Disclosures

- I have received BP monitors from Lloyds Pharmacies and Omron for my research

- I chair the BHS BP monitoring sub-group

- I am funded by NIHR at the university and a part-time partner at 27 Beaumont St, Oxford

General Practice in 2015

The doctor will see you in a month! GPs' waiting times warning to patients as they claim they are so overworked that standards of care are 'dangerous'

- Doctors are warning patients will routinely wait up to a month to see a GP by this time next year due to increased demand and a shortage of doctors
- Survey asked 714 senior GPs about waiting times and standards of care
- They also said they are so overworked they are missing serious illnesses
- Conservatives and Labour have both promised to give patients increased access to GPs - but neither has set out how extra do

GPs 'too busy to see your child': Parents are swamping A&E because they feel squeezed out by family doctors, warn experts

- Thousands of children taken to A&E because GPs are prioritising adults
- Out-of-hours family doctors' contracts reward care of chronically ill adults
- These changes have 'squeezed out' the care of children, researchers

But don't worry, we're plugging the £30bn gap
with £8bn and 5000 more GPs by 2020…

SELF-MONITORING FOR CONTROL OF BLOOD PRESSURE?

Self Monitoring reduces BP
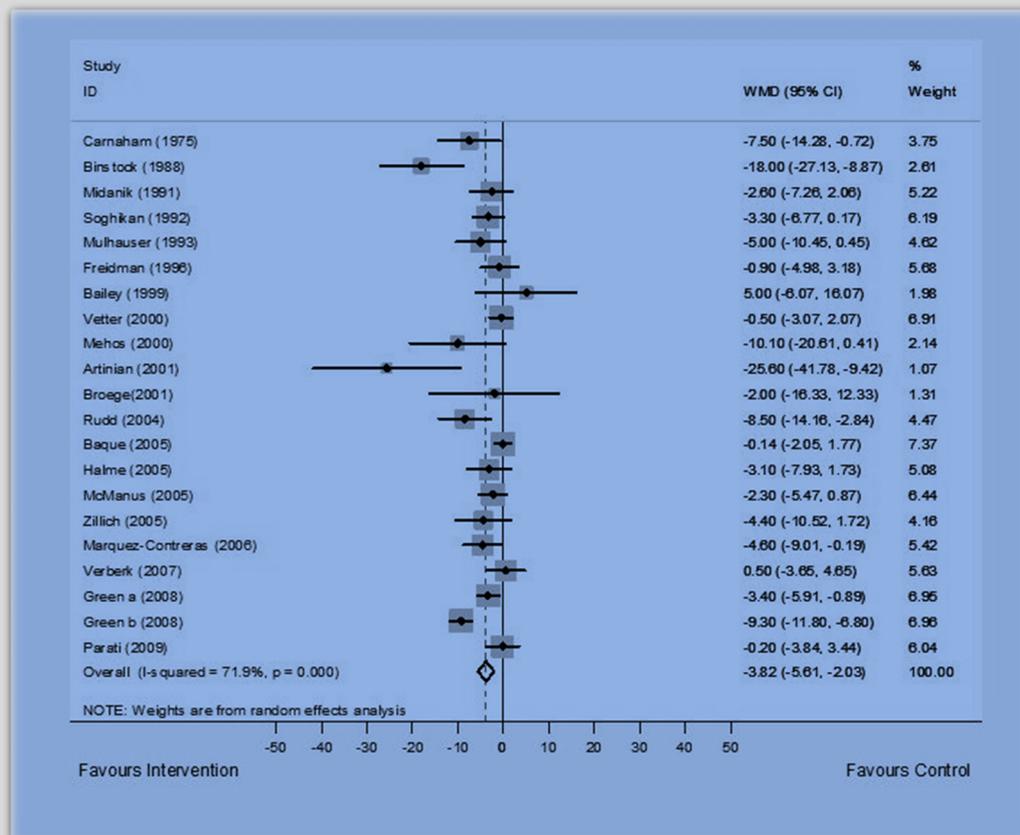
- Small reductions in blood pressure from self-monitoring:

  - SBP by 3.8 mmHg

  - DBP by 1.5 mmHg

Bray et al. *Annals of Medicine* 2010

Effect depends on what else you do…

- Most effect combined with feedback or self-management

Intervention and Study	Total population	Control	Intervention	RR of BP control (95% CI)	% Weight
SM without feedback					
TASMINH1	401	212	189	1.05 (0.66, 1.67)	5.53
Godwin et al.,	458	209	249	1.17 (0.78, 1.77)	5.92
Verberk et al.,	434	208	226	0.75 (0.51, 1.12)	6.04
AUPRES	407	210	197	0.73 (0.47, 1.12)	5.77
TYBC - Con vs. Int 1	234	122	112	1.54 (0.76, 3.12)	4.03
Subtotal	1934	961	973	0.95 (0.74, 1.22)	27.28
(I-squared = 30.9%, p = 0.215)					
SM with feedback via Web/telephone					
TeleBPMet	179	57	122	1.21 (0.56, 2.61)	3.71
Kerry et al.,	334	167	167	0.95 (0.59, 1.52)	5.48
eBP - Con vs. Int 1	493	247	246	1.29 (0.88, 1.89)	6.13
Wakefield - Con vs. Int 1	183	102	81	0.94 (0.49, 1.79)	4.36
Subtotal	1189	573	616	1.12 (0.87, 1.44)	19.67
(I-squared = 0.0%, p = 0.713)					
SM with feedback via Web/telephone & Education					
TASMINH2	480	246	234	1.78 (1.22, 2.58)	6.16
TASMINH-SR	450	230	220	2.71 (1.82, 4.04)	6.00
CAATCH	691	366	325	1.05 (0.77, 1.44)	6.57
HINTS - Con vs. Int 1	264	137	127	1.50 (0.86, 2.62)	4.92
Wakefield - Con vs. Int 2	180	102	78	1.64 (0.84, 3.19)	4.26
Subtotal	2065	1081	984	1.65 (1.15, 2.37)	27.90
(I-squared = 71.5%, p = 0.007)					
SM with regular counselling/telecounselling					
Hyperlink	388	191	197	2.85 (1.77, 4.57)	5.47
TYBC - Con vs. Int 2	238	122	116	1.55 (0.74, 3.26)	3.83
HINTS - Con vs. Int 2	269	137	132	1.78 (1.01, 3.12)	4.89
HINTS - Con vs. Int 3	264	137	127	1.68 (0.94, 2.99)	4.80
eBP - Con vs. Int 2	484	247	237	2.73 (1.87, 3.96)	6.16
Subtotal	1506	697	809	2.33 (1.84, 2.96)	24.94
(I-squared = 0.0%, p = 0.413)					
Heterogeneity between groups: p = 0.000					
Overall	6086	2704	3382	1.37 (1.10, 1.70)	100.00
(I-squared = 69.5%, p = 0.000)					

.5 1.5 2.5 3.5 4.5

Favours control   Favours intervention

NOTE: Weights are from Random-effects; DerSimonian-Laird estimator

Self-monitoring – who's using it?

- Survey of 625 GPs via doctors.net 2011
  - 91% had patients who self monitor
  - 34% had monitor to lend and 20% monitor in waiting room
  - Self-monitoring for diagnosis - 37%
  - Self-monitoring for management - 83%

McManus et al Journal of Human Hypertension 2013

Now widespread use by people with hypertension

- Canada 78% self-monitor (Logan J Hyp 2008)

- Italy   75% self-monitor (Cuspidi Blood Pressure 2005)

- UK   30% self-monitor (Baral, IJHyp 2011)

- UK   40% with hypertension and 21% without
             have self-monitored their own BP

      (McManus West Midlands 2012)

But only about 50% ever tell their GP…

HOW CAN I USE THIS?

SO WHY NOT GIVE PATIENTS (MORE) CONTROL?

