Blood Pressure Monitors for Mobile Devices

Chris Patricoski MD FAAFP
Kirt J Beck, Director TTAC
Telehealth Technology Assessment Center, ANTHC
Anchorage, Alaska
August 14, 2012
Disclaimer

• Make, models and manufacturers of products are discussed.

• Some models are discussed as examples and not meant to be promotional marketing or advertisement for the product.

• Reviews are based on our specific experience, device and encounter and may not be generalizable.

• We do not endorse any particular product.

• Reviews are not meant to identify one particular device for purchase nor to direct clinical care.
Mobile Blood Pressure Monitors

*Our Criteria*

- Consumer based products
- Able to Travel (backpack, suitcase, etc.)
- Automatic inflation & measure
- No major software purchase required
- Under $300
Does Not Include

- Home health or remote monitoring devices with hubs
- Monitoring devices that are part of broader inclusive package
- Ambulatory Blood Pressure Devices
- Anything over $300 (consumer cost break)
Not Included

-Home Health Monitoring Devices with Hub-

All IDEAL LIFE Managers™ - our patented, FDA-approved monitoring devices - communicate through a wireless gateway known as the IDEAL LIFE Pod™. Users simply plug the Pod into a regular telephone jack and their home is instantly ready for integrated, automatic communication with any of IDEAL LIFE's remote health management products.
Not Included
-Home Health Monitoring Devices with Hub-

The BP Manager - used in conjunction with the IDEAL LIFE Pod™, a wireless gateway - transmits real-time information through any mode of communication, including phone lines, cell phones, and the Internet. Simply plug the Pod into a phone line and the system set-up is complete.
A team at IBM Zurich Research Laboratory Zurich has created the IBM mobile health toolkit for gathering measurement data from a range of devices, and present it to management software via a well-defined and easily implemented interface. January 2005
http://www.ercim.eu/publication/Ercim_News/enw60/husemann.html
Not Included
-Ambulatory BP Monitors-

A&D LifeSource TM-2430 @ $1,800
WA Amb BP Recorder 6100 @ $1,900

Tiba or Mortura Medical
Mobile Blood Pressure Monitors

Our Criteria

• Consumer based products
• Able to Travel (backpack, suitcase, etc.)
• Automatic inflation & measure
• No major software purchase required
• Under $300
Mobile BP Pressure Devices

*Our Definition*

I would like a reasonably priced BP unit that I can travel with and download my data.

Photos courtesy of [www.wired.com](http://www.wired.com), [www.marriott.com](http://www.marriott.com) and [www.freefoto.com](http://www.freefoto.com)
Blood Pressure Monitors

Four Units Identified

iHealth BP3        Withings BP-800

Omron BP791 IT    Omron HEM-670 IT
## Blood Pressure Monitors

### Our Cost

<table>
<thead>
<tr>
<th>iHealth BP 3</th>
<th>Omron BP791IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$120</td>
<td>$80</td>
</tr>
<tr>
<td>Withings BP-800</td>
<td>Omron HEM-670IT (wrist)</td>
</tr>
<tr>
<td>$138</td>
<td>$149</td>
</tr>
</tbody>
</table>
iHealth BP 3
Withings BP-800
Omron BP791 IT
Omron HEM-670 IT
Blood Pressure Monitors

Two methods of mobility

1. iPhone (smartphone or device)
   • iPhone App

2. Laptop with USB connection
   • Personal Health Record
## Blood Pressure Monitors

<table>
<thead>
<tr>
<th>iHealth BP 3</th>
<th>Omron BP791IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone, iPad, iTouch</td>
<td>Laptop with USB connector</td>
</tr>
<tr>
<td>iHealth App (v2.1.3)</td>
<td>Microsoft Health Vault drivers for Omron BP791IT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Withings BP-800</th>
<th>Omron HEM-670IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPhone, iPad, iTouch</td>
<td>Laptop with USB connector</td>
</tr>
<tr>
<td>Withings App (v3.7)</td>
<td>Microsoft Health Vault drivers for Omron HEM-670IT</td>
</tr>
</tbody>
</table>
iHealth BP 3
iHealth BP 3

