Home BP monitoring and the Scale-up BP study

Brian McKinstry
Vicky Hammersley, Richard Parker, Andrew Stoddart, Mary Paterson, Hilary Pinnock, Janet Hanley, Paul Padfield
Scale of the problem

• Measuring BP is the second commonest reason for attending Primary Care

• **1.2 million appointments** in Scotland just for measuring BP
  (Many millions more as part of routine care)

• Likely to double in the next 10-15 years

ISD Top 10 conditions seen in General Practice. [https://isdscotland.scot.nhs.uk/Health-Topics/General-Practice/Publications/2013-10-29/PTI_Oct13_Fig8_top10Conditions.xls](https://isdscotland.scot.nhs.uk/Health-Topics/General-Practice/Publications/2013-10-29/PTI_Oct13_Fig8_top10Conditions.xls)
Problems with measurement and management

• Measurements taken in surgeries are
  • Inaccurate compared with ABPM and home monitoring
  • Poor predictor of future pathology
• Around 15-20% white coat phenomenon
• Around 5% concealed hypertension
• And 30% are not controlled
So how do we cope?

• Self monitoring

However

• Although as effective as routine care, patients feel insecure left purely to self-manage and tend to consult anyway

• Drive towards telemetrically supported supervised self-monitoring
The Intervention

Reminders to self monitor and
Automated feedback by text

Home
Patient takes readings
links by bluetooth to mobile phone

Remote server
Record of readings and symptom scores

Nurse checks website every 1-2 weeks

GP practice

Telemetric supported self monitoring
Does it work?

Telescot HITS study
- RCT carried out in Lothian 401 people with uncontrolled BP
- Demonstrated a 4mm drop in BP compared with control. Measured accurately by ABPM
- Telescot diabetes and stroke RCTs supported these findings
- Subsequently supported by SR of 14 international trials
- Modelling of impact on cardiovascular disease suggests cost-effectiveness

Patients found it helpful

Well I tried everything. I had it on the table, I had my arm on a pillow and I was trying to relax as much as I could, but there's no way you're going to cheat the machine so it's... it is a good thing like. You cannot kid yourself on with it.

Why go down to the surgery when I can do it sitting at the kitchen table?

When I was taking the blood pressure I couldn't bear looking at 140, 150 over 110... So... starting to get more walking exercise.... I didn't want beta blockers because they had various side effects... so it did spur me on to look for an alternative...
Qualitative study with clinicians

• Clinicians, liked it but, had to log on to a separate website to see results
• Many GPs in the practice didn’t do this, potentially reducing the effect
• They suggested changes which integrated the care with their own working practices which would make it more efficient
Scale-up BP

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Implementation at scale

• Clinicians are busy

• Introduction of technology
  • Must fit with current work patterns
  • Must be seen to benefit patients and clinicians
  • Intuitive
  • Time and support for the introduction
  • Time to bed in when evaluating
Scale-up BP

• This involves a simple system based on text reminders
• Any mobile phone can be used
• Uploads to a website
What’s new? Scale-up BP

- NHS Lothian can extract data from website every 1, 3 or 6 months
- This is converted to a PDF report and sent via docman to routine practice results data-feed. **No need to log on.**
- Practice nurse views and notes any problems
- Patient is phoned to check compliance and if necessary change medication
- Website is available at any time for more frequent checks.
Telemetric supported self monitoring
Reports sent to GP practices

- Docman reports of the readings are created
- Chosen reporting interval set for each individual patient
- All BP readings and average displayed
- An alert is shown when the target is not met, with advice to consider intervention

'I think there is a clear vision of not having patients coming in for routine hypertension, and that must be the way forward.' (GP)
Will it work at scale?

• Will doctors and nurse in the NHS adopt the technology?
• Will it disadvantage some groups in society?
• Will clinicians take account of readings and respond appropriately?
• What impact does it have on
  • intermediate outcomes (BP)?
  • process outcomes (health service use)?
Data sources for feasibility study

• Eight practices (4 early adopters)
• Patients taking up Scale-Up gave permission for their records to be checked
• All patients with HBP in these practices had their GP records transferred to the Safe Haven by Albasoft and de-identified
• SMR01 data on these patients was transferred to Safe Haven
• Interviews with patients and clinicians
• Case-note review of people in the Scale-Up group
Results

- Uptake by Practices
- Uptake by patients
Cumulative % of GP practices in NHS Lothian participating in Scale Up BP early years

30-40% ‘take off’ point for widespread adoption
Present figure 60%

‘I mean, this is quietly saving a whole lot of time and work for the practice’ (GP)
Patient Uptake

And patients like it, that’s all I hear (GP)
Number of Scale-Up readings in one year
Change in systolic blood pressure over time
Difference between the first reading and the last reading (First – Last) Sets of readings more than 6 months for control.
And between second telemonitored reading and last in telemonitored group

