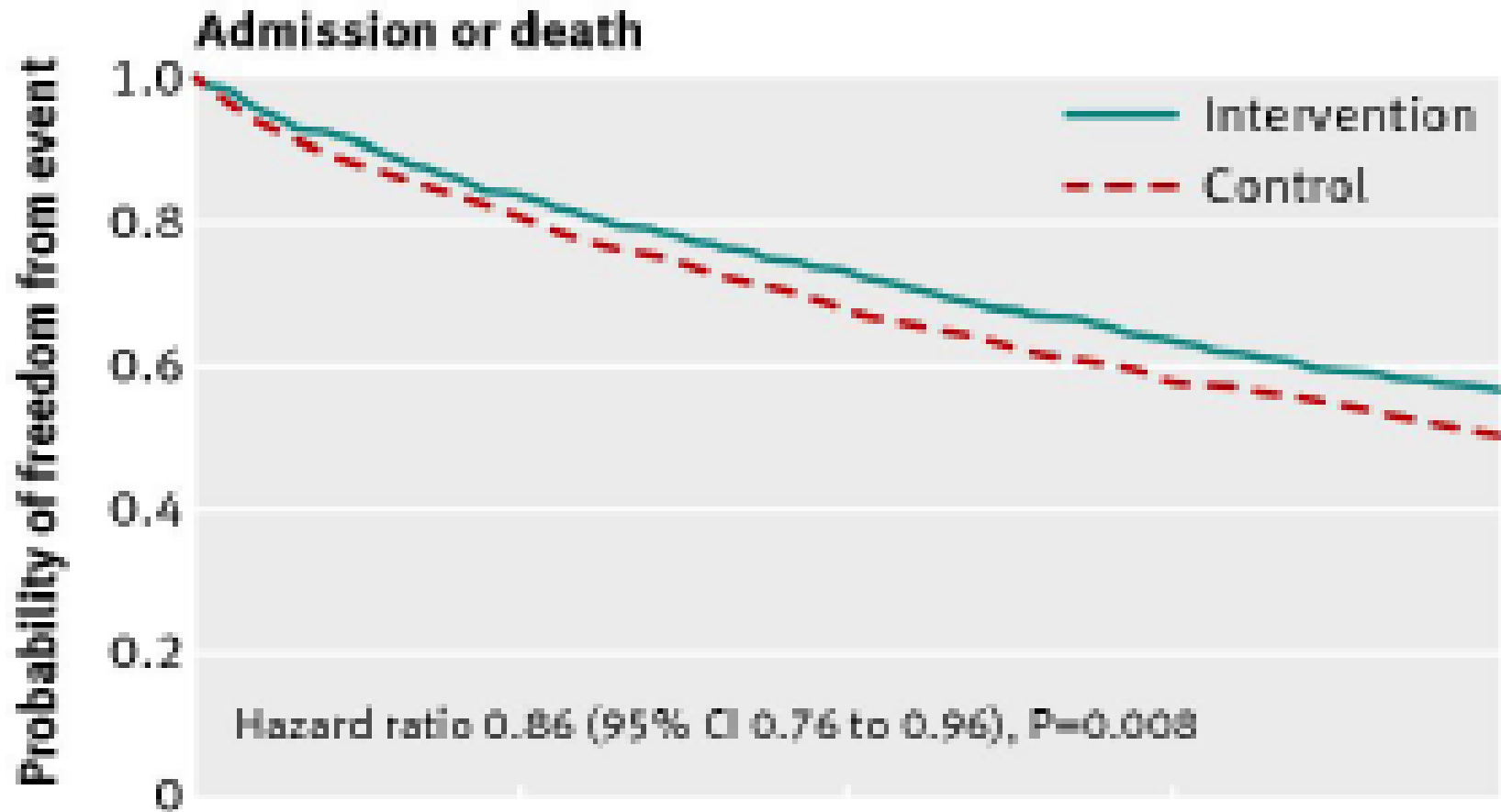
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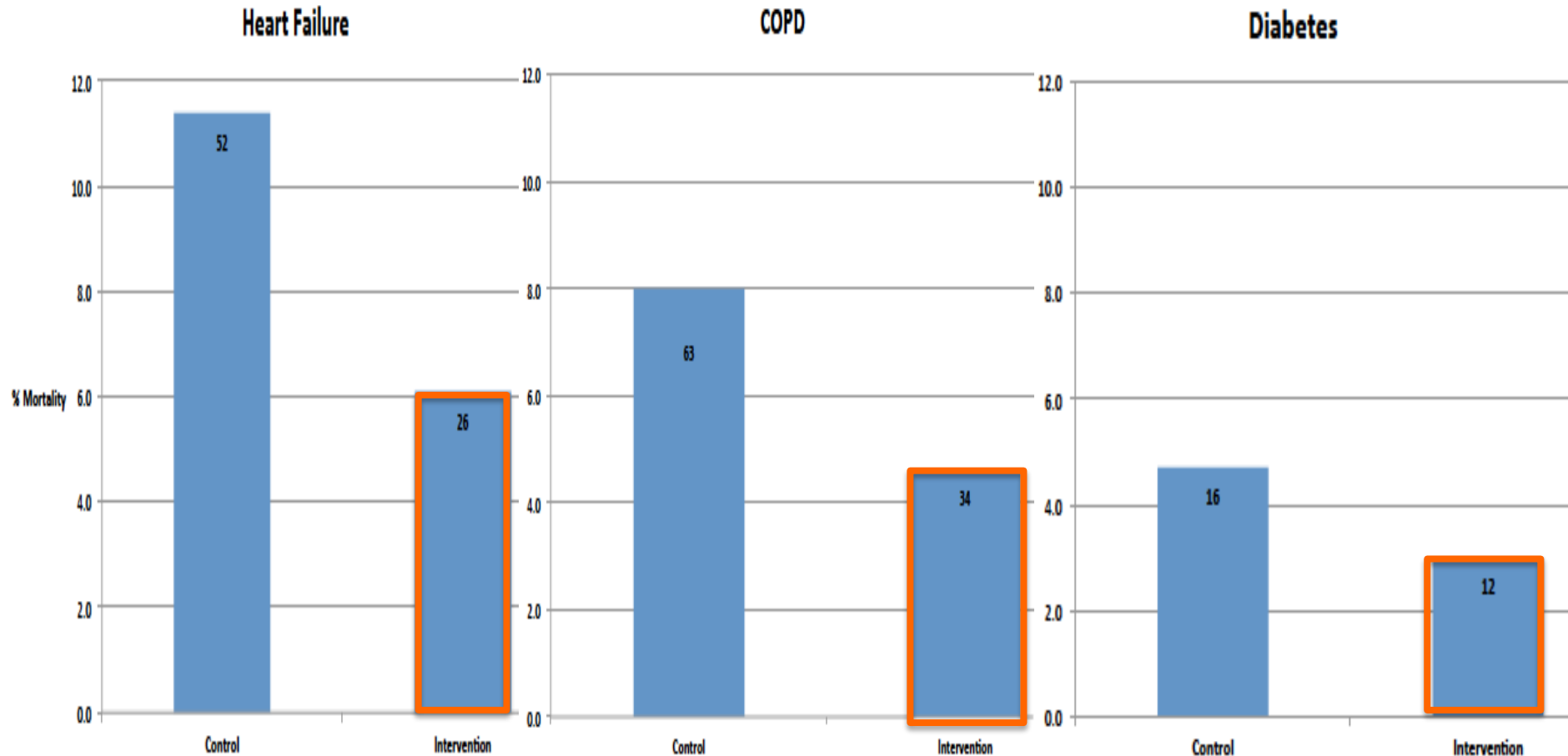
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Admission or Death - Kaplan Meier



