

Clinical ‘Calibration’ of Home Monitoring Devices for Tele- Health: A Component of the HeartCycle Programme

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Introduction

- Treatment of Heart Failure is complex
- Diet, Lifestyle, complex therapeutic regimes, device therapy, surgery
- Evidence of reducing mortality and hospital admissions with tele-monitoring - recent Cochrane review- reduced death by 44% and readmissions by 21%

Tele-Monitoring

- Technology has advanced from measurements of blood pressure (BP), heart rate (HR) and weight.
- Activity levels, heart rate variability, sleep quality, bio impedance, acoustic cardiography.
- Informed decision made by patient
- Patient at the centre of care and in charge
- Sense of personal satisfaction
- Better and timely intervention

The Nexfin – a compact monitor

- Beat to beat
- Non-invasive
- Blood pressure
- Cardiac output



Nexfin overview

- A basic Nexfin consists of
 1. Monitor
 2. Wrist unit
 3. Finger cuff
 4. Heart Reference System



Touch screen hemodynamic dashboard

One Screen

Blood
Pressures
Cardiac Output
Stroke Volume
Vascular
Resistance
dP/dt



Non – Invasive Cardiac Monitor (NICaS)









HeartCycle-Life challenges

- A series of randomised-controlled studies investigating the effects of common ‘challenges’ that patients with heart failure might encounter during home monitoring in everyday life.
- Funded by the European Union framework Programme-7 HeartCycle programme.
- Patients with heart failure but includes patients with uncomplicated hypertension as a control group.
- We report the preliminary results for one component of this programme.

Methods

- Patients were randomly assigned to take (MT) or to withhold (MW) all their morning medications prior to study and to have a high (HS) or a low (LS) salt diet for 3 days before each study period.
- Haemodynamic measurements were made using finger probes and volume-clamp technology (Nexfin, Bmeye, Netherlands). In each case, the left arm and fingers were used for measurement.
- Ten men, (median age 70 years) with symptomatic chronic heart failure.
- Treated with loop diuretics, ACE inhibitors or angiotensin receptor blockers and beta-blockers have been enrolled.

Table 1 shows the data for evaluations conducted before and during exercise using Nexfin.

	Pre Exercise (Median)				During Exercise (Median)			
	MT/LS	MW/LS	MT/HS	MW/HS	MT/LS	MW/LS	MT/HS	MW/HS
HR/min	61	60	63	70	77	79	78	80
SBP (mmHg)	107	117	116	116	122	143	132	125
DBP (mmHg)	68	70	74	72	76	89	84	78
CO (L/min)	3.2	3.7	3.4	4.0	4.4	5.1	4.4	5.4
SVR (wood units)	27	23	24	22	24	27	25	18