Telemonitoring and self-management in the control of hypertension (TASMINH2): a randomised controlled trial

Richard J McManus, Jonathan Mant, Emma P Bray, Roger Holder, Miren I Jones, Sheila Greenfield, Billingsley Kaambwa, Miriam Banting, Stirling Bryan, Paul Little, Bryan Williams, F D Richard Hobbs

McManus et al Lancet 2010

The Trial

- **Eligibility**
  - Age 35-85
  - Treated hypertension (no more than 2 BP meds)
  - Baseline BP >140/90 mmHg
  - Willing to self monitor and self titrate medication

- **Patients individually randomised to self-management vs usual care stratified by practice and minimised on sex, baseline SBP, DM status,**

- **Practice GPs determine management**

Self Monitoring – 1ˢᵗ week of every month
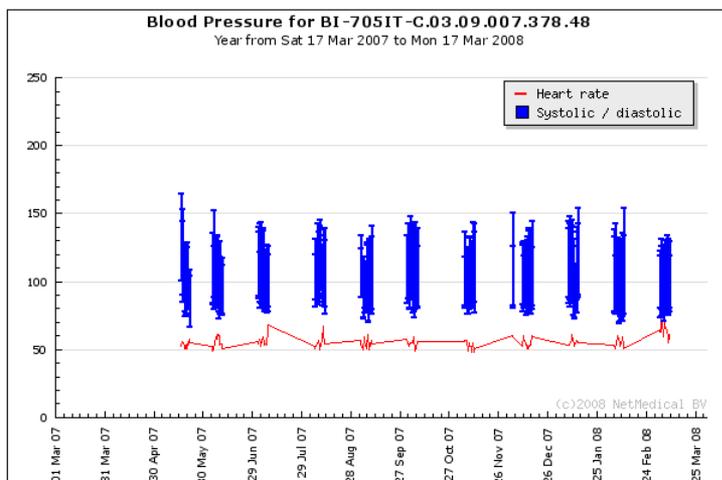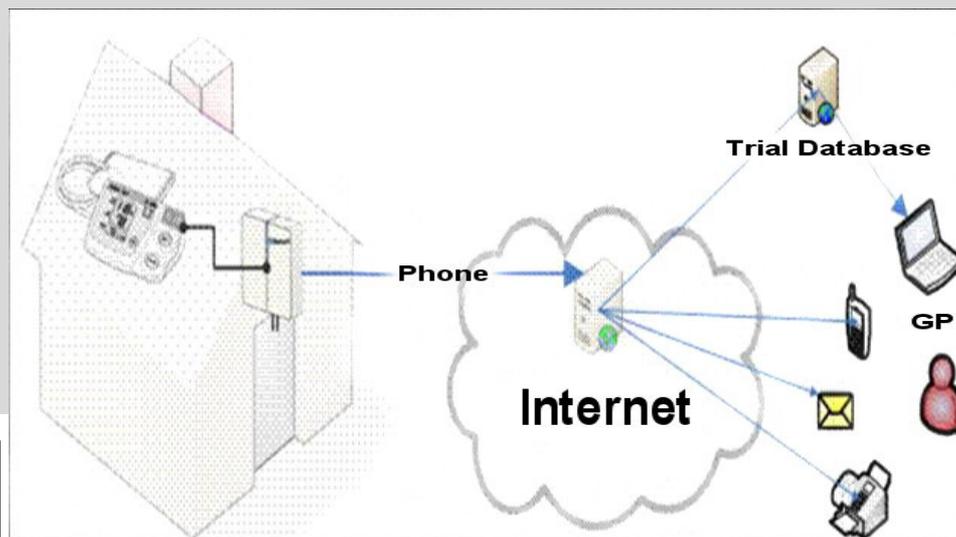
Intervention

- Blood Pressure Targets:
  - NICE (140/90 or 140/80 mmHg)
  - minus 10/5 mmHg
    i.e. 130/85 mmHg or 130/75 mmHg
- Patients agreed titration schedule with their GP after randomisation
- Traffic Light system to adjust medication

Level	Blood Pressure	Action
HIGH	SYS 201 or more OR DIA 101 or more	Your BP is too high. Make an appointment within 24 hours to see your GP or nurse. Record a RED reading
RAISED may need to alter medication	SYS 131-200 OR DIA 86-100	Your BP is raised. Record an AMBER reading If FOUR or more AMBER readings in one week on 2 consecutive months then look at your medication change instructions.
NORMAL	SYS 101-130 AND DIA 85 or less	Your BP is normal. This is fine provided that you have no side effects. Record a GREEN reading
LOW	SYS 100 or less	Your blood pressure is too low Make appointment to see your GP Record a RED reading

Outcomes

- Follow up at 6 & 12 months

- Main outcome Systolic Blood Pressure

- Secondary outcomes: Diastolic BP / costs / anxiety / health behaviours/ patient preferences / systems impact / costs

- Recruitment target 480 patients (240 x 2)

- Sufficient to detect 5mmHg difference between groups

Baseline Results

	Intervention (n=234)	Control (n=246)
Age (years)	66·6 (8·8)	66·2 (8·8)
Men	110 (47%)	115 (47%)
Systolic blood pressure (mm Hg)	152·1 (11·9)	151·8 (11·9)
Diastolic blood pressure (mm Hg)	85·0 (8·5)	84·5 (9·6)
Ethnic origin		
White	223 (95%)	238 (97%)
Black	5 (2%)	2 (1%)
Asian	4 (2%)	6 (2%)
Other	2 (1%)	0
Body-mass index (kg/m²)	29·6 (5·8)	30·0 (5·4)
IMD 2007 score*	16·7 (13·3)	17·3 (14·0)
Current smoker	19 (8%)	14 (6%)
Anxiety score (STAI-6)†	10·1 (3·3)	9·7 (3·1)
Past medical history		
Coronary heart disease	22 (9%)	24 (10%)
Cerebrovascular disease	12 (5%)	9 (4%)
Diabetes	18 (8%)	17 (7%)
Chronic kidney disease	17 (7%)	27 (11%)
Atrial fibrillation	19 (8%)	18 (7%)
Number of antihypertensive drugs	1·50 (0·53)	1·54 (0·51)

Results - primary outcome SBP

	Mean blood pressure (mm Hg)			Effect size (mm Hg)	
	Baseline	6 months	12 months	Baseline to 6 months	Baseline to 12 months
Systolic blood pressure; unadjusted					
Intervention	152·1 (150·6 to 153·6)	139·0 (137·0 to 141·0)	134·9 (132·6 to 137·1)	3·7 (0·6 to 6·8)	5·5 (2·2 to 8·8)
Control	151·8 (150·3 to 153·3)	142·4 (140·2 to 144·6)	140·1 (138·0 to 142·2)	··	··
Systolic blood pressure; adjusted*					
Intervention	151·9 (150·8 to 153·1)	138·8 (136·6 to 141·0)	134·7 (132·3 to 137·0)	3·7 (0·8 to 6·6)	5·4 (2·4 to 8·5)
Control	152·0 (150·9 to 153·2)	142·6 (140·5 to 144·8)	140·3 (138·0 to 142·6)	··	··

TASMINH2

Results - medications

- ❑ 212 (80%) self managed for full 12 months

- ❑ 148 (70%) made at least one
  medication change

- ❑ At 12m intervention group prescribed
  0.46 (0.34, 0.58) additional antiHT (p=0.001)

- ❑ Main changes seen in thiazides and
  calcium channel blockers
  (60% on ACEI/ARB at baseline)

Results – side effects

- Similar side effects in intervention vs control

	Intervention (n=234)	Control (n=246)	p value
Stiff joints	95 (41%)	104 (42%)	0·709
Pain	89 (38%)	84 (34%)	0·375
Fatigue	84 (36%)	78 (32%)	0·332
Swelling of legs	74 (32%)	55 (22%)	0·022
Sleep difficulties	72 (31%)	80 (33%)	0·680
Dry mouth	68 (29%)	59 (24%)	0·208
Feeling flushed	61 (26%)	57 (23%)	0·461
Cough	61 (26%)	60 (24%)	0·672
Breathlessness	53 (23%)	59 (24%)	0·730
Sore eyes	48 (21%)	58 (24%)	0·419

BUT WHAT ABOUT HIGH RISK PATIENTS?

Research

Original Investigation

Effect of Self-monitoring and Medication Self-titration on Systolic Blood Pressure in Hypertensive Patients at High Risk of Cardiovascular Disease
The TASMIN-SR Randomized Clinical Trial

Richard J. McManus, FRCGP; Jonathan Mant, MD; M. Sayeed Haque, PhD; Emma P. Bray, PhD; Stirling Bryan, PhD; Sheila M. Greenfield, PhD; Miren I. Jones, PhD; Sue Jowett, PhD; Paul Little, MD; Cristina Penaloza, MA; Claire Schwartz, PhD; Helen Shackleford, RGN; Claire Shovelton, PhD; Jinu Varghese, RGN; Bryan Williams, MD; F.D. Richard Hobbs, FMedSci

McManus et al JAMA 2014

Primary Outcome - SBP

| | Blood Pressure, mm Hg | | | | | | Difference[b] | |
| | Baseline | | 6 Month | | 12 Month | | 6 Month | 12 Month |
	No. of Patients	Mean (95% CI)[a]	No. of Patients	Mean (95% CI)[a]	No. of Patients	Mean (95% CI)[a]		
Systolic Blood Pressure Complete Case								
Usual care	230	143.6 (141.9-145.4)	225[c]	138.1 (136.0-140.3)	230	137.8 (135.4-140.3)	6.1 (2.9-9.3)	9.2 (5.7-12.7)
Intervention	220	143.1 (141.4-144.9)	215	131.8 (129.6-134.1)	220	128.2 (125.9-130.4)		
Systolic Blood Pressure With Multiple Imputation for Missing Values								
Usual care	276	144.2 (142.3-146.1)	276	138.4 (136.3-140.5)	276	138.2 (136.1-140.2)	5.5 (1.6-9.5)	8.8 (4.9-12.7)
Intervention	276	143.5 (141.6-145.4)	276	132.1 (129.8-134.4)	276	128.6 (126.5-130.7)		

IS IT COST EFFECTIVE?