<table>
<thead>
<tr>
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<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
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<tr>
<td>Control SBP difference</td>
<td>3484</td>
<td>3.50</td>
<td>19.47</td>
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<tr>
<td>Control DBP difference</td>
<td>3484</td>
<td>1.88</td>
<td>11.61</td>
</tr>
<tr>
<td>Telemonitored SBP difference</td>
<td>399</td>
<td>6.55</td>
<td>15.17</td>
</tr>
<tr>
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Poorly controlled patients in Scale-Up

• Patients whose initial home Systolic BP was >135, the mean change in BP was -15.06 mmHg

• Patients whose initial home BP <135 it was +1.18mmg.
Percentage with raised SBP and DBP: second reading compared to 6-12 months later [for subgroup]

<table>
<thead>
<tr>
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<th>Second reading</th>
<th>6 - 12 months later</th>
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<tr>
<td>Tele SBP 135+</td>
<td>190/399 (48%)</td>
<td>94/399 (24%)</td>
</tr>
<tr>
<td>Tele SBP 140+</td>
<td>138/399 (35%)</td>
<td>51/399 (13%)</td>
</tr>
<tr>
<td>Tele SBP 150+</td>
<td>62/399 (16%)</td>
<td>20/399 (5%)</td>
</tr>
<tr>
<td>Tele DBP 85+</td>
<td>138/399 (35%)</td>
<td>66/399 (17%)</td>
</tr>
<tr>
<td>Tele DBP 90+</td>
<td>90/399 (23%)</td>
<td>23/399 (6%)</td>
</tr>
</tbody>
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<tr>
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<th>6 - 12 months later</th>
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<tr>
<td>Controls SBP 135+</td>
<td>2119/3484 (61%)</td>
<td>1879/3484 (54%)</td>
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<tr>
<td>Controls SBP 140+</td>
<td>1658/3484 (48%)</td>
<td>1414/3484 (41%)</td>
</tr>
<tr>
<td>Controls SBP 150+</td>
<td>894/3484 (26%)</td>
<td>555/3484 (16%)</td>
</tr>
<tr>
<td>Controls DBP 85+</td>
<td>1080/3484 (31%)</td>
<td>799/3484 (23%)</td>
</tr>
<tr>
<td>Controls DBP 90+</td>
<td>672/3484 (19%)</td>
<td>411/3484 (12%)</td>
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Changes occur regardless of Age, sex, social deprivation
Clinician responsiveness

- 95% of alerts dealt with
- Median time to management 13 days
## Time spent in consultation

<table>
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<th>Time in relation to Telemonitoring start date</th>
<th>N</th>
<th>Mean in minutes</th>
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<tbody>
<tr>
<td><strong>Total Consultation time</strong></td>
<td>Before</td>
<td>1446</td>
<td>11.37</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>1771</td>
<td>9.09</td>
</tr>
<tr>
<td><strong>Total Consultation time in surgery</strong></td>
<td>Before</td>
<td>1082</td>
<td>13.76</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>1135</td>
<td>12.02</td>
</tr>
</tbody>
</table>

- Small increase in total number of consultation probably due to the initial consultation
Limitations

• Before and after study (potential regression to mean)
• Controls may not be similar
• Initial uptake was from largely affluent practices
• Recorded surgery measured blood pressure was often from scale-up so could not be used as an outcome
• We had to estimate time spent looking at Docman data (but there may be a solution)
Conclusions

• A significant proportion of general practices and professionals embraced the idea of supervised telemonitoring at scale.
• BP control seemed to improve in line with RCTs
• There was no obvious increase in face-to-face workload
What’s next?

• Working with NSS to find a national solution
• TEC fund has received £1m to further extend the work collaborating with the BHF
• Setting up an observatory for long term follow-up these patients
• Developing an app and management algorithm
• Multicentre RCT in post-stroke/TIA patients (Oxford Cambridge and Southampton)
1.2 MILLION CONSULTATIONS THIS YEAR

BY 2030 THIS WILL DOUBLE!

DOING NOTHING IS NOT AN OPTION
TECHNOLOGY HAS TO BE THE ANSWER
Collaborators
Elizabeth Payne, Alison MacAulay, Daniel Plenderleith [NHS Lothian], Lisa Welsh, Michelle Brogan [Scottish TEC Fund], Allan Walker [Lothian Safe Haven], Dave Kelly [Albasoft], Gordon Black [Scottish Government], Phil O’Connell [Simple Telehealth]

Boroughloch Medical Practice
Conan Doyle Medical Centre
Dalhousie Medical Practice
Ferguson Medical Practice
Grange Medical Group
Ladywell Medical Centre East
Mackenzie Medical Centre
The Harbours Medical Practice
Line plot showing systolic blood pressure change over time

Mean Systolic Blood Pressure

Patient time relative to start of telemonitoring (weeks)

Type of blood pressure reading
- Blue line: Surgery BP: Control patients
- Red line: Surgery BP: Telemonitoring patients
- Green line: Telemonitoring BP: Telemonitoring patients