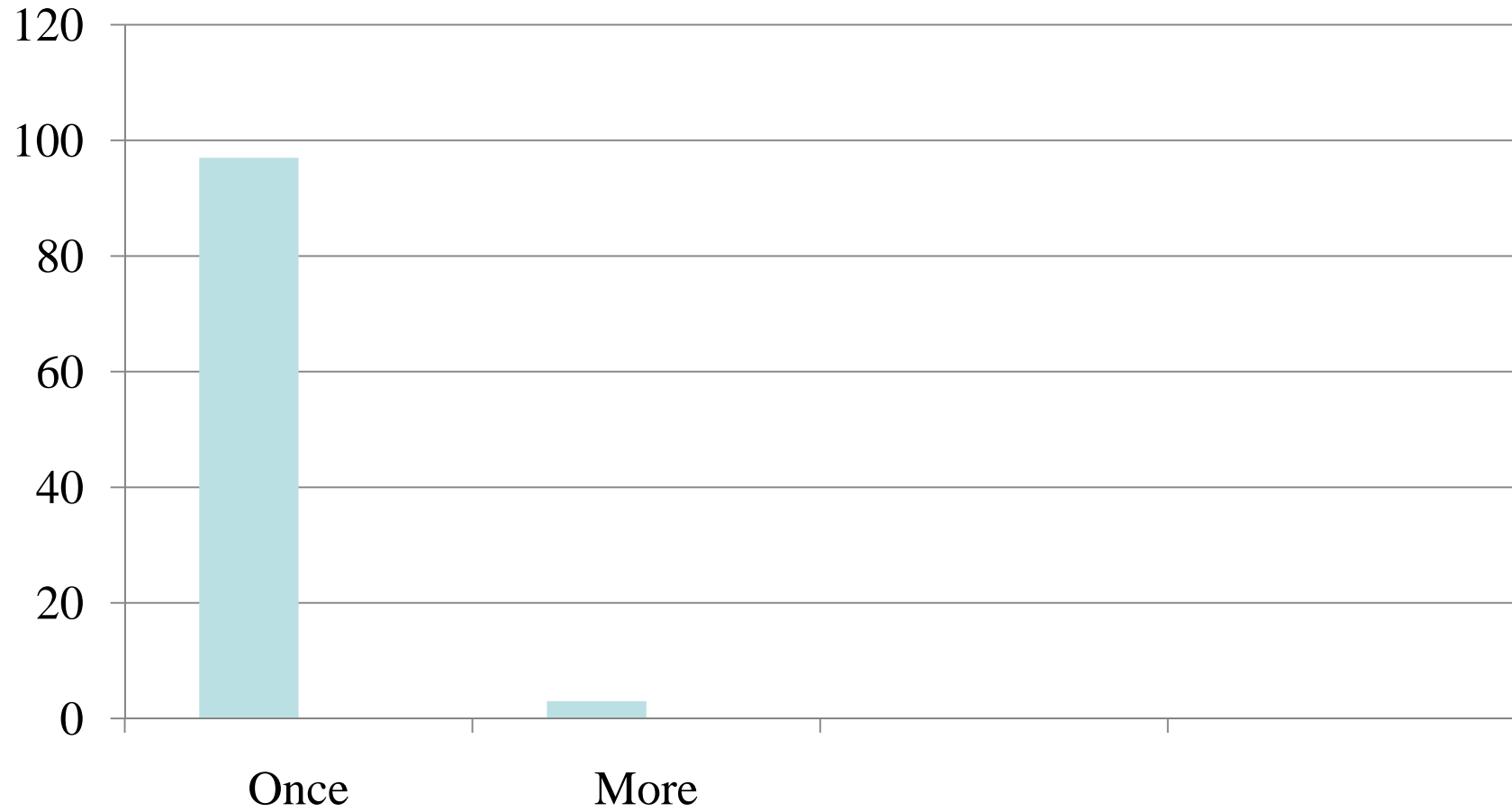
Results

- HR, BP and cardiac output rose with light exercise, and SVR tended to fall.
- Cardiac output was higher and SVR tended to be lower when medication was withheld and on HS diet.
- No consistent pattern of BP was observed.