Self-management cost effective
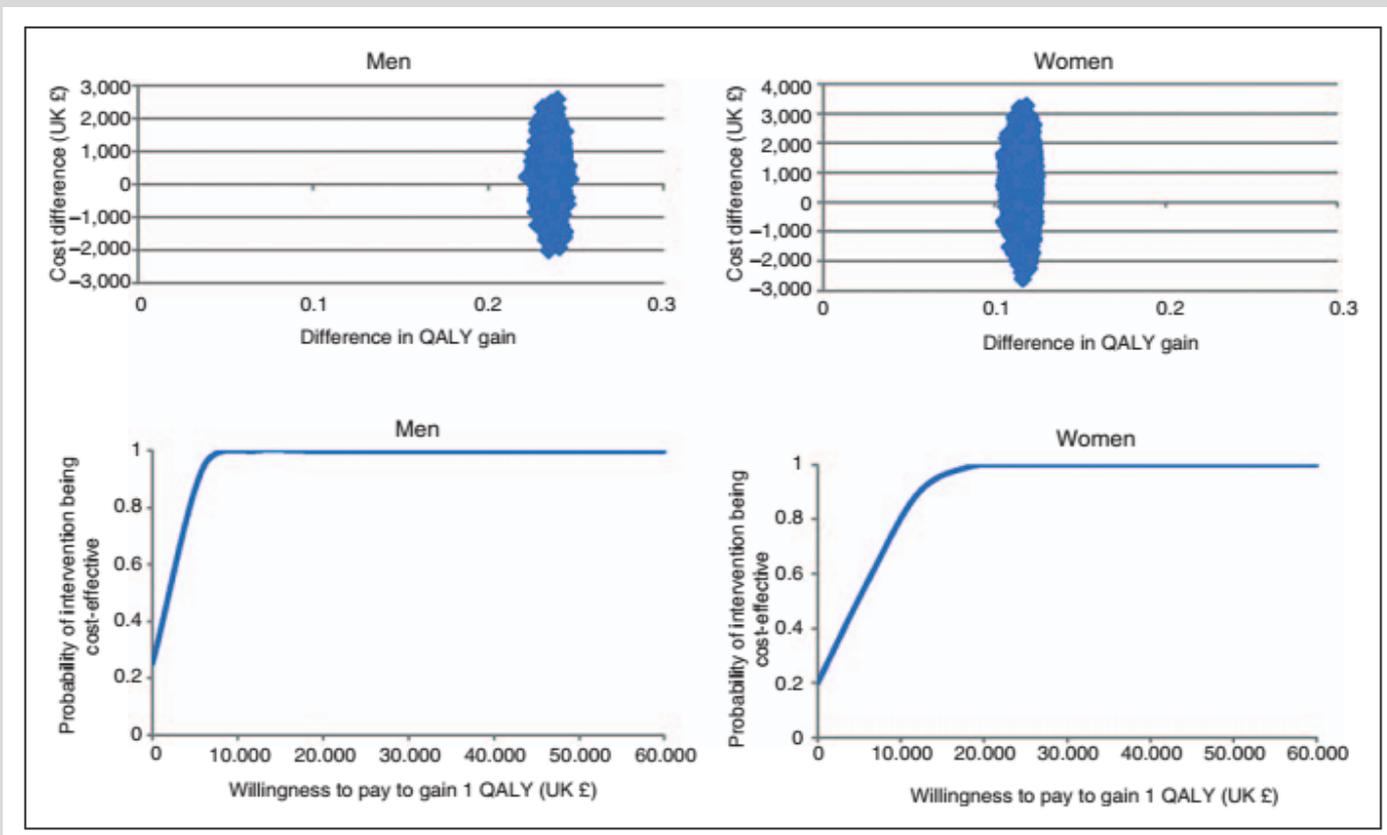
£1624 per QALY for men & £4923 per QALY for women

Kaambwa et al EJPC 2013

Even more so in higher risk patients
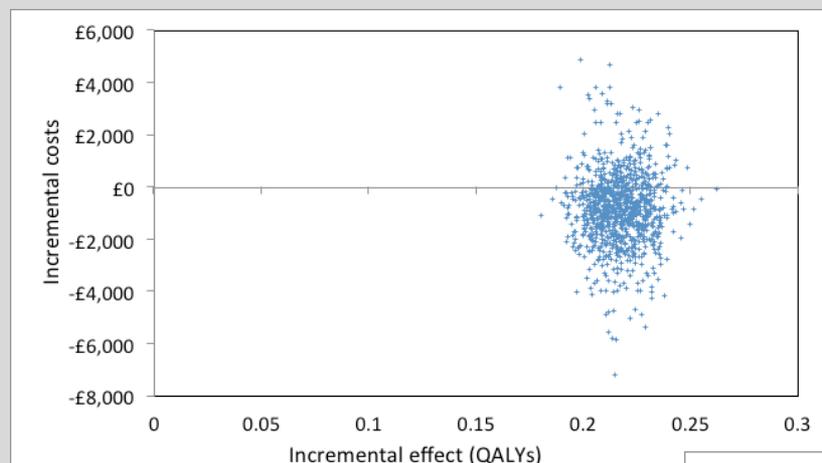
Increased QALYs and
Cost saving

99% probability of being
cost-effective at NICE threshold
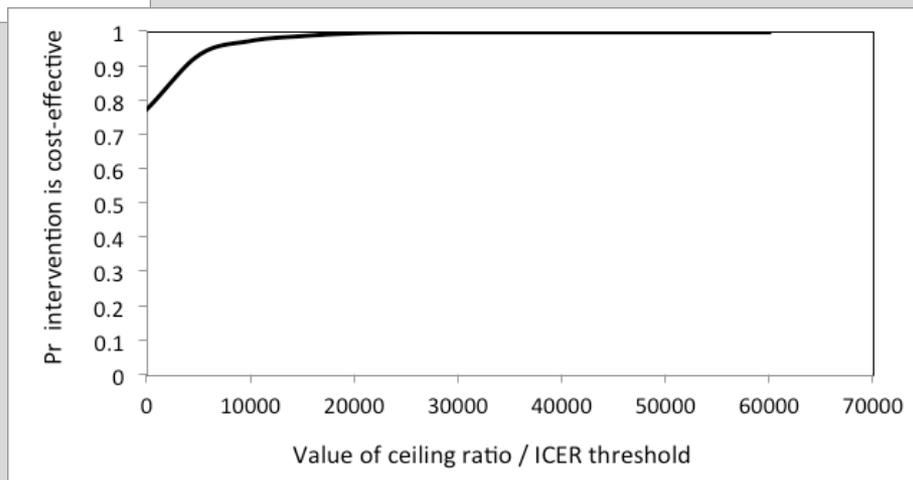
WHAT DO PATIENTS THINK?

Results – Interviews (Monitoring)

- Patients generally positive about self-monitoring

- Surprised at difference between home and surgery readings

- Majority thought that monitoring for 1 week/month was 'about right', but some found it excessive

- Most managed telemonitoring but failure in app 10%
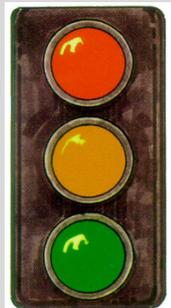
Results – Interviews (Medication)

- Patients did not like having to take medication but accepted they had to

- All said they took their medication regularly

- Patients more comfortable about making a medication change if their BP readings were substantially above target

- Patients reluctant to implement a medication change if only just raised and several chose not to

Card (Practice code: M91017, ID number: 00896):
The Tasmin exercise that I have taken part in I found it first class, it helped me monitor a check on my blood pressure once the twelve months and I shall continue to record my blood pressure on a monthly basis

Please return to the research team using the FREEPOST envelope provided

Card (Practice code: M91017, ID number: 00893):
Dear Tasmin Team
I found the time I spent with the study interesting and informative. It made me realize that I can monitor my own health to a certain extent and intend getting the equipment to carry on doing so. I wish the team all success, and look forward to hearing the end results of the study

Card (Practice code: E82102, ID number: 00344):
Enjoyed taking part in study. Interesting to see what level BP was at. Initially lacked confidence but this grew. Learnt a bit about managing BP

Card (Practice code: Grampton, ID Number: 00913):
I found the project of self monitoring my Blood Pressure measurements very interesting and informative. In respect of my own situation whenever I had my Blood Pressure checked prior to this project I was always being told that my readings were too high (in the 140 range and even 150/90). Nothing was done about this problem other than advice to control my weight and exercise.

Participating in this project with the facility of medication changes, I had three changes, has reduced my Blood Pressure from 140/84 at the start of the project to 129/75 today. As a result of the information gained from this project I am going to continue monitoring my own Blood Pressure.

The frustrating aspect of this project was the need to complete the diary, giving the same answers to the same questions month after month.

Meetings with researchers I always found to be pleasant, friendly, helpful and unpressurised. There was always time to read and answer question sheets and raise any concerns that I wanted to discuss.