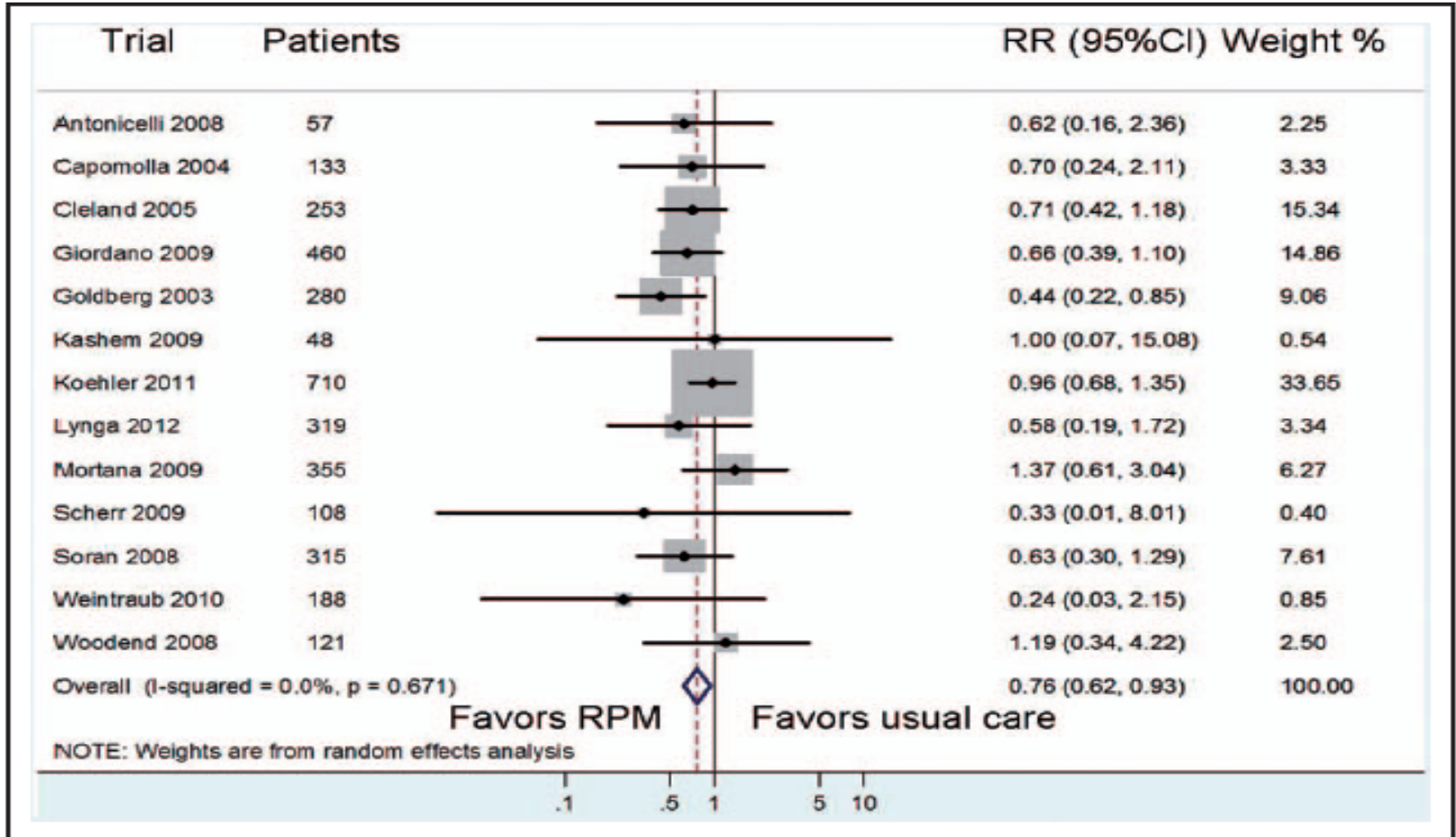


WSD Mortality by condition





Meta- Analysis – TH CHF & Mortality



Small but significant reduction in WSD Type 2 diabetics (n=457) who received TH

Mean HbA1c

Control 8.41% to 8.38%

Intervention 8.38% to 8.15%

Adjusted difference - 0.30%,

95% CIs -0.53% to -0.07%

Problems of Combining Studies - Heterogeneity

Heterogeneous nature of studies

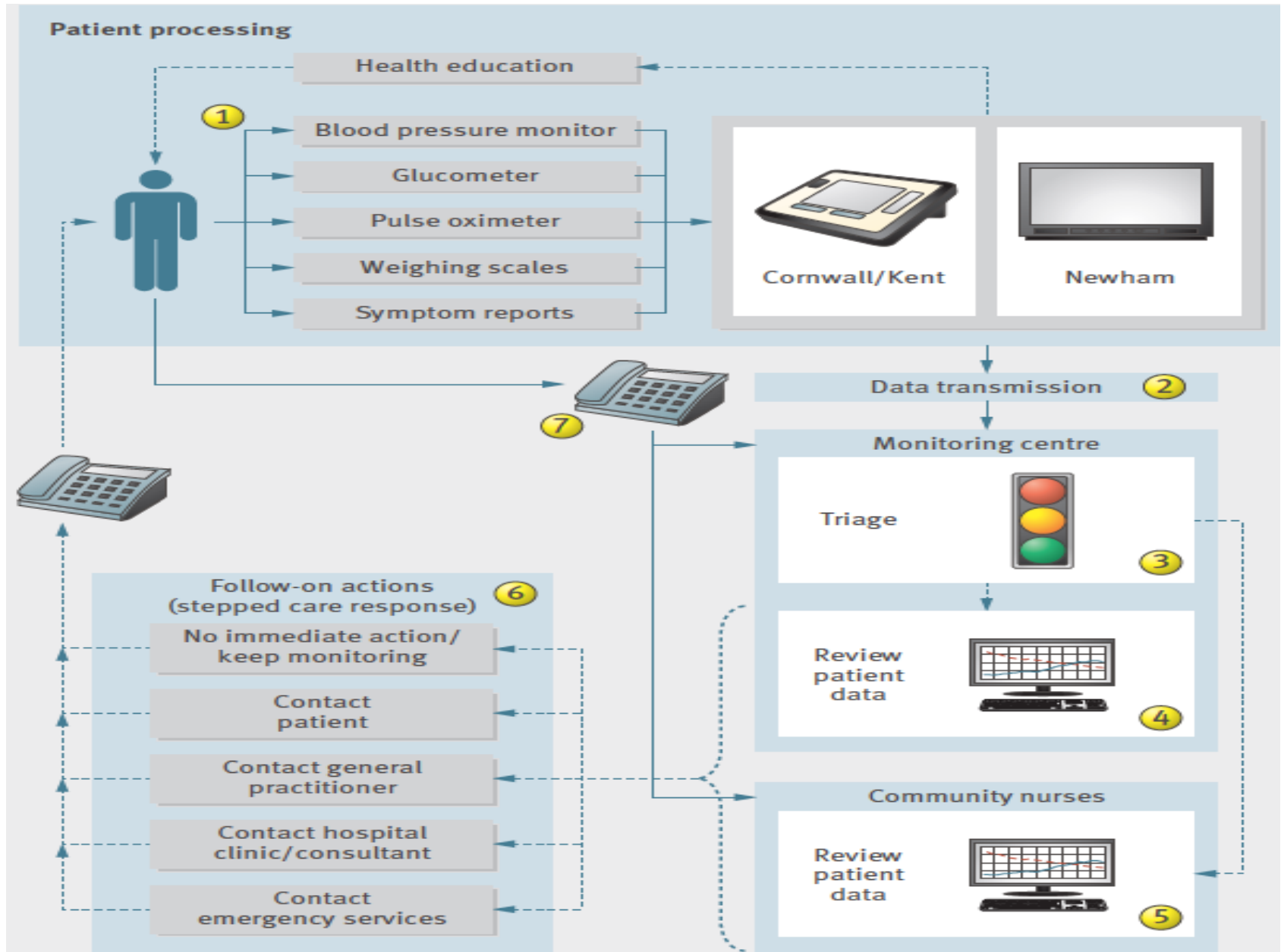
Adapted from paper on Heart Failure (Achelrod 2014)

1. Variable risk of bias
2. Potential statistical under-powering - Small sample sizes
3. Variable but short follow-up periods
4. Variable patient baseline characteristics e.g. severity of CHF,
5. Diagnostic criteria for CHF differed between studies.
6. Traditional care highly variable – e.g specialist nurses, GPs, Cardiologists.
7. Variable TH interventions e.g. sophisticated TM technology thru to telephone
8. Coverage varied from 24-hour thru to normal working hours.
9. Frequency of data transmission ranged from twice daily to weekly.
10. Variable types of data transmitted – eg blood pressure and bodyweight others weight only

