
# HIMSS Davies Award
## Case Study #1
## Self-Measured Blood Pressure Program

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Geneva Castro, RN

December, 2017

# About Lana'i Community Health Center

- 501(c)3 Non-profit Organization
- Federally Qualified Health Center (FQHC)
- Provides services to approximately to 60% of the island's population
- LCHC provides holistic, INTEGRATED medical, dental, and behavioral health services.
- Total number of employees is approximate ly 40, most are full time and hired from the local community.
- Clinical professionals include 2 full time Family Nurse Practitioners, the Medical Director .25 FTE clinical, 2 full time phycologist and the dental team.
- LCHC will see over 2000 unduplicated patients in 2017 and approximately 7,500 visits.

# The Island of Lānaʻi

- 3,100 people
- Plantation history-”The Pineapple Island”
- Diverse mostly Asian/Hawaiian/ Pacific Islander population
- Over 40% of residents – Filipino
- 30 miles of paved road
- Amazing hikes, gorgeous beaches, fresh air
- Current primary economic driver is the hotel/hospitality industry

# Why self-measuring blood pressure (SMBP)?
## Its time has come!

- The science
- The device
- The information system
- The health care delivery system

*JAMA*. 2013 July 3; 310(1): 46–56. doi:10.1001/jama.2013.6549.

# Effect of Home Blood Pressure Telemonitoring and Pharmacist Management On Blood Pressure Control: The HyperLink Cluster Randomized Trial

**Karen L. Margolis, MD, MPH[a], Stephen E. Asche, MA[a], Anna R. Bergdall, MPH[a], Steven P. Dehmer, PhD[a], Sarah E. Groen, PharmD[c], Holly M. Kadrmas, PharmD[c], Tessa J. Kerby, MPH[b], Krissa J. Klotzle, PharmD[c], Michael V. Maciosek, PhD[a], Ryan D. Michels, PharmD[c], Patrick J. O'Connor, MD, MPH[a], Rachel A. Pritchard, BA[a], Jaime L. Sekenski, BS[a], JoAnn M. Sperl-Hillen, MD, MPH[a], and Nicole K. Trower, BA[a]**

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Home Blood Pressure Monitoring: Take It to the Bank
David J. Magid, MD, MPH; Beverly B.Green, MD, MPH

"In this issue of JAMA, the well-designed and well-executed Home Blood Pressure Telemonitoring and Case Management to Control Hypertension (HyperLink)study by Margolis and colleagues demonstrates how to improve BP control by making hypertension management more like modern banking: accessible, easy, and convenient."

JAMA July 3,2013 Volume 310,Number 1

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

SHATTUCK LECTURE

The Future of Public Health

Thomas R. Frieden, M.D., M.P.H.

Blood-pressure control, which can save more lives than any other clinical intervention, is successful in only about half of Americans; nearly 90% of patients with uncontrolled hypertension have both health insurance and a regular source of care, and more than 80% have multiple contacts with the health system each year.

n engl j med 373;18 nejm.org October 29, 2015

J Hypertens. 2016 Aug;34(8):1520-7. doi: 10.1097/HJH.0000000000000966.

**Prognostic significance of on-treatment home and clinic blood pressure for predicting cardiovascular events in hypertensive patients in the HONEST study.**

Shimada K[1], Kario K, Kushiro T, Teramukai S, Zenimura N, Ishikawa Y, Okuda Y, Saito I.

Author information

Study of over 20,000 patient over 2 years

Morning blood pressure is a better predictor of CVD risk

## 4.2. Out-of-Office and Self-Monitoring of BP

| Recommendation for Out-of-Office and Self-Monitoring of BP<br>References that support the recommendation are summarized in Online Data Supplement 3 and Systematic Review Report. | | |
|---|---|---|
| **COR** | **LOE** | **Recommendation** |
| I | $A^{SR}$ | 1. Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension (Table 11) and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions (1-4). |

SR indicates systematic review.