Card (Practice code: E82102, ID Number: 670):
→ ABC Would Have Been Better If I Could Have Completed Diary On Line So You Can Prompt Me To Complete Chase For Return. Have To Complete Almost Nothing By Hand These Days

Card (Practice code: M91017, ID number: 00770):
If I had a copy of the diary and questionnaire with me now I could give detailed examples of sections I found difficult to complete. I did find quite a number of questions ambiguous especially on the questionnaire completed at interview — to the extent that I wonder how it will be possible to draw valid conclusions from the responses. Perhaps it's just that I have an over argumentative nature.

Please return to the research team using the FREEPOST envelope provided

OVER

I do wish you every success with your work especially since I have a feeling that over medication does occur — maybe I should stop reading in the 'Telegraph'.

Card (Practice code: M89601, ID number: 01241):
(1) Diary a bit repetitive but the end result got the message over to what you are eating.
(2) Found out my BP needed reducing and this is now in check with medication adjustments. Thankyou for your time & effort.

Card (Practice code: F81004, ID Number: 338):
TASMIN TRIAL.
I HOPE MY CONTRIBUTION HAS BEEN USEFUL TO THE TRIAL. FOR ME IT WAS QUITE ENLIGHTING, AND HAS GIVEN ME A MUCH BETTER UNDERSTANDING ABOUT 'BLOOD PRESSURE' AND 'TREATMENT & CONTROL' THE CO-OPERATION, FROM GP'S AND ALL TRIAL MEMBERS HAS BEEN 'HIGH QUALITY'. IT HAS BEEN A REWARDING EXPERIENCE FOR ME.

Please return to the research team using the FREEPOST envelope provided

I WOULD CERTAINLY GIVE SYMPATHETIC CONSIDERATION, TO ANY FUTURE PARTICIPATION, TO SIGNING UP AGAIN.

What patients thought (intervention)

Empowerment

- *I have felt much better during my participation and have been able to lead a much higher quality of life (01175)*

- *It made me feel in control in managing my blood pressure (199)*

Understanding

- *...it made me go into it more, looked it up on the computer and made me aware of how important the blood pressure is. (01606)*

- *..it has highlighted examples of what I think affects my blood (01554)*

TASMIN-SR

What patients thought (intervention)

Trial triggered BP reduction

- *..whenever I had my blood pressure checked prior to this project I was always being told that my readings were too high (in the 140 range and even 150/90). Nothing was done about this problem other than advice to control my weight and exercise. Participating in this project with the facility of medication changes, I had three changes, has reduced my blood pressure from 140/84 at the start of the project to 129/75 today… (00912)*

Motivation to rethink aspects of lifestyle

- *Taking part in the TASMINH trial has caused me to re-evaluate my lifestyle. I feel that I am very active for my age-only my back problem stops me from doing more. Whilst my diet is not bad, I feel there is room for improvement and will try to eat more fruit, veg and fish (00040)*

HOW CAN I USE THIS?

How can I use self-management?

- Usual self-monitoring issues as previously

- Set a target – usually 135/85mmHg – and tell the patient

- Make a plan for them to follow "a recipe"
  - Up to three steps
  - Write it down ? Add to repeat list "medication change 1,2…"
  - Organise blood tests if needed

- Ask patient to adjust medication vs BP (colour chart?)

- Can titrate vs side effects to (impotence)

WHAT NEXT?

Multiple clinic readings

- Multiple clinic readings predict which patients are likely to have a significant white coat or masked *effect* on home monitored BP[8]

A) White coat effect group — n = 92
B) Normal group — n = 95
C) Masked effect group — n = 33
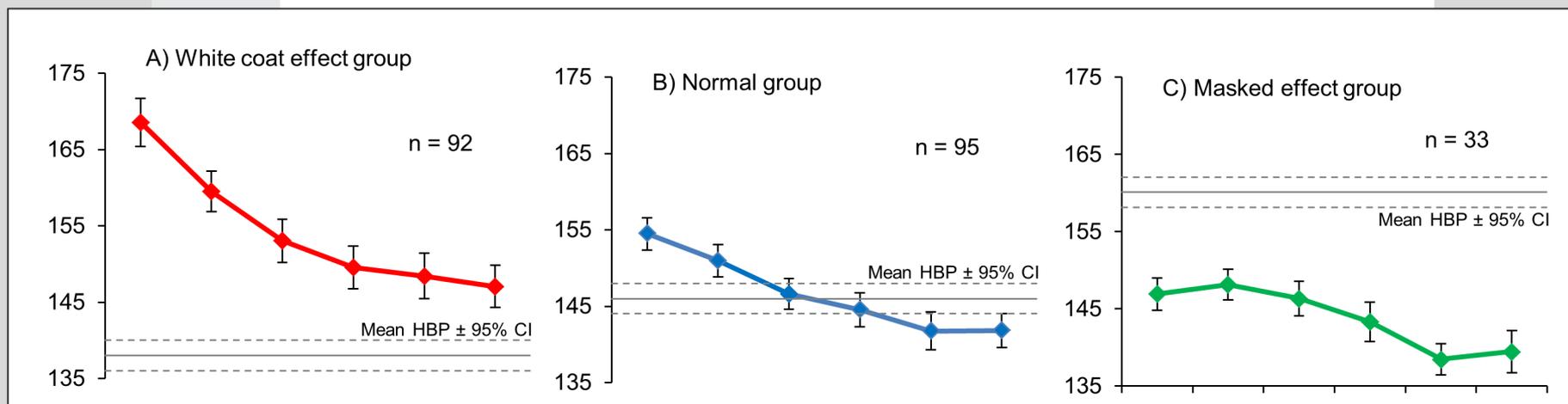
Objectives: Identification of people with lower (white-coat effect) or higher (masked effect) blood pressure at home compared to the clinic usually requires ambulatory or home monitoring. This study assessed whether changes in SBP with repeated measurement at a single clinic predict subsequent differences between clinic and home

INTRODUCTION

Hypertension is an important risk factor for cardio-vascular disease [1], which is the major cause of morbidity and mortality worldwide [2]. In those with established hypertension, effective management depends on accurate measurement of blood pressure in

[8]Sheppard JP, et al. *Journal of Hypertension* 2014; 20 Aug

The future – no cuffs?

Bottom line

- Self-titration & telemonitoring results in significantly lower blood pressure than usual care which is sustained after 12 months

- Increased medication likely to be main mechanism

- Cost effective under UK criteria

- Effective in hypertension and higher risk

- Impact of telemonitoring largely as safety net

- Patients are willing to be more involved in decisions on medication

Final Plug!

- TASMINH4 study currently recruiting

- Usual care vs self-monitoring vs telemonitoring

- We need 150 + practices nationally so all welcome

- See me or tasminh4@phc.ox.ac.uk

Acknowledgements

Prof Jonathan Mant
Dr Emma Bray
Dr Miren Jones
Dr Claire Schwartz
Dr James Sheppard
Dr Kath Tucker
Dr Claire O'Brien
Amanda Davies
Miriam Banting
Helen Shackleford
Jinu Varghese
Dr Sayeed Haque
Roger Holder
Dr Sue Jowett
Cristina Penaloza
Dr Billy Kaambwa
Prof Sheila Greenfield
Prof Paul Little
Prof Stirling Bryan
Prof Bryan Williams
Prof Richard Hobbs

Acknowledgements

Background

Hypertensive disorders during pregnancy are a leading cause of direct maternal deaths in the UK

Regular self-monitoring of blood pressure could improve detection of gestational hypertension

Why is early detection important?

(Currently no cure for Pre-eclampsia)

- Anti-hypertensive medication
- Problems can escalate rapidly
- Detect difficulties with the baby
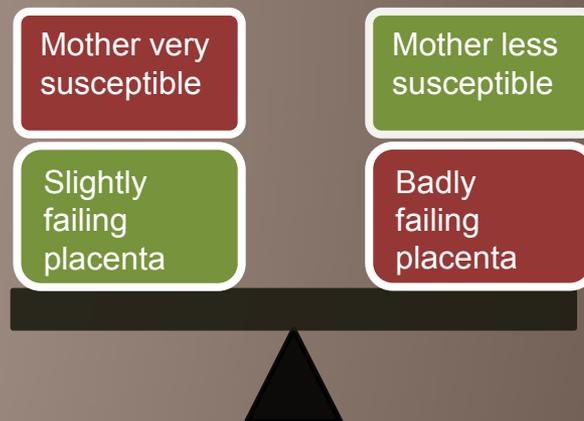
Considerations

- Thresholds for home readings

- Differences through the trimesters

- Feasibility (variability, monitors)

- Protocols (how often /when)

Systematic review

Aim

Find all available literature comparing Home and Clinic readings to assess the current evidence regarding thresholds