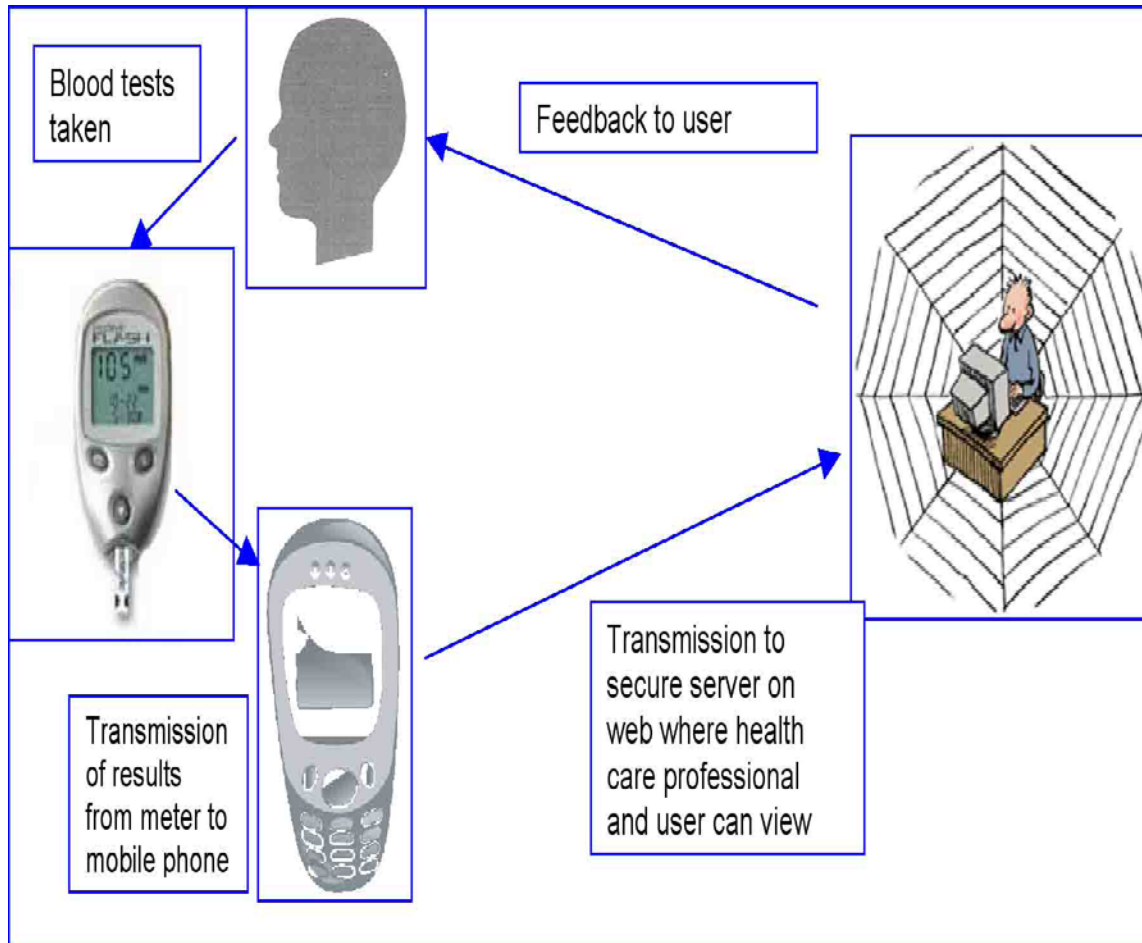
Variations in Equipment



WSD Telehealth Processes



M – Health – WSD study in Diabetes



Asking the right question

1. "There are no right answers to wrong questions." -
Ursula K. Le Guin

1. . "We thought that we had the answers, it was the
questions we had wrong." - *Bono*

Does telehealth work ?

Is this the right question

- Telehealth is a small part of the intervention
- The technology works in transmitting information
- The bulk of effort required and costs are around the configuration of the service
- The technology is disruptive to organisation
- The introduction of TH is about changing organisations, behaviour and practice
- Participant attitudes is one critical element in moving to scale



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WSD - Cost-effectiveness of TH

Cost effectiveness Methods

- The primary outcome was incremental cost per quality-adjusted life year (QALY) gained.
- Utility values were constructed from the EQ-5D (Brooks, 1996) with societal weights (Dolan et al., 1995, Dolan, 1997).
- Unit costs of TH involved describing the processes involved in producing the interventions and correspondence with site project teams to collect financial and activity data.

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Service use and costs

- Intervention costs £455 per person, across 3 sites; equipment £166, support £290 (3 months)
- Use of services at follow-up: slightly lower reported contacts with health and social care services by the TH group
- Health and social care costs per person:
 - *excluding* direct intervention costs, **lower** in TH group
 - *including* direct intervention costs, **higher** in TH group

WSD Questionnaires

Psychological Well-being

Brief STAI Short form state anxiety measure

CES-D 10 Short form Depression Scale

Quality of Life

UK SF12 Measure of health-related quality of life

EQ-5D Measure of health outcome – also utilized for QALYs

MLHFQ Minnesota Living with Heart Failure Questionnaire - measure of patients' perceptions of the effects of congestive heart failure on their lives