# AHA/ACC Guidelines Nov. 2017

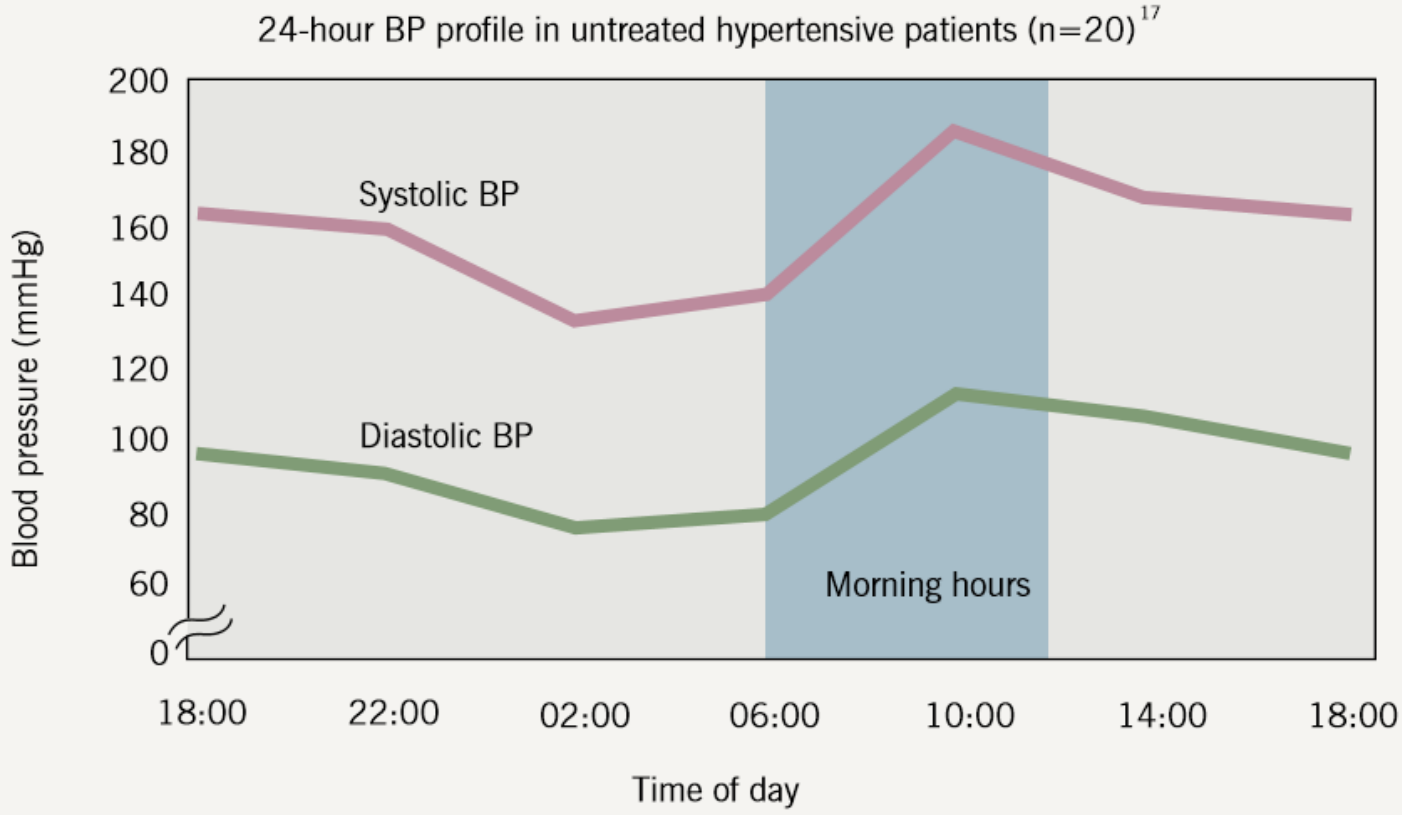
Out-of-the Office Blood Pressure Measures are recommended for **Diagnosis and Treatment**

# You can’t get there from here!

Blood pressure measurement and detection of hypertension. By: Pickering, Thomas G., Lancet, 00995355, 7/2/1994, Vol. 344, Issue 8914

**“Hypertension can be identified only by measurement of the blood pressure. However, conventional detection methods are unreliable for three main reasons: (a) technical inaccuracies, some of which are avoidable; (b) the inherent variability of blood pressure; and (c) the tendency for blood pressure to increase in the presence of a physician (white-coat hypertension). “**

**Figure 1. The circadian rhythm of blood pressure**[1]




**Key:** BP= blood pressure

# Cost-effectiveness of the introduction of home blood pressure measurement in patients with office hypertension

Hidefumi Fukunaga[a], Takayoshi Ohkubo[a,c], Makoto Kobayashi[d], Yuichiro Tamaki[b], Masahiro Kikuya[a], Taku Obara[b,c], Miwa Nakagawa[b], Azusa Hara[a,c], Kei Asayama[c], Hirohito Metoki[b,c], Ryusuke Inoue[c], Junichiro Hashimoto[a,c], Kazuhito Totsune[b,c] and Yutaka Imai[b,c]