## **The Systematic review**

1512 journal articles identified

19 papers appeared to have carried out both home and clinic monitoring

8 studies included or provided data on home and clinic readings

# Table of included studies

Author, Year, Country	Population	Number	Gestation
IPD			
Brown (2006) Australia	Suspected hypertension	66	Average of 23 weeks
Chandiramani (2006) UK	Suspected hypertension	100	unknown
Lo (2002) New Zealand	1) Healthy pregnancy at booking 2) women with pre-eclampsia	101 +45	Throughout pregnancy >38 weeks
Rey (2007) Canada	1) Hypertensive 2) normotensive high risk of pre-eclampsia	100 +20	Throughout pregnancy <20 to >36 weeks
Rey (2009) Canada	1) Chronic hypertension 2) Pre-eclampsia 3) Isolated Office Hypertension (White coat)	111 41 7	Third trimester (28-38 weeks gestation)
Summary Data only			
Ishikuro (2013) Japan	Healthy singleton pregnancy with no history of hypertension	575	20 weeks till 4 weeks postpartum
Mooney (1991) UK	Any Pregnancy	35	30 weeks
Homuth (1993) Germany	Gestational hypertension	26	unknown

# Average Home and Clinic readings are similar through pregnancy
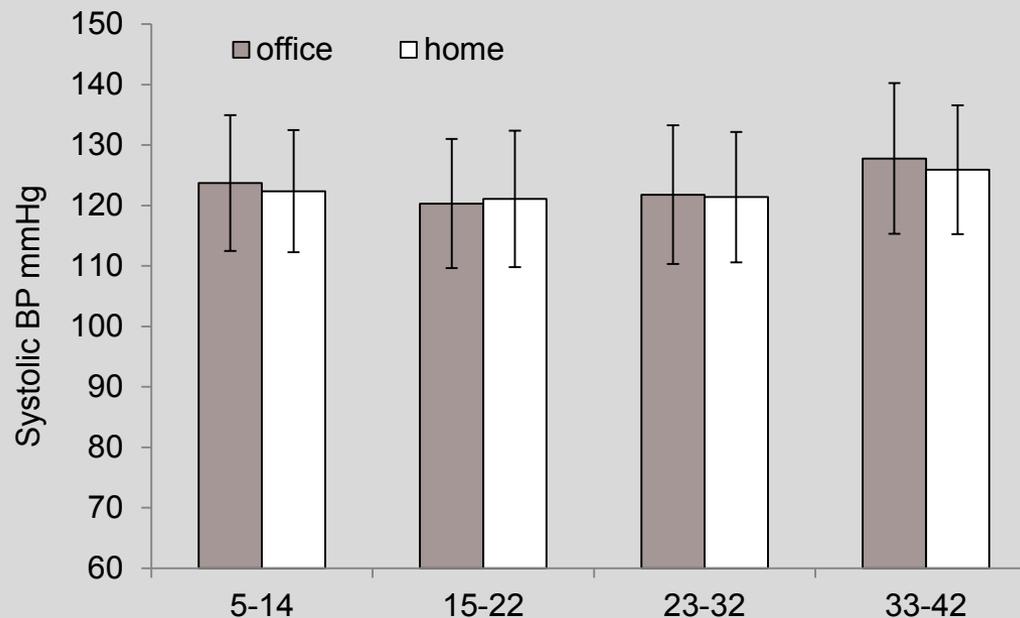
# Clinic vs Home Systolic BP through pregnancy
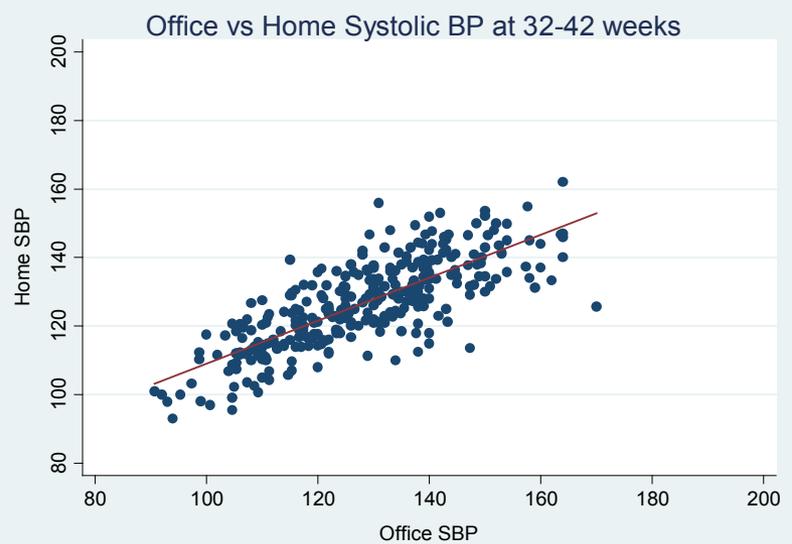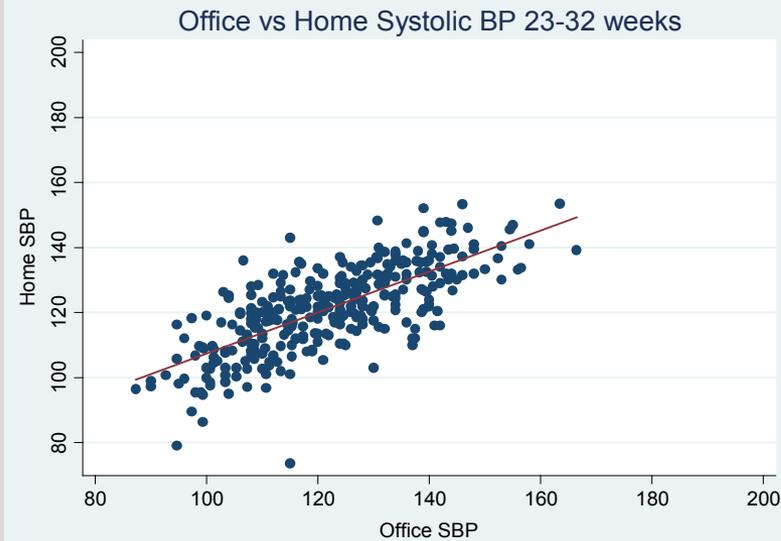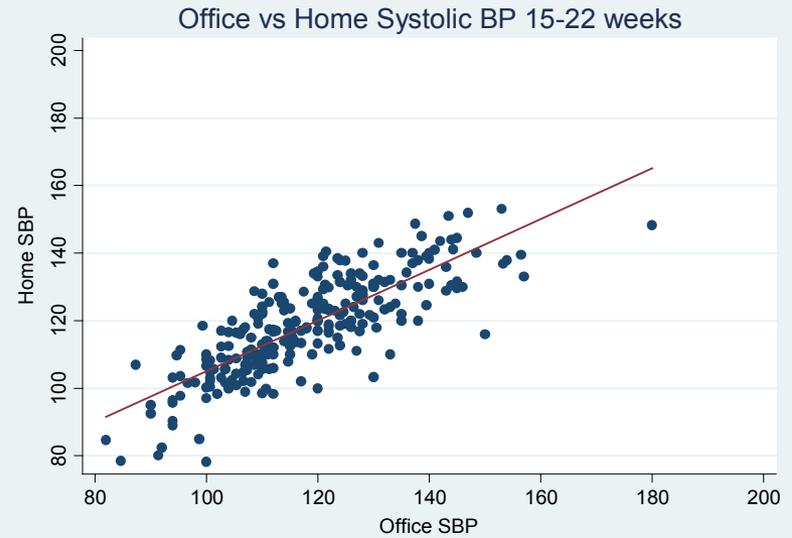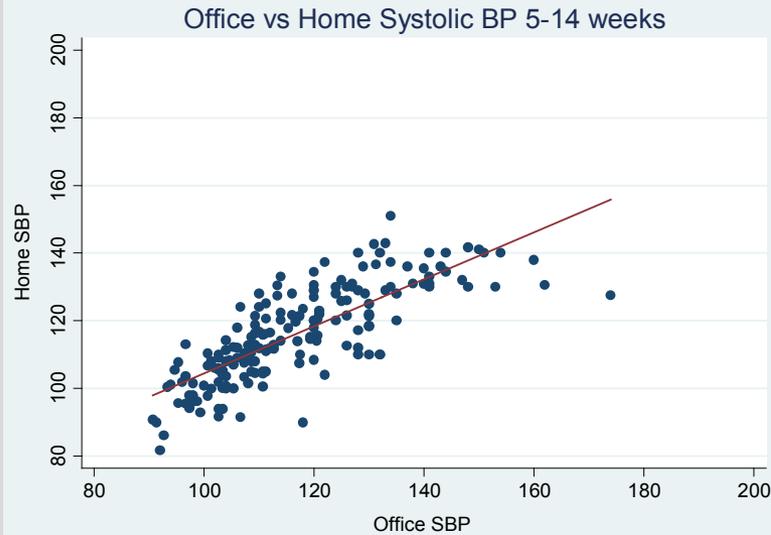
Difference in home and clinic SBP through pregnancy