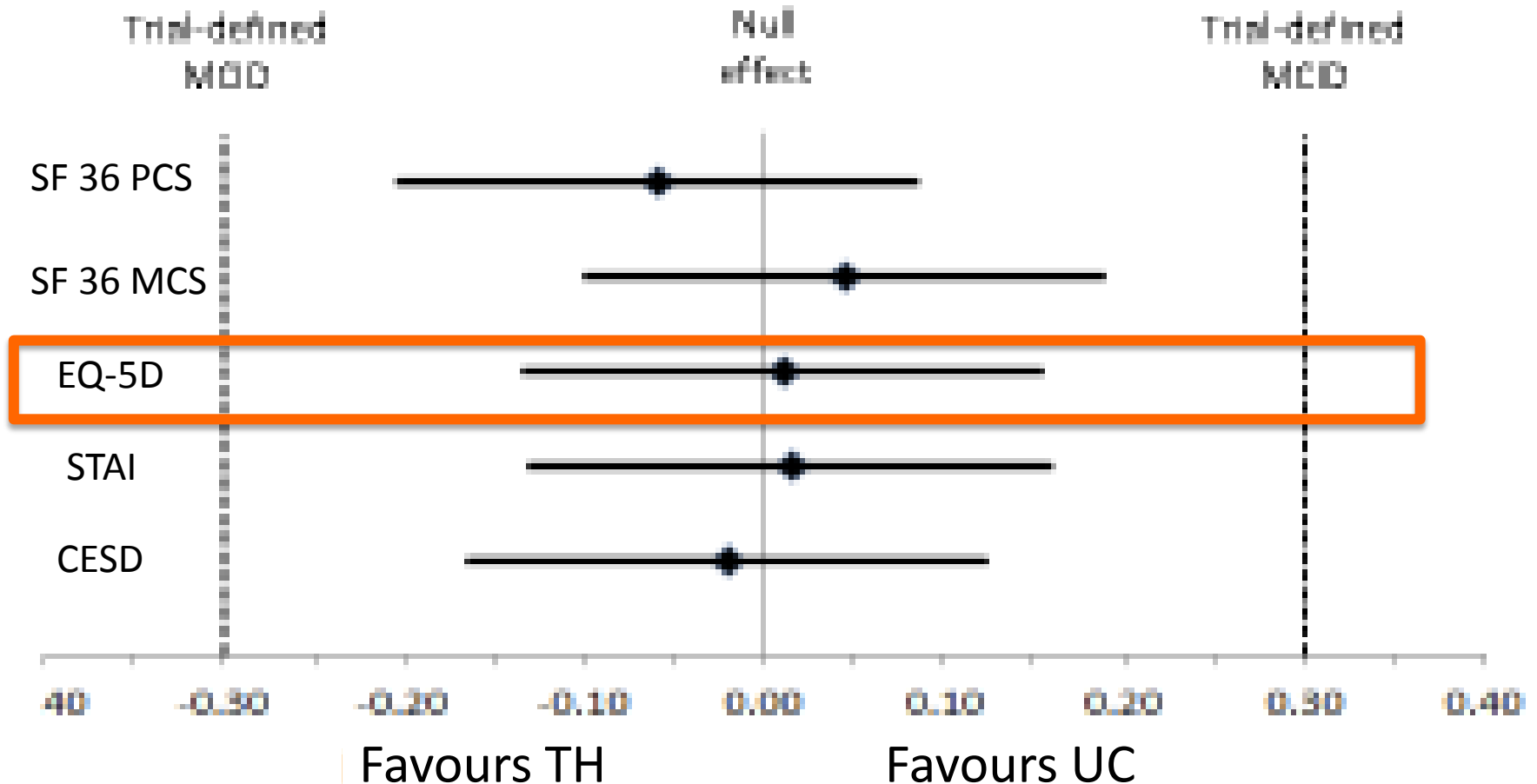
CRQ Chronic Respiratory Questionnaire - measure of quality of life for patients with chronic lung disease

DHP Diabetes Health profile – disease specific quality of life measure

TDS Townsend Disability index of activities that assesses physical ability in social terms (12mth & EUS)

WSD TH PROMS

12 Months ITT complete case analysis



Is Quality of Life the appropriate outcome for TH

Is HRQoL the appropriate outcome for TH– EQ5D

What are the items in the EQ5D and would they be expected to change with TH.

EQ-5D DIRECTIONS: By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

© EuroQoL Group 2004

Mobility

I have no problems walking about

☐

I have some problems walking about

☒

I am confined to bed

☐

1. Mobility
2. Self Care
3. Usual activities
4. Pain and Discomfort
5. Anxiety and Depression

Is HRQoL the appropriate outcome for TH – EQ5D

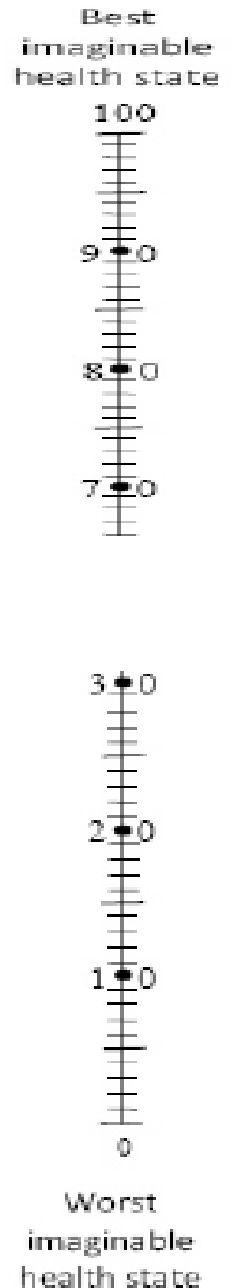
What are the items in the EQ5D and would they be expected to change

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate in relation to this scale how good or bad your own health is today, in your opinion. Please do this by writing the number in the box below to indicate which point on the scale describes how good or bad your health state is today.