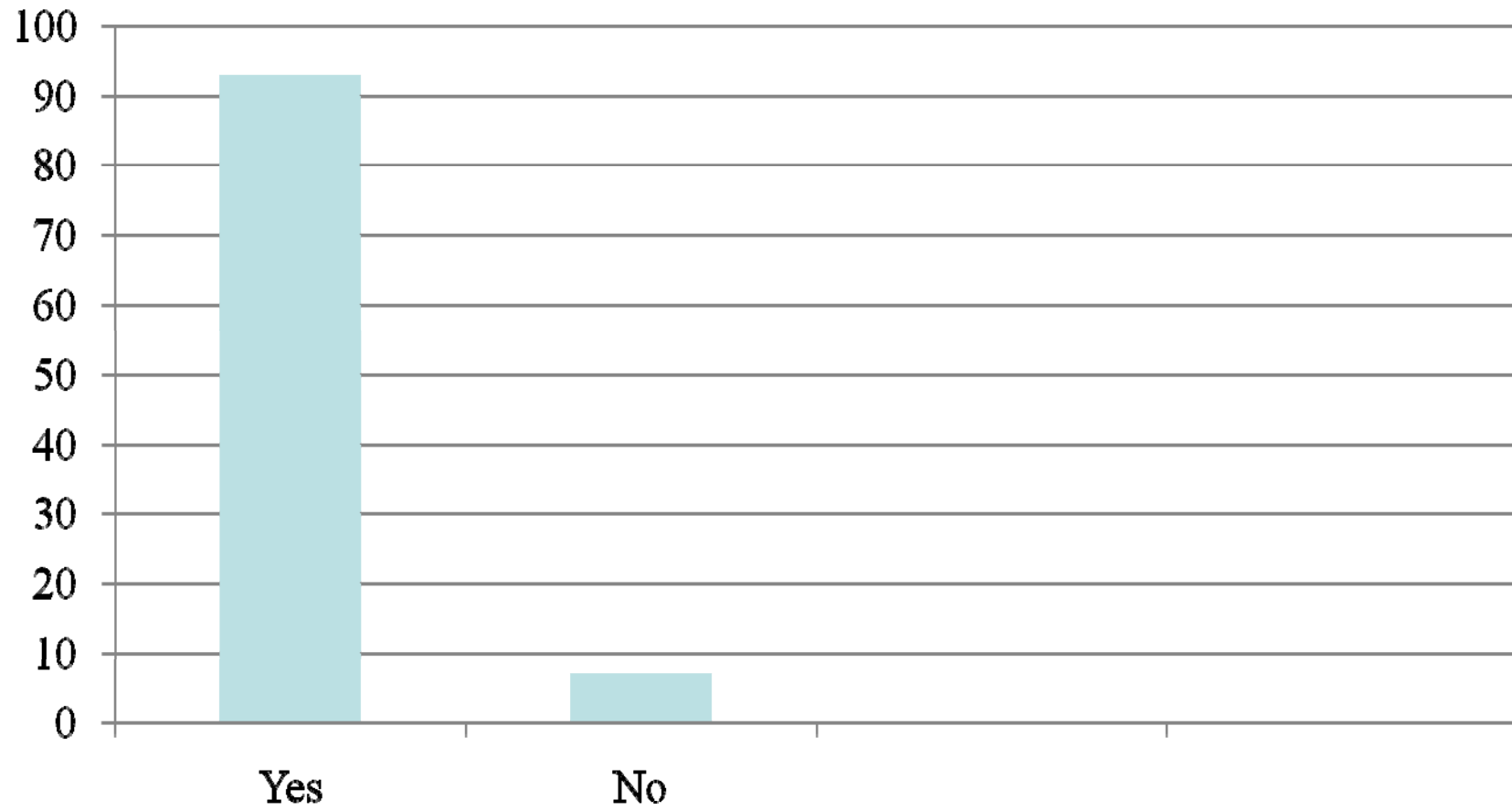
Hull churches Home from Hospital Service (Tele Health Survey (02/2011))

- 100 patients
- Motiva Tele-health equipment
- Received equipment during 2010-2011
- Detailed survey questionnaire
- Completed over 3 weeks
- 100% response