-contents-
iHealth BP 3

Dock and Power Cord

Dock

Cable

Insert A port to the BP3 dock
iHealth BP 3
iHealth BP 3
iHealth BP 3

1. Place bottom of cuff 1/2" above bend in elbow
2. Rest arm on table

Large Adult Cuff
30-42 cm
1-1/3/16 ~ 16-1/2" INCH
iHealth BP 3
iHealth BP 3
iHealth BP 3
iHealth BP 3
iHealth BP 3
iHealth BP 3
iHealth BP 3

iHealth™
BLOOD PRESSURE DOCK
QUICK START GUIDE

1. CONNECT YOUR IOS DEVICE, GET THE iHealth APPLICATION FROM THE APP STORE
   Connect the blood pressure dock with your iPod touch, iPhone, or iPad.
   Download the free “iHealth” App from the App Store.

2. CONNECT THE CUFF TO THE DOCK
   Insert the cuff tubing connector into the air port on the left side of the dock. Make sure the connector is fully inserted to avoid air leakage during the blood pressure test.

3. PREPARE FOR MEASUREMENT
   Place the cuff around your bare arm 1/2” (1-2 cm) above the elbow joint.
   When seated, place your arm on a flat surface such as a desk or
Withings BP-800
Withings BP-800
Withings BP-800
-contents-
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Withings BP-800
Omron BP791IT
Omron BP791IT
Omron BP791IT

-contents-
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron BP791IT
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT -contents-
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT

7/23SYS PM 130
3.37
83 DIA 82

PULSE mmHg
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT
Omron Wrist HEM-670IT
# Mobile Blood Pressure Devices

## -form factor-

<table>
<thead>
<tr>
<th></th>
<th>iHealth BP 3</th>
<th>Withings BP-800</th>
<th>Omron BP791IT</th>
<th>Omron HEM-670IT (wrist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuff Type</td>
<td>Upper Arm Cuff</td>
<td>Upper Arm Cuff</td>
<td>Upper Arm Cuff</td>
<td>Wrist Cuff</td>
</tr>
<tr>
<td>Cuff Type</td>
<td>Wrap cuff with cinch bar</td>
<td>Spring, curved cuff</td>
<td>Spring, curved cuff</td>
<td>Spring, curved cuff</td>
</tr>
<tr>
<td>Cuff Type</td>
<td>Cuff, Air Tube and Station Iphone dock</td>
<td>Cuff, Integrated Cylinder and Cable</td>
<td>Cuff, Air Tube and Station</td>
<td>Wrist Cuff and Cable</td>
</tr>
<tr>
<td>Display</td>
<td>Display via iPhone, iPad, iTouch</td>
<td>Display via iPhone, iPad, iTouch</td>
<td>Display on BP Station</td>
<td>Display on Wrist Unit</td>
</tr>
<tr>
<td>Air Tube</td>
<td>Has Air Tube</td>
<td>No Air Tube</td>
<td>Has Air Tube</td>
<td>No Air Tube</td>
</tr>
</tbody>
</table>
## Mobile Blood Pressure Devices
### -Functional Aspects-

<table>
<thead>
<tr>
<th></th>
<th>iHealth BP 3</th>
<th>Withings BP-800</th>
<th>Omron BP791IT</th>
<th>Omron HEM-670IT (wrist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP = Number &amp;</td>
<td>BP = Number &amp; graphic with magnifying glass rising</td>
<td>BP = Number &amp; graphic with fan twirling</td>
<td>BP = Number</td>
<td>BP = Number</td>
</tr>
<tr>
<td>graphic with</td>
<td>P = pulse wave graphic &amp; Heart beating</td>
<td>P = Heart beating</td>
<td>P = Heart beating</td>
<td>P = Heart beating</td>
</tr>
<tr>
<td>magnifying glass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP = Number &amp;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>graphic</td>
<td>P = pulse wave graphic &amp; Heart beating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with fan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>twirling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP = Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P = Heart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>beating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes P during</td>
<td>Inflates above max Systolic</td>
<td>Inflates above max Systolic</td>
<td>Takes P during up Cycle</td>
<td></td>
</tr>
<tr>
<td>up Cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43 second read</td>
<td>35 second read</td>
<td>35 second read</td>
<td>30 second read</td>
<td></td>
</tr>
<tr>
<td>Soft cuff; a</td>
<td>Easy to position, but tightenest cuff with inflation</td>
<td>Typical BP cuff easy to position</td>
<td>Easy on the wrist, but positional</td>
<td></td>
</tr>
<tr>
<td>little difficult</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to put on,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>straighten out</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