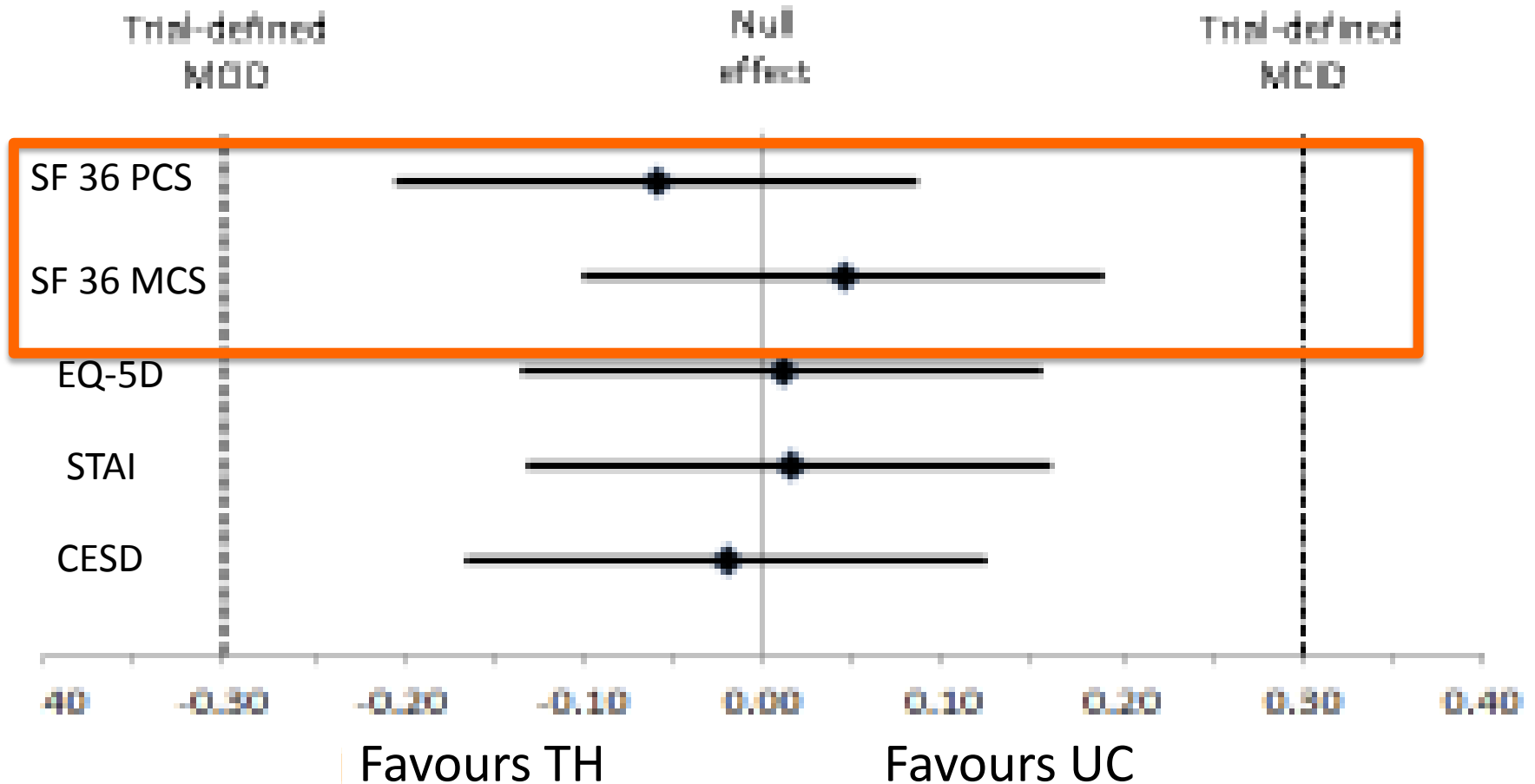
FILL IN HERE →

YOUR OWN HEALTH STATE TODAY		



WSD RESULTS

SF-36





Examples of the SF36

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Examples of the SF36

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- b Accomplished less than you would like ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- c Did work or other activities less carefully than usual ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Cost effectiveness Methods

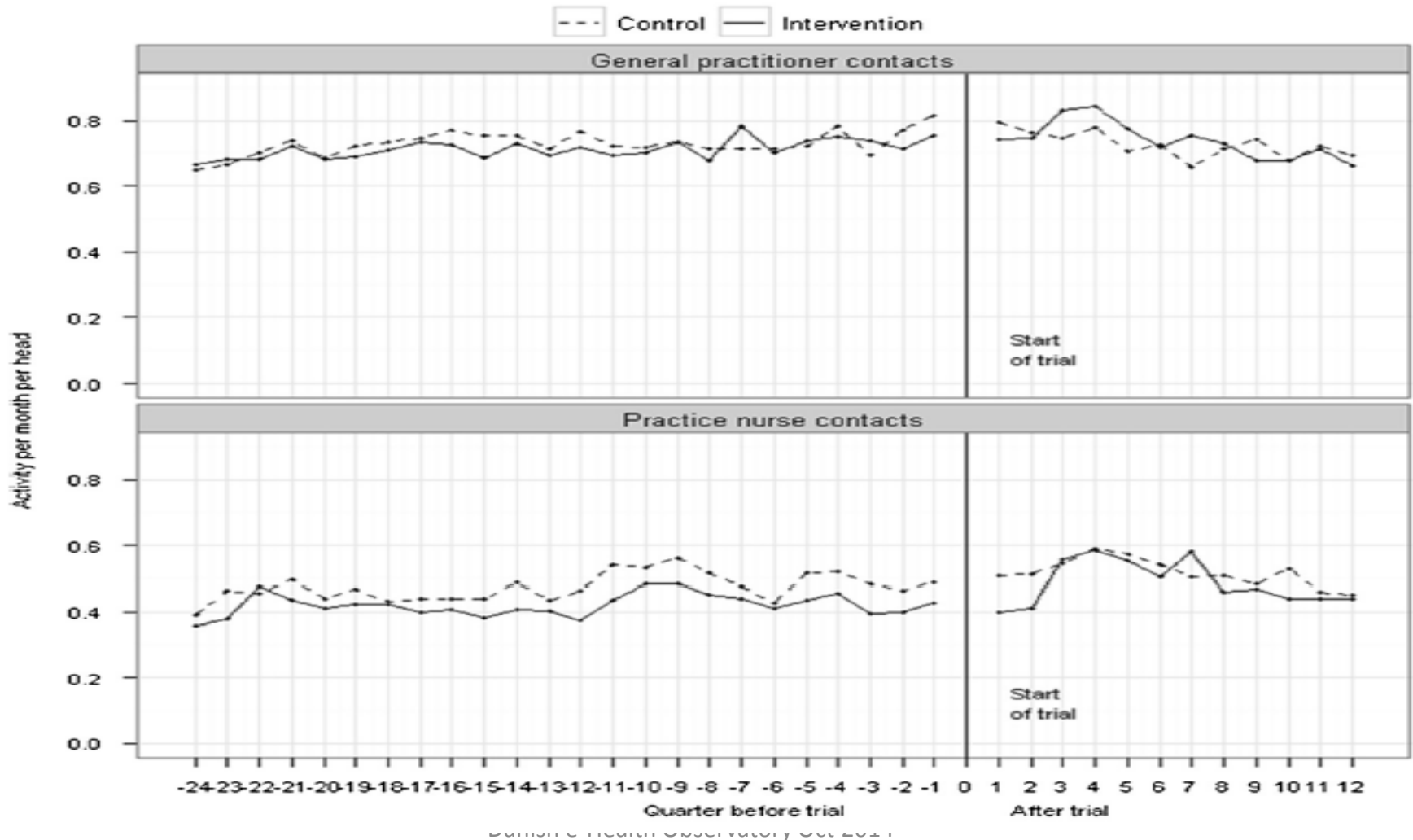
- The primary outcome was incremental cost per quality-adjusted life year (QALY) gained.
- Utility values were constructed from the EQ-5D (Brooks, 1996) with societal weights (Dolan et al., 1995, Dolan, 1997).
- If there is no Quality of Life improvement it is difficult to get a favourable cost effectiveness outcome
- Unlikely to have change in Quality of Life on either the EQ5D or the SF36 or 12.