***Objective*** **Cost-effectiveness of hypertension treatment is an important social and medical issue in Western as well as in Eastern countries, including Japan. Home blood pressure (HBP) measurements have a stronger predictive power for cardiovascular events than casual clinic blood pressure (CBP) measurements. Therefore, the introduction of HBP measurement for the diagnosis and treatment of hypertension should lead to a decrease in medical expenditure. This study presents calculations of the cost savings likely to take place when HBP is implemented for newly detected hypertensive subjects in Japan.**

**US$674 000 to US$2.51 million per 1000 subjects per 5 years for treatment of hypertension, when sensitivity analysis is performed.**

***Conclusions*** **The introduction of HBP measurement for the treatment of hypertension is very useful for reducing medical costs. *J Hypertens* 26:685–690 © 2008 Wolters Kluwer Health | Lippincott Williams & Wilkins.**

Journal of Hypertension 2008, 26:685–690

Keywords: cost-effectiveness, home blood pressure, Ohasama study, white-

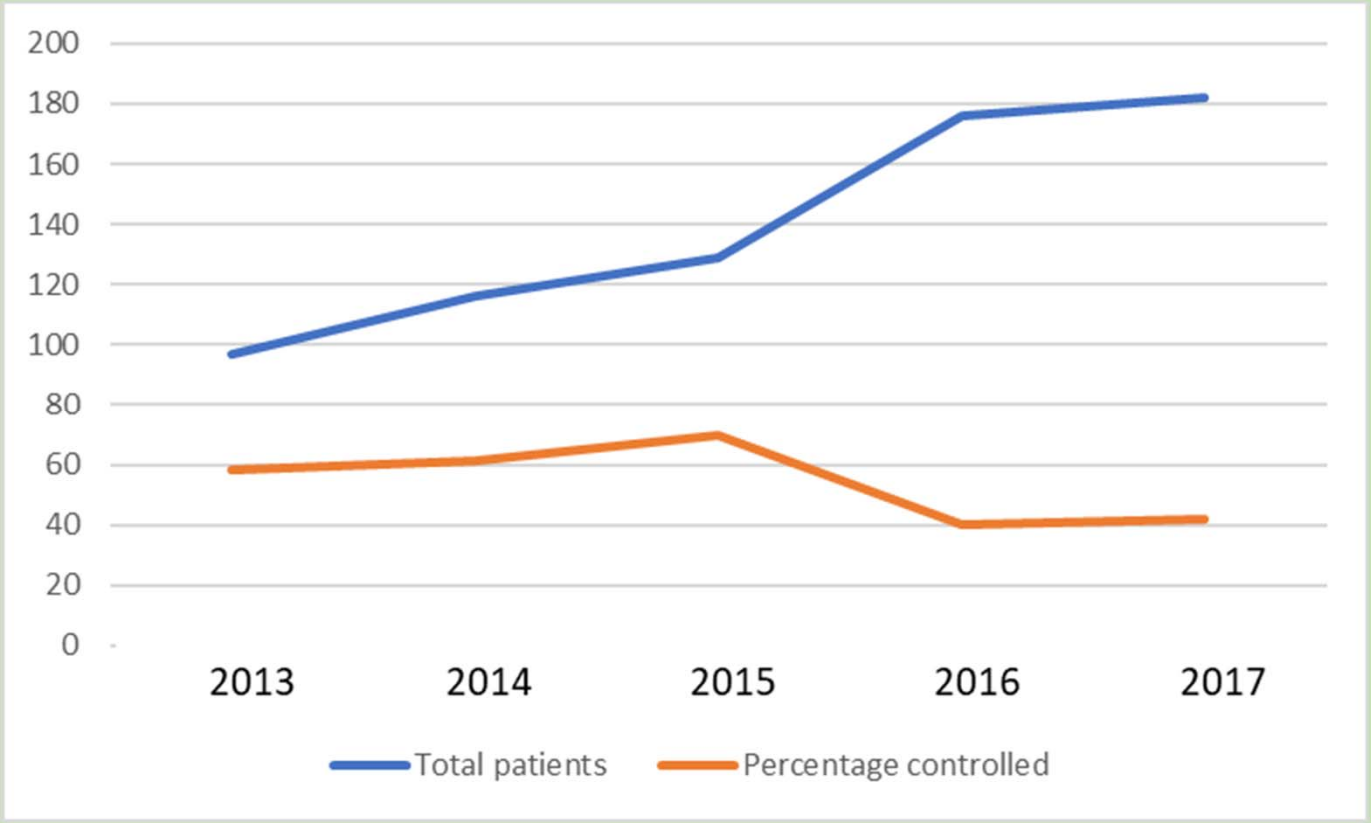
Abstract ▾ Send to: ▾

Hypertension. 2008 Jul;52(1):1-9. doi: 10.1161/HYPERTENSIONAHA.107.189011. Epub 2008 May 22.