# Mobile Blood Pressure Devices

## -Comments-

<table>
<thead>
<tr>
<th></th>
<th>iHealth BP 3</th>
<th>Withings BP-800</th>
<th>Omron BP791IT</th>
<th>Omron HEM-670IT (wrist)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A little hard to put on &amp; position cuff</td>
<td>Easy to slide on &amp; can grab cylinder to position</td>
<td>Typical BP easy to put on &amp; position</td>
<td>Easy simple to put on</td>
<td></td>
</tr>
<tr>
<td>Takes P during up Cycle</td>
<td>Inflates above max Systolic</td>
<td>Inflates above max Systolic</td>
<td>Most positional</td>
<td></td>
</tr>
<tr>
<td>Soft cuff</td>
<td>Nice twirling fan graphic</td>
<td>Most conventional unit</td>
<td>Small letters &amp; numbers</td>
<td></td>
</tr>
<tr>
<td>Takes longer to do the reading, but don’t really notice because of the graphic</td>
<td>So tight that in can hurt a little with inflation</td>
<td></td>
<td>Used battery power faster than other units</td>
<td></td>
</tr>
</tbody>
</table>
New! On the horizon...

iHealth wrist and Bluetooth

iHealth Lab, a subsidiary of China-based Andon Health, just received 510(k) clearance from the FDA for a wrist-worn, Bluetooth-enabled blood pressure monitor called the iHealth BP7 Wireless Blood Pressure Wrist Monitor that will connect with iPhones, iPads, and iPod touch devices. July, 2012

New! On the horizon...

Android

Blood Pressure Monitors planning to integrate with Android application as well.

Android HMA (Health Manager Application “HMA”)
The Android HMA is an application developed by ConnectedHealth which will be pre-installed on the Android Phone. The role of the HMA is to act as a gateway routing data from medical devices in the patient’s home to a central Electronic Medical Record housed at a secure site, and accessible by the Managed Healthcare organization.

New! On the horizon...

Home Hub (Freescale)

Freescale is working on a connected platform called Home Health Hub (HHH), an i.MX28-based reference platform for others to build on. The ARM9 processor is connected to a host of networking interfaces, including WiFi, Bluetooth (as well as its low-power implementation), Zigbee, sub-1GHz and Ethernet. The Hub will be a central point for connecting various medical devices like blood pressure monitors or glucometers that then feeds data to a tablet.

New! On the horizon...

Home Cloud Services (Marvel)

Marvell’s Home Server initiative solves this problem by enabling an affordable, low power platform with plug and play installation which connects home digital devices seamlessly and provides easy remote access.

Marvell’s total bundle solution – highly integrated SoCs, advanced 802.11n, Wi-Fi, G.hn solution, Phy, power management, and switch – make it simple for OEMs to quickly design a system, resulting in faster time to market and reduced development cost.
New! On the horizon...

With Home Hubs / Home Cloud Services will BP Monitor devices become just another consumer integrated device?
New! On the horizon...

**Cuffless Wireless BP Monitoring?**

**Sense A/S** (Taastrup, Denmark) is developing a continuous blood pressure monitor using a patch that has electrodes that sense the changing impedance of tissue around a vessel and convert it into a BP reading. They received $5.9 million from venture fund SEED Capital & Vaekstfonden to help refine this cuffless BP measurement device. Feb. 2012

New! On the horizon...

Cuffless Wireless BP Monitoring?

Sense A/S (Taastrup, Denmark) expects to secure FDA 510(K) clearance for the blood pressure measurement device and have it launched commercially next year, 2013. [Link](http://medgadget.com/2012/02/new-startup-develops-continuous-blood-pressure-measurement-without-a-counter-pressure-cuff.html)