What is the impact of TH on GP and Nurse activity

Table 3 Baseline characteristics of intervention and controls groups (data are % of group unless otherwise specified)

	Control	Intervention	Standardised difference (%)
Number in group	1098	1219	
Number of practices	80	82	
Number of patients per practice (median (range))	10 (1 to 62)	8 (1 to 76)	
Index long-term condition			
Chronic Obstructive Pulmonary Disease	47.4	45.0	−4.8
Diabetes	22.6	27.1	10.4
Heart failure	30.0	27.9	−4.6
Number of chronic health conditions (mean (SD))	1.9 (1.8)	1.8 (1.8)	−3.9

What is the impact of TH on GP and Nurse activity



What is the impact of TH on GP and Nurse activity

	Before		After	
	Control	Intervention	Control	Intervention
GP contacts	8.98 (7.61)	8.84 (6.76)	8.85 (8.16)	8.99 (7.00)
Practice nurse contacts	6.07 (8.07)	5.26 (7.76)	6.28 (8.98)	5.92 (9.83)

Front line professionals' experiences & perceptions of telehealth & telecare

Frontline professionals' perceptions of patient focused benefits of TH

eg: 'What this is about is to catch them quick, educate them, get them to manage their own condition before it gets more complex then they won't get to the top of the triangle.' (Telehealth nurse)

Positives

Effective, low risk form of patient care

Enhances patient health awareness & self management

Enables more prompt & appropriate responses to patients with LTC

Beliefs that most patients capable of adopting & using TH

Negatives

Some concerns about appropriateness:

for very severely ill patients

for patients with lowest level of illness

Use of current TH excludes patients with limited/no ability in reading/writing English

TH Professionals' perception of impact of TH on professional practice

Nursing perspective

- Few adverse impacts
- Manageable training
- Manageable adjustments to working practice
- Enhances time management
- Opportunity for enhancing professional status
- Needs to be embedded in practice

GP perspective (*Most had little detailed knowledge about TH*)

- Varied impact on current workload
- Some questioned whether TH was helpful to patient care
- Some scepticism about usefulness of monitoring data
- Lack of capacity to attend to detailed patient information

Benefits to service users & carers

- Enhances safety of the frail or vulnerable
- Contributes to maintenance of independent living
- Enhances quality of life for people with LTC
- Enhances patient confidence
- Provides reassurance for family and informal carers
- Reduces avoidable use of hospitals and other services

Negative comments

- Low status and underappreciated work
- Routinised
- Inadequate responses from services can be a source of stress.