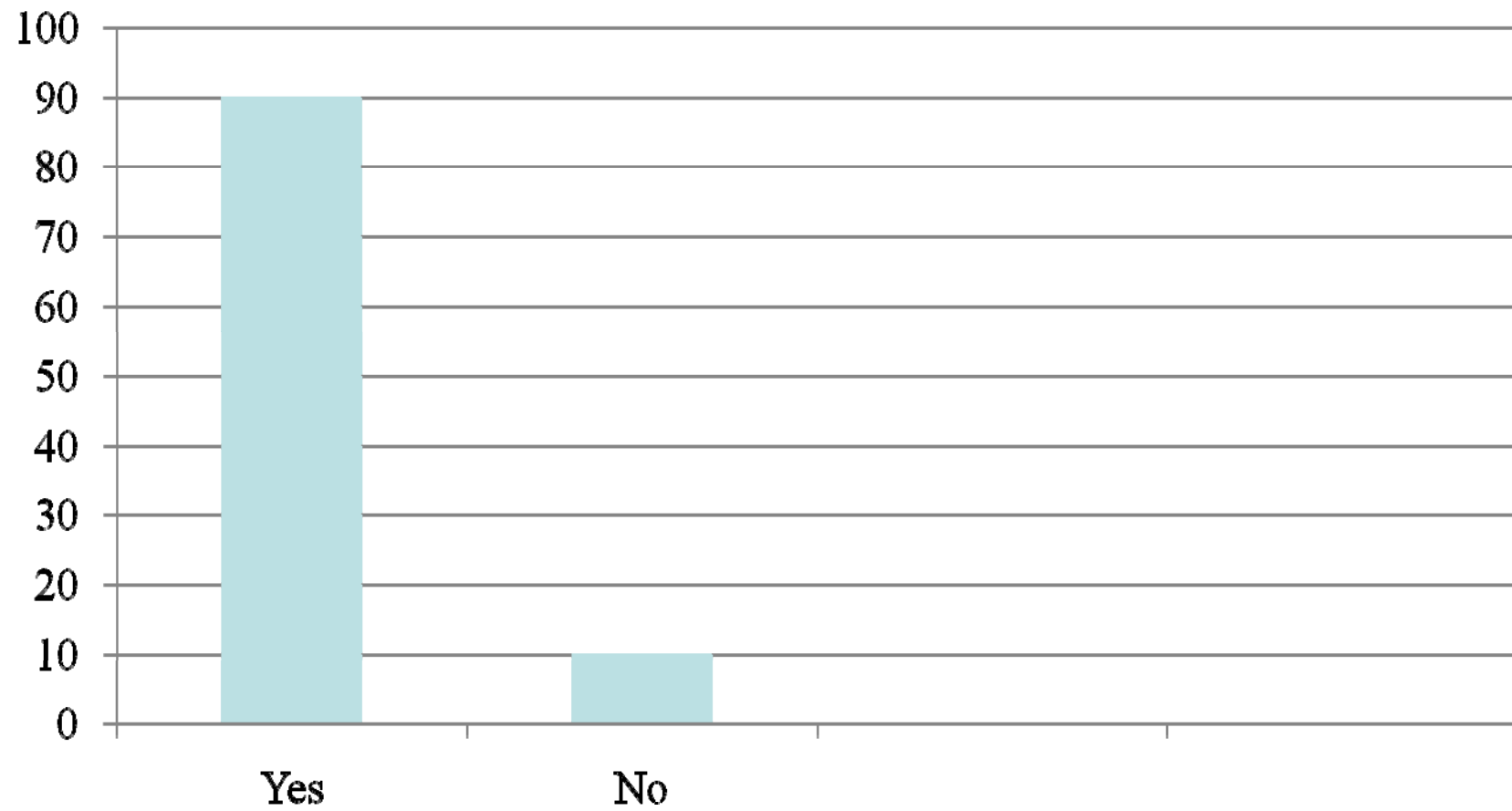
How often do you monitor at home?