# Call to action on use and reimbursement for home blood pressure monitoring: executive summary: a joint scientific statement from the American Heart Association, American Society Of Hypertension, and Preventive Cardiovascular Nurses Association.

Pickering TG, Miller NH, Ogedegbe G, Krakoff LR, Artinian NT, Goff D; American Heart Association; American Society of Hypertension; Preventive Cardiovascular Nurses Association.

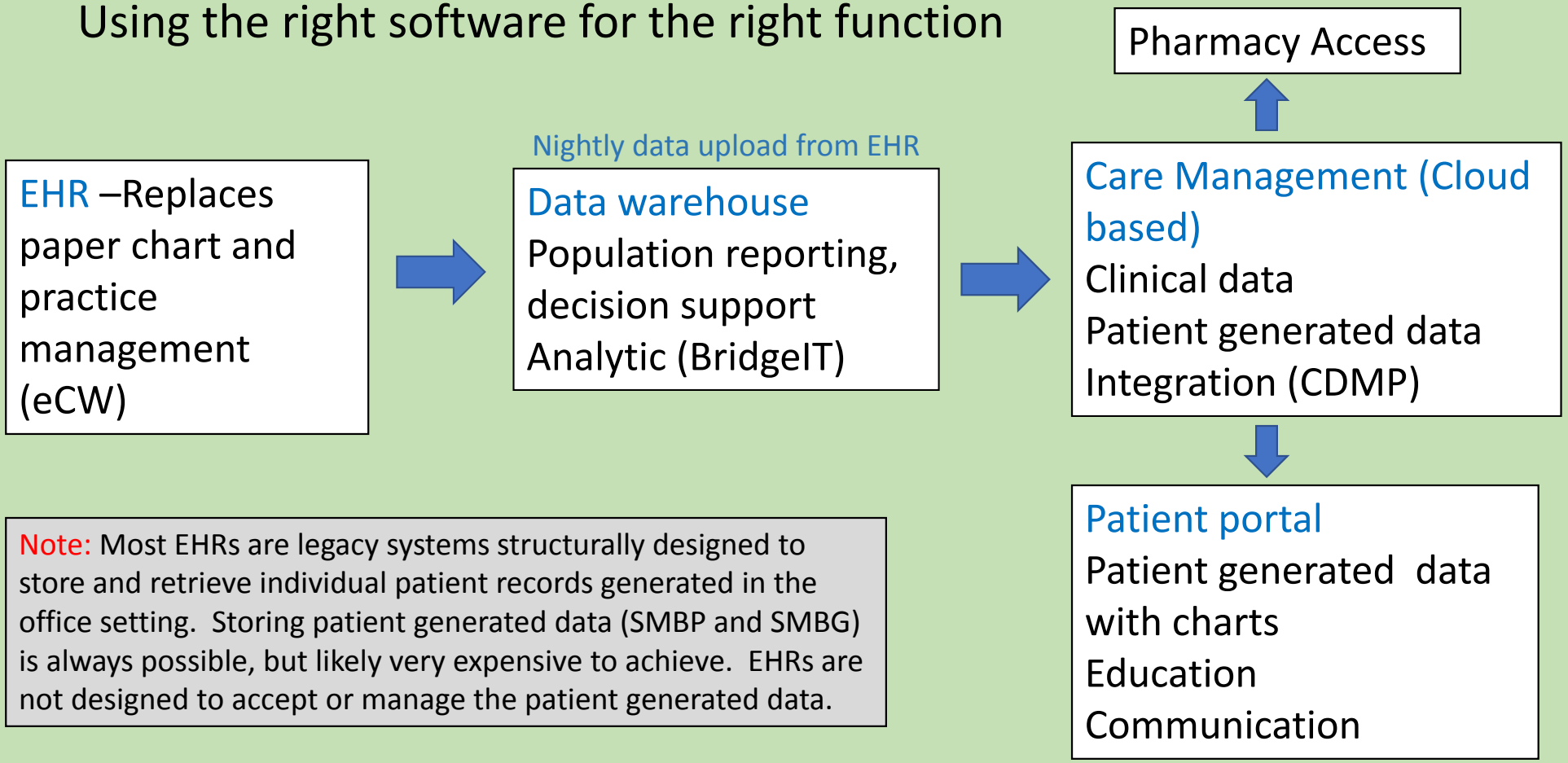
# Hypertension patients and control LCHC




| | Total Patients | Percentage |
|---|---|---|
| 2013 | 97 | 58% |
| 2014 | 116 | 61% |
| 2015 | 129 | 70% |
| 2016 | 176 | 40% |
| 2017 | 182 | 42% |