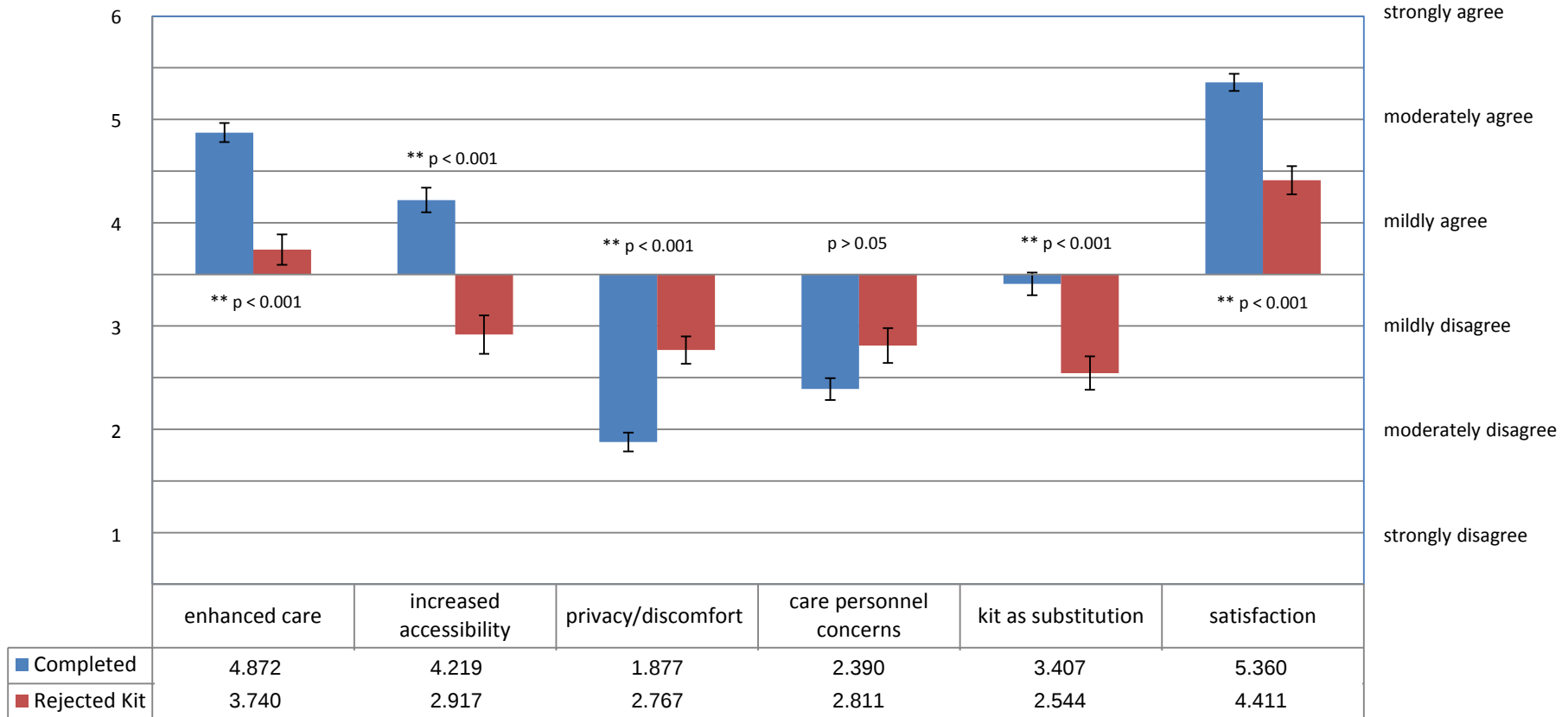
Is Telehealth for all

- Often assumed that Telehealth is applicable to all individuals.
- Significant proportion reject telehealth
- Application of Telehealth and Telecare may be less appropriate to some individuals - favour more paternalistic approach
- Application of Telehealth more appropriate in conditions that require significant monitoring (e.g.diabetes, CHF).
- Important to be aware of patient concerns so that these may be addressed in any roll out

WSD : Key qualitative themes from those not wanting to trial the equipment

- Perceptions of health, self-care and dependency
- Views on technology and operational factors
- Expectations and experiences of changes in service provision and use

Factors that influence people wanting to continue using TH after some experience



Telehealth is not about technology

- It requires fundamental re-organisation of healthcare
- Supports the move into the community
- Supports the empowerment of patients if deployed appropriately
- Is a disruptive technology
- Its about people and practice

Importance of Care Pathway & participants in introducing TH in Primary Care

Major themes were that practices should:

- (1) understand the capabilities and limitations of the technology and the willingness of patient and physician stakeholders to use it
- (2) understand the workflow, flow of information, and human factors needed to optimize use of the technology
- (3) engage and prepare the physicians
- (4) involve the patient in the process.

Organisation and Telehealth

Organisation – WSD Key finding

Engagement of clinicians is critical for TH implementation

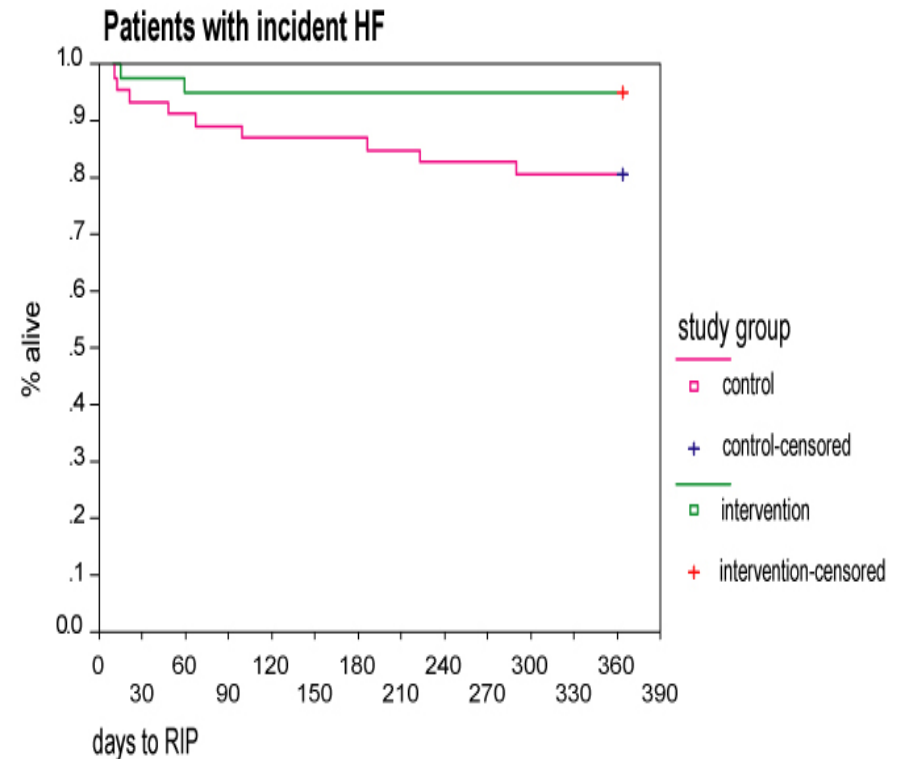
- Successful recruitment of WSD participants and implementation of the RCT was aided in all three sites by:
 - clinical champions at strategic (senior management) and operational levels (GPs and nursing teams)
 - availability of financial resources
 - external management consultancy support
 - support from third sector (e.g. Age Concern)
- In Cornwall **use of the PCT** as the programme lead for TH led to increased and more sustained engagement by clinical stakeholders

Integrating Self care and TH

- Possible to increase sustainability of both SC and TH

Brief Self Management intervention
For newly diagnosed CHF patients

1. 1.5 hours at discharge
2. Home Visit 1 week later
3. Telephone call 1 week later





Conclusions re Self Care in WSD

- Most TH interventions do not pay adequate attention to patient self-care behaviour
- This was not a focus in the WSD intervention
- Alternative delivery models are needed if self care is to be improved
- Self-management interventions available and need to be combined these more effectively with TH to make interventions sustainable.

Thank you

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