**A** — Mean Difference in Clinic-Home Systolic BP 5-14 Weeks Gestation

Study	WMD (95% CI)	% Weight
IPD data		
Lo 2002	1.38 (-1.09, 3.84)	33.18
Rey 2007 & 2009	-1.28 (-6.80, 4.24)	23.15
Brown 2004	2.15 (-4.57, 8.88)	19.58
Chandiramani 2006	-7.65 (-12.88, -2.42)	24.08
Subtotal (I-squared=70.0%, p=0.019)	-1.26 (-5.58, 3.06)	100.00
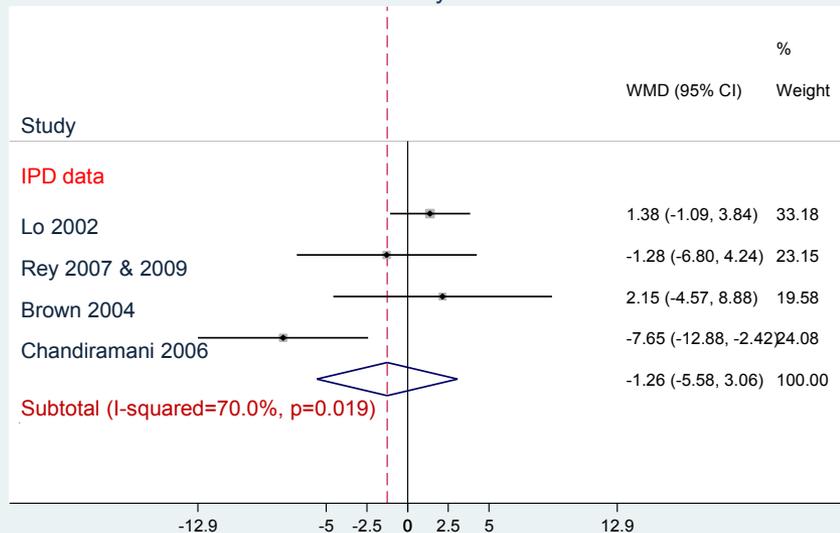
B — Mean Difference in Clinic-Home Systolic BP 15-22 Weeks Gestation

Study	WMD (95% CI)	% Weight
IPD data		
Lo 2002	3.02 (0.14, 5.90)	33.85
Rey 2007 & 2009	-2.26 (-6.11, 1.59)	25.71
Brown 2004	2.70 (-2.71, 8.11)	16.82
Chandiramani 2006	-0.36 (-4.51, 3.80)	23.62
Subtotal (I-squared=44.8%, p=0.143)	0.81 (-1.84, 3.46)	100.00
Summary Data		
Ishikuro NT	-4.00 (-5.11, -2.89)	94.05
Ishikuro HT	-5.00 (-9.42, -0.58)	5.95
Subtotal (I-squared=0.0%, p=0.667)	-4.06 (-5.14, -2.98)	100.00
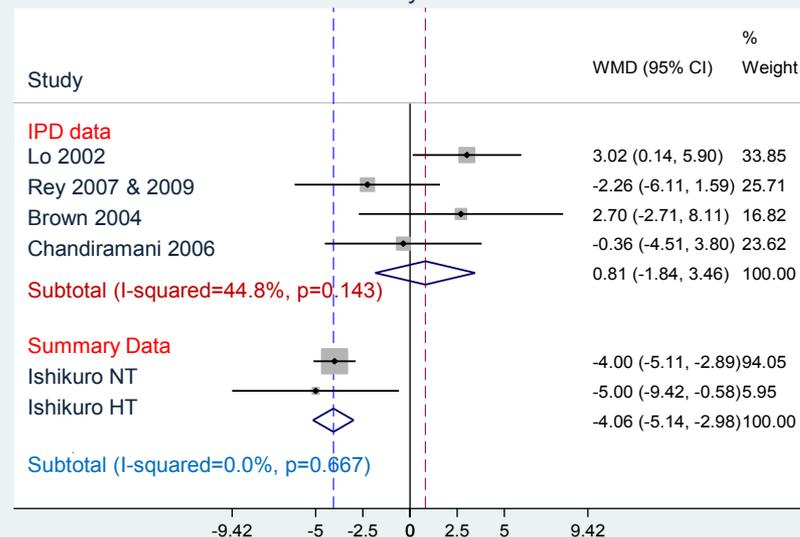
C — Mean Difference in Clinic-Home BP at 23-32 Weeks Gestation

Study	WMD (95% CI)	% Weight
IPD data		
Lo 2002	2.35 (-0.56, 5.26)	29.43
Rey 2007 & 2009	-0.85 (-3.79, 2.09)	29.28
Brown 2004	1.48 (-3.59, 6.55)	18.46
Chandiramani 2006	-4.54 (-8.65, -0.43)	22.83
Subtotal (I-squared=%, p=0.)	-0.32 (-3.24, 2.60)	100.00
Summary Data		
Mooney 1991	-2.90 (-8.72, 2.92)	100.00
Subtotal (I-squared=?%, p=0.?)	-2.90 (-8.72, 2.92)	100.00
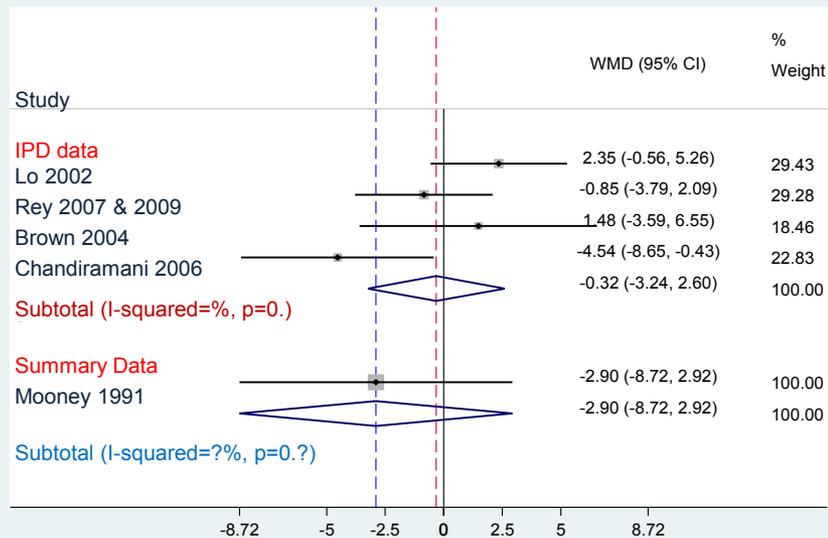
D — Mean Difference in Clinic-Home Systolic BP 33-42 Weeks Gestation

Study	WMD (95% CI)	% Weight
IPD data		
Lo 2002	3.09 (-0.06, 6.24)	29.40
Rey 2007 & 2009	-1.58 (-4.46, 1.31)	30.20
Brown 2004	-3.00 (-12.49, 6.49)	12.72
Chandiramani 2006	-5.92 (-9.62, -2.21)	27.68
Subtotal (I-squared=77.8%, p=0.004)	-1.59 (-5.82, 2.65)	100.00
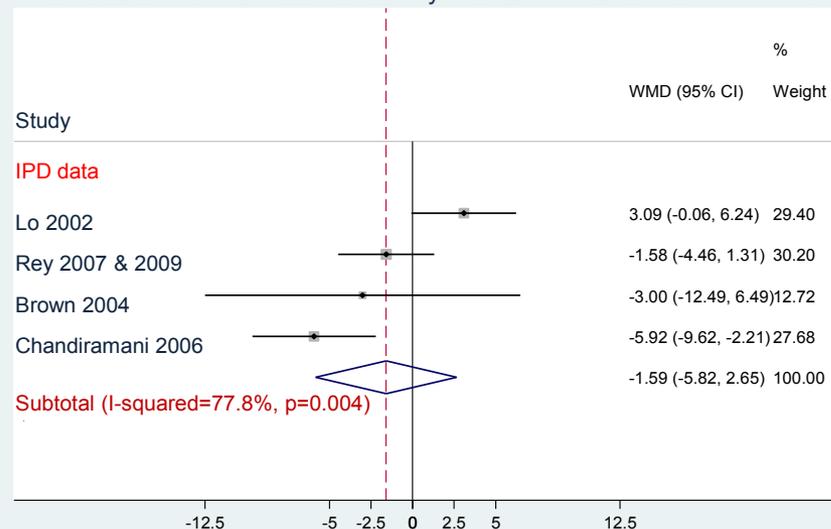
Note: Weights are from random effect analysis

White coat and Masked Hypertension
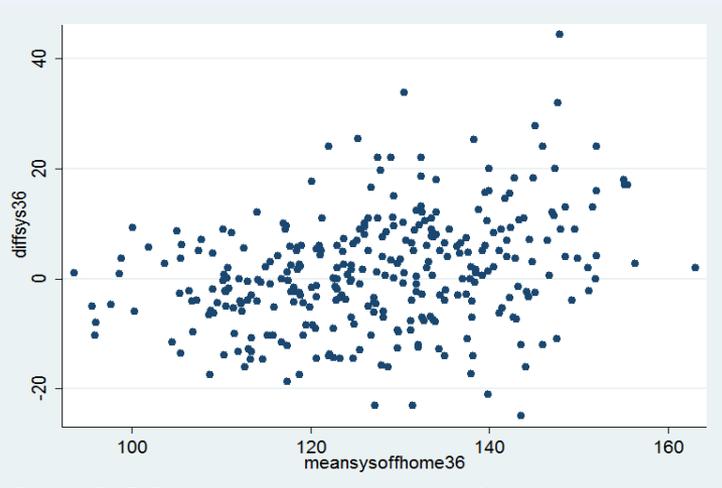
Bland Altman plot 33-42 weeks

There is more white coat hypertension than masked hypertension

There is as much WCH as true hypertension!

| Gestation (weeks)	5-14	15-22	23-32	33-42
True Normotensive	81.97	85.33	78.50	61.92
Masked Hypertension	3.83	2.32	2.18	5.57
White Coat Hypertension	8.74	6.95	11.53	16.10
True Hypertension	5.46	5.41	7.79	16.41

Conclusions

- SM has potential to be useful in early detection of GH and rule out WCH

- Based on current evidence a threshold of 140/90 would seem appropriate

- We need a large scale study to compare home and clinic readings using a validated monitor.