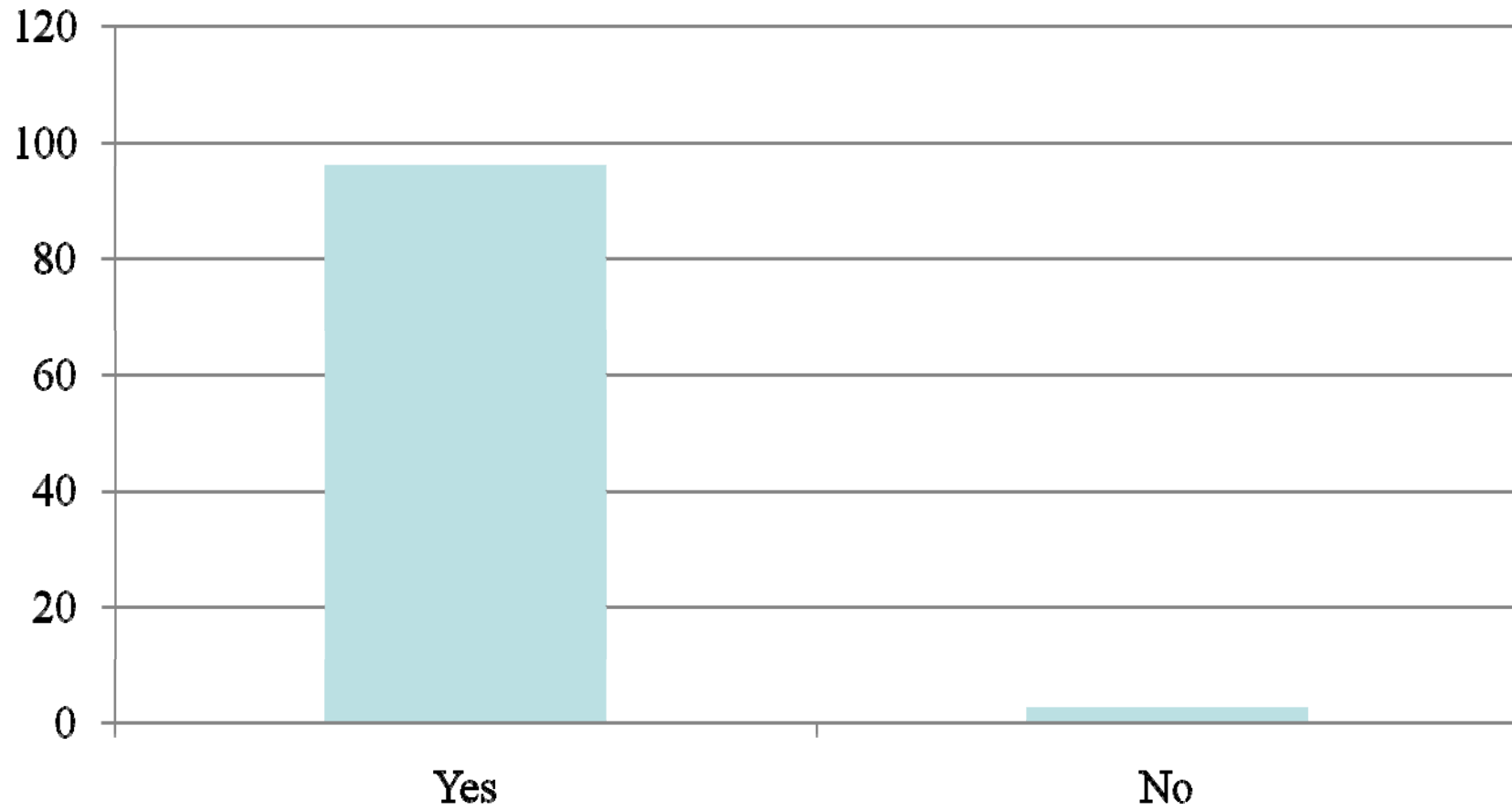
Felt More in Control



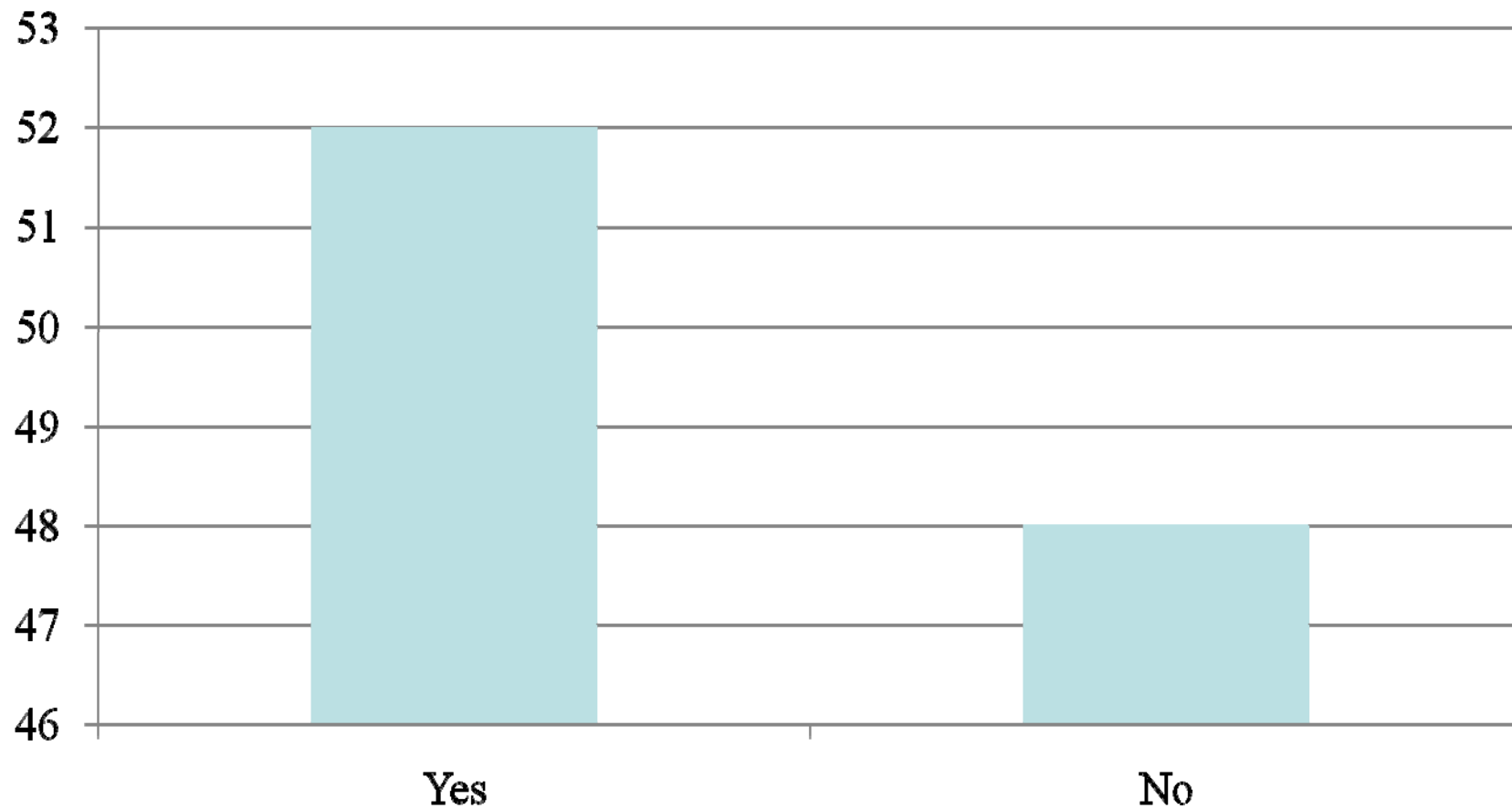
Felt Less Anxious



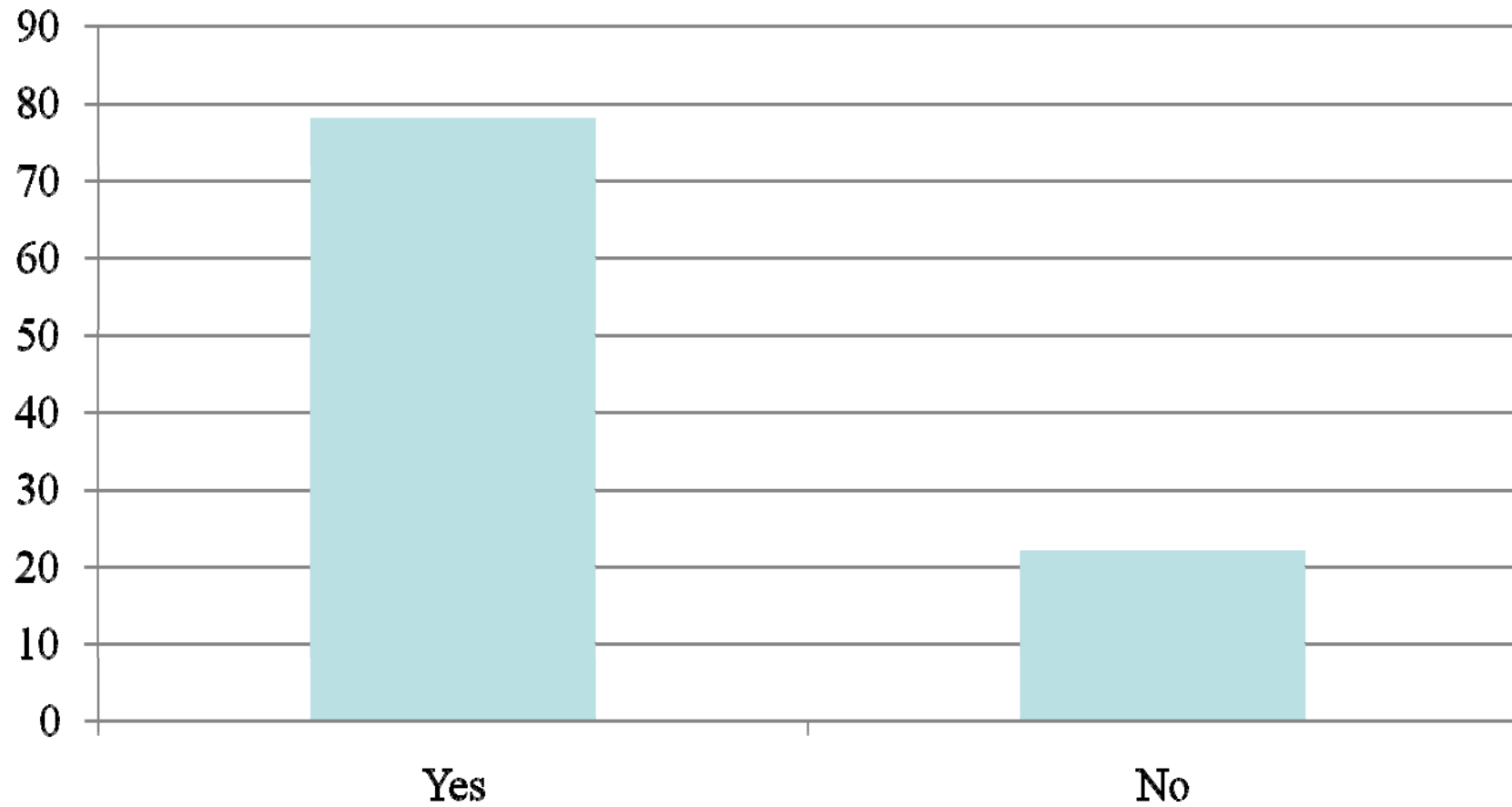
Felt More Informed



Felt That Hospital Re-Admission Had been reduced



Felt There was less need to see GP



Some Comments

- “I feel more safe by having it here”
- “You feel some one cares”
- “Puts your mind at rest”
- “As soon as it was installed I felt that some one was there for me”

What is the Future?

2 strategies

- Crisis Prediction- lots of false positives
- Health Maintenance – Daily adjustment of medications, optimal use of diuretics
- Use of intelligent systems supporting patients
- Using the largest health care force- **Patients**

Thank You