Self-monitoring of blood pressure in pregnancy: The BuMP study

Aim: Establish a suitable monitoring protocol and clear diagnostic thresholds for home BP monitoring in pregnancy

Design: Prospective observational feasibility study of self-monitoring BP in pregnancy.

BuMP
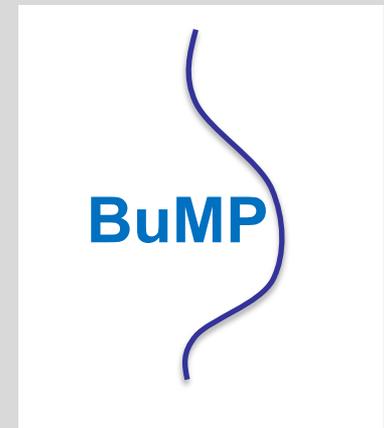
Population:

higher risk women

- previous incident of pre-eclampsia
- First pregnancy
- age 40 years or older
- pregnancy interval of more than 10 years
- body mass index (BMI) of 30 kg/m² or more at first visit
- family history of pre-eclampsia
- multiple pregnancy

Intervention:

3 days a week (morning and evening)

Study Flow Chart

Baseline
(12 or 16 weeks)

↓

28 weeks

↓

36 weeks

↓

6 weeks Postpartum
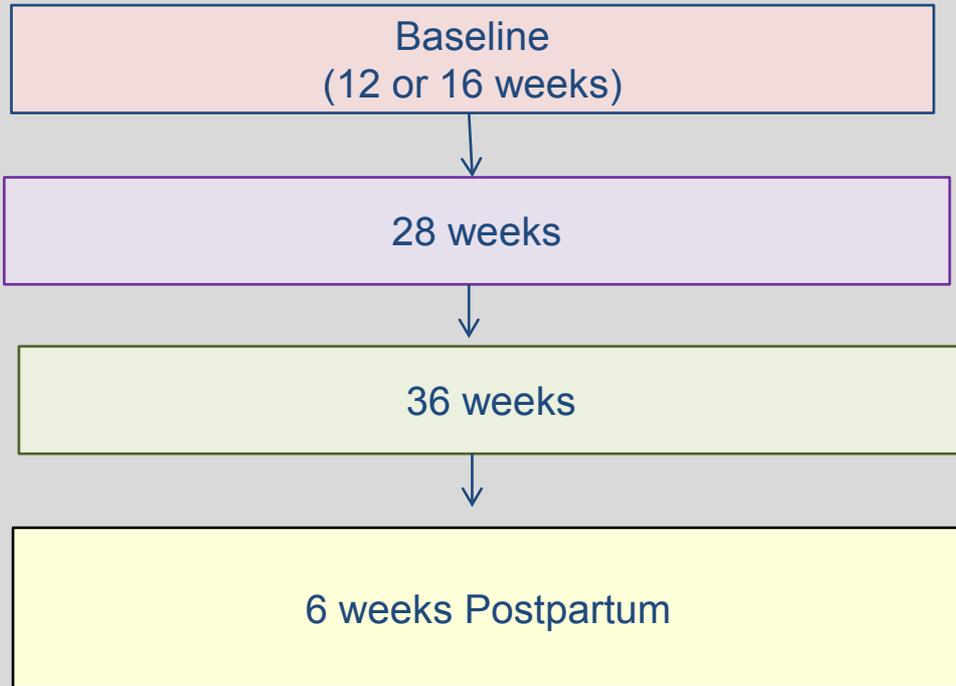
Patients' chart for interpreting blood pressure reading

| Level	Blood Pressure	Action
HIGH	SYS 150 or over OR DIA 100 or over	Your blood pressure is high, repeat once more in 5 minutes. If your blood pressure reading is still high you should contact the community midwife, GP surgery or out of hours service as soon as possible (within 4 hours).
RAISED	140-149 OR 90-99	Repeat the BP measurement after 4 hours. If it remains raised or you have any symptoms associated with pre-eclampsia (see below) contact a midwife or GP within 12 hours
NORMAL	SYS 85-139 OR DIA 90 or less	Your BP is normal. This is fine provided that you have no other symptoms Routine ANC (standard visits)
LOW	SYS 85 or less	Your blood pressure is low. Contact midwife within 24 hours or within 4 hours if symptomatic

Patient text message system 'Florence'

http://www.getflorence.co.uk/

Recruitment

Baseline
(12 or 16 weeks)

28 weeks

36 weeks

10.5% drop out
(n=21)
3% miscarriage
(n=6)

4.5% drop out
(n=9)
1% still birth
(n=2)
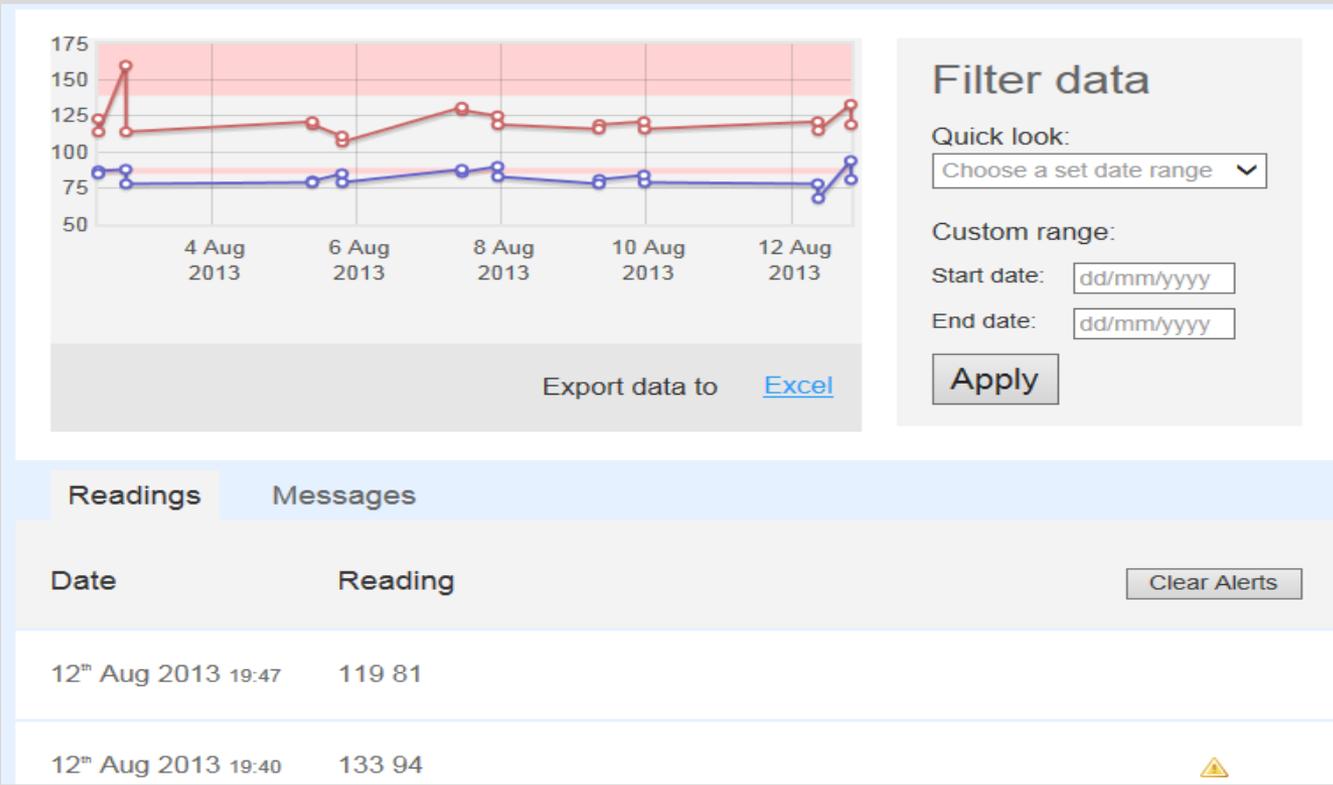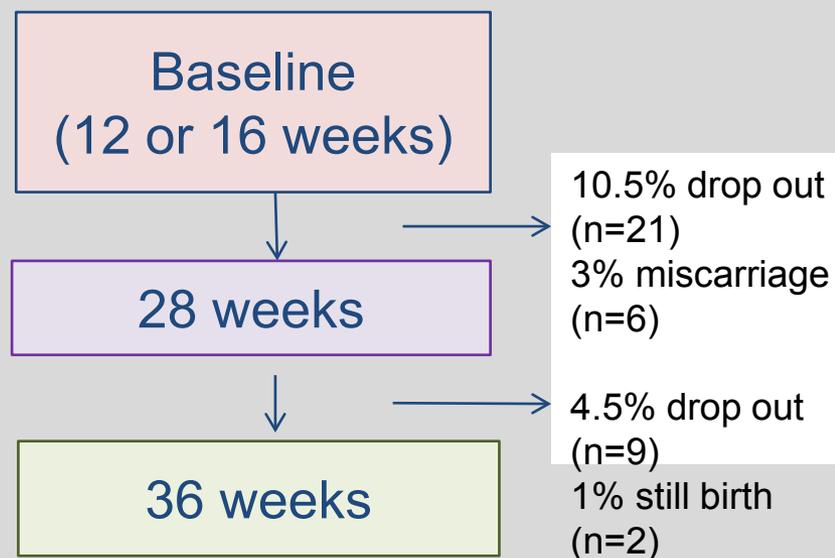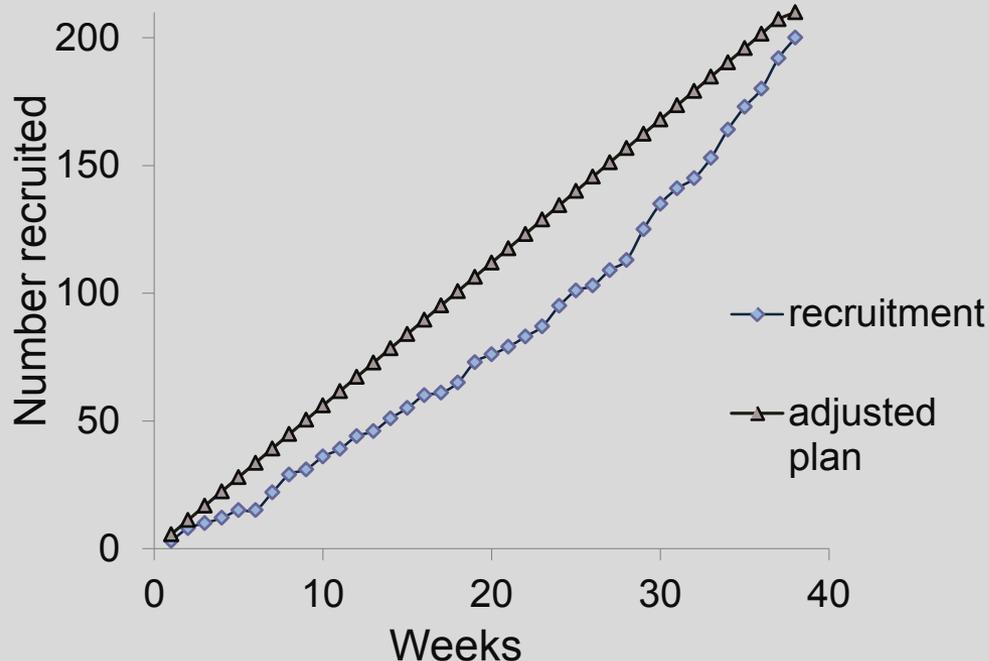
201 women were recruited over 9 months.

80% were recruited at secondary care sites.

BuMP

Results

BuMP
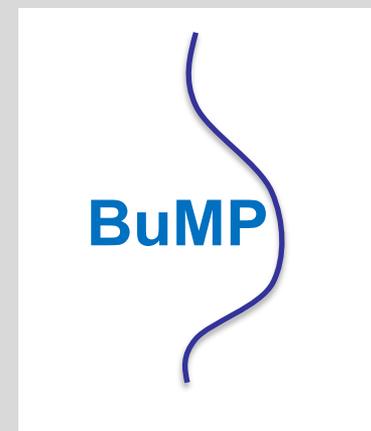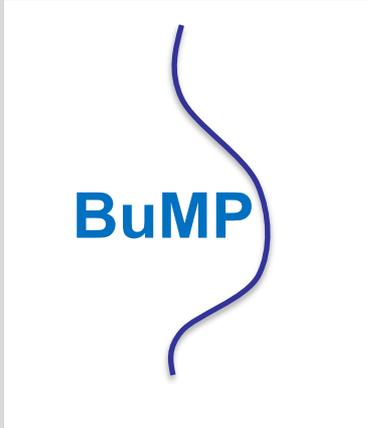
Baseline Characteristics	
Age	31.4 (5.5)
BMI	28.2 (6.8)
BP	116/70mmHg

22% raised BP
15% Gestational hypertension
7% Pre-eclampsia

Home vs clinic BP
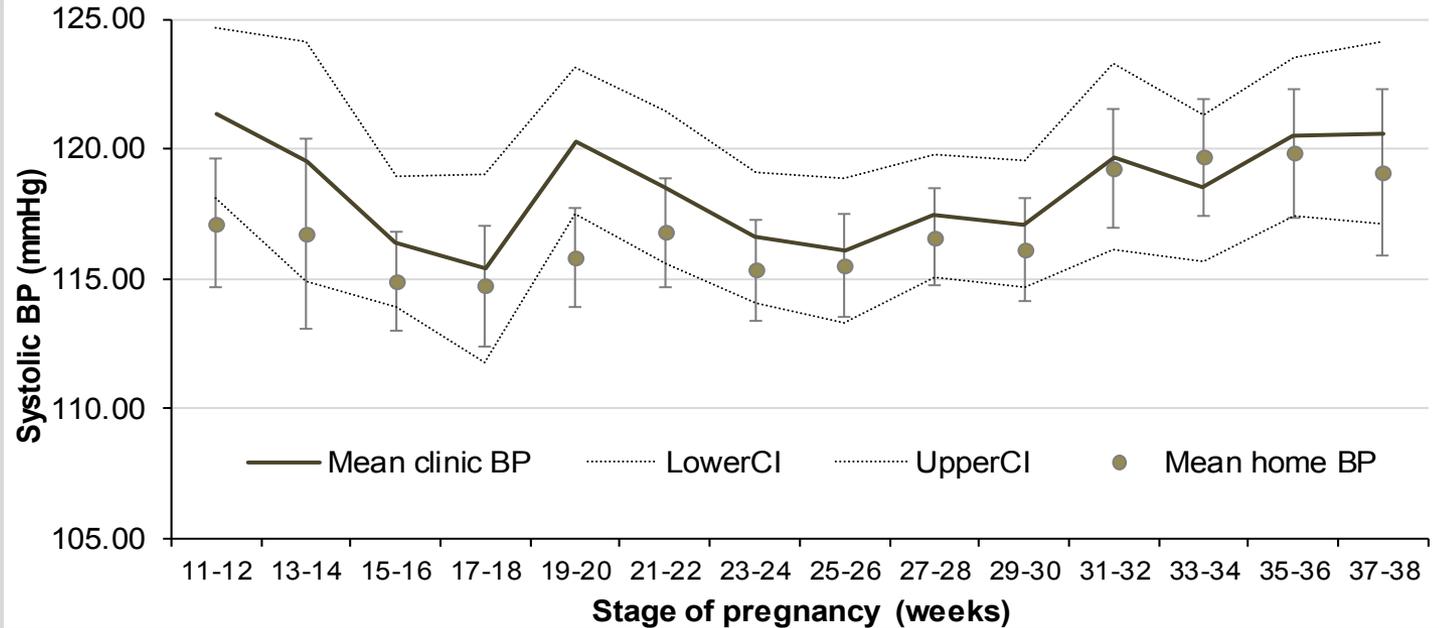
Conclusions

- Self-monitoring of BP in pregnancy is feasible and could:
  - improve the detection of GH
  - rule out WCH
  - allow re-organisation of care.

- home and clinic blood pressure was similar

- Large RCT needed!

Take home messages

• There may be high levels of white coat hypertension in pregnancy.

• Self-monitoring of BP may improve the detection of gestational hypertension and white coat hypertension.

• Few automated BP monitors have been validated for use in pregnancy.

Thank you for listening!

Thank you to the research team:

Carole Crawford, James Hodgkinson, Clare Bankhead, Richard Stevens, Kathryn Taylor, Nia Roberts…. and all of the BuMP study team lead by Richard McManus.

Thank you to:

Midwives, GP's and the research network and the Women who took part!