# Data integration

## Using the right software for the right function

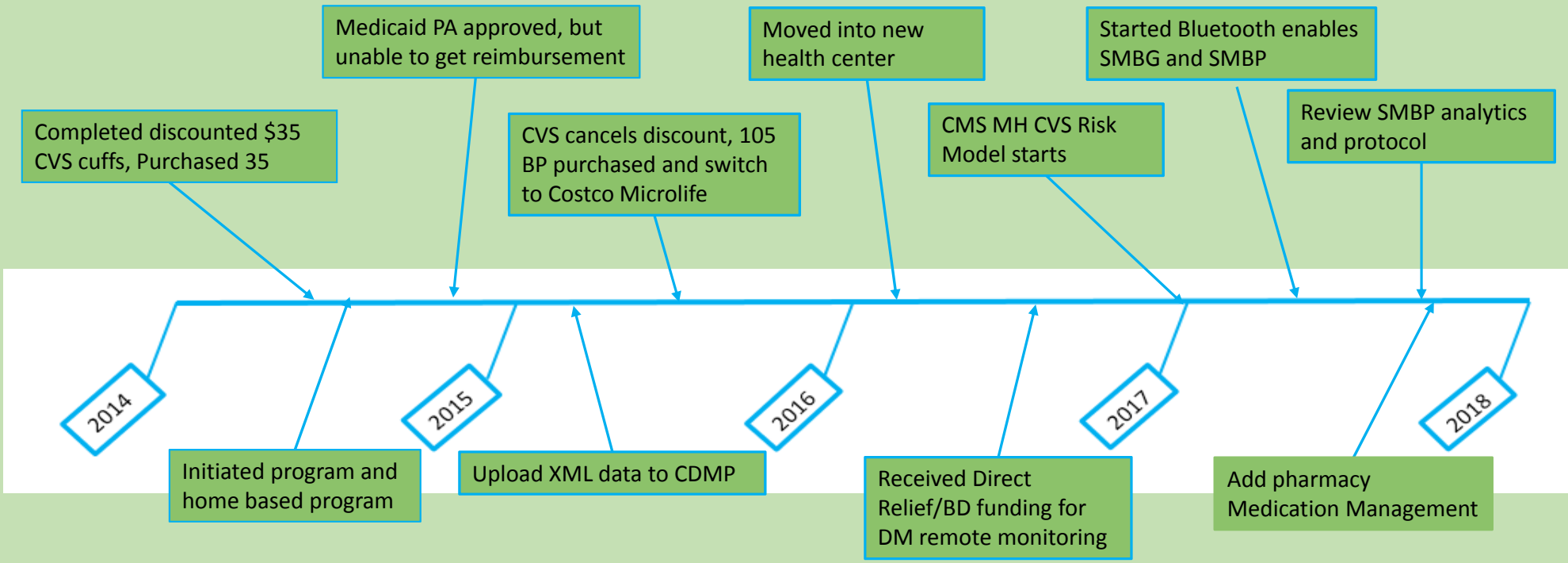



Note: Most EHRs are legacy systems structurally designed to store and retrieve individual patient records generated in the office setting. Storing patient generated data (SMBP and SMBG) is always possible, but likely very expensive to achieve. EHRs are not designed to accept or manage the patient generated data.

# Translating Research into Practice
# Self-Measured Blood Pressure

- Successfully competed for a 1 year CVS Caremark Foundation Grant ($50,000)
- Selected off-the-shelf BP cuffs rather than A&D telehealth system (Used in Health Partners research project)
- Microlife BP cuff sold at Costco was selected ($39) with memory stored in an XML file allowing the recordings to be uploaded into CDMP and printed for immediate use in the office
- Microlife makes the branded CVS BP Cuff with the same software and we were able to arrange for local CVS to discount their BP cuffs to $35, a cost passed on to our patients
- Initial plans to start small was scrapped when almost all patients purchased the BP cuff and were part of the program
- Initiated home-based data collection and management with an MA and APRN visiting as an option to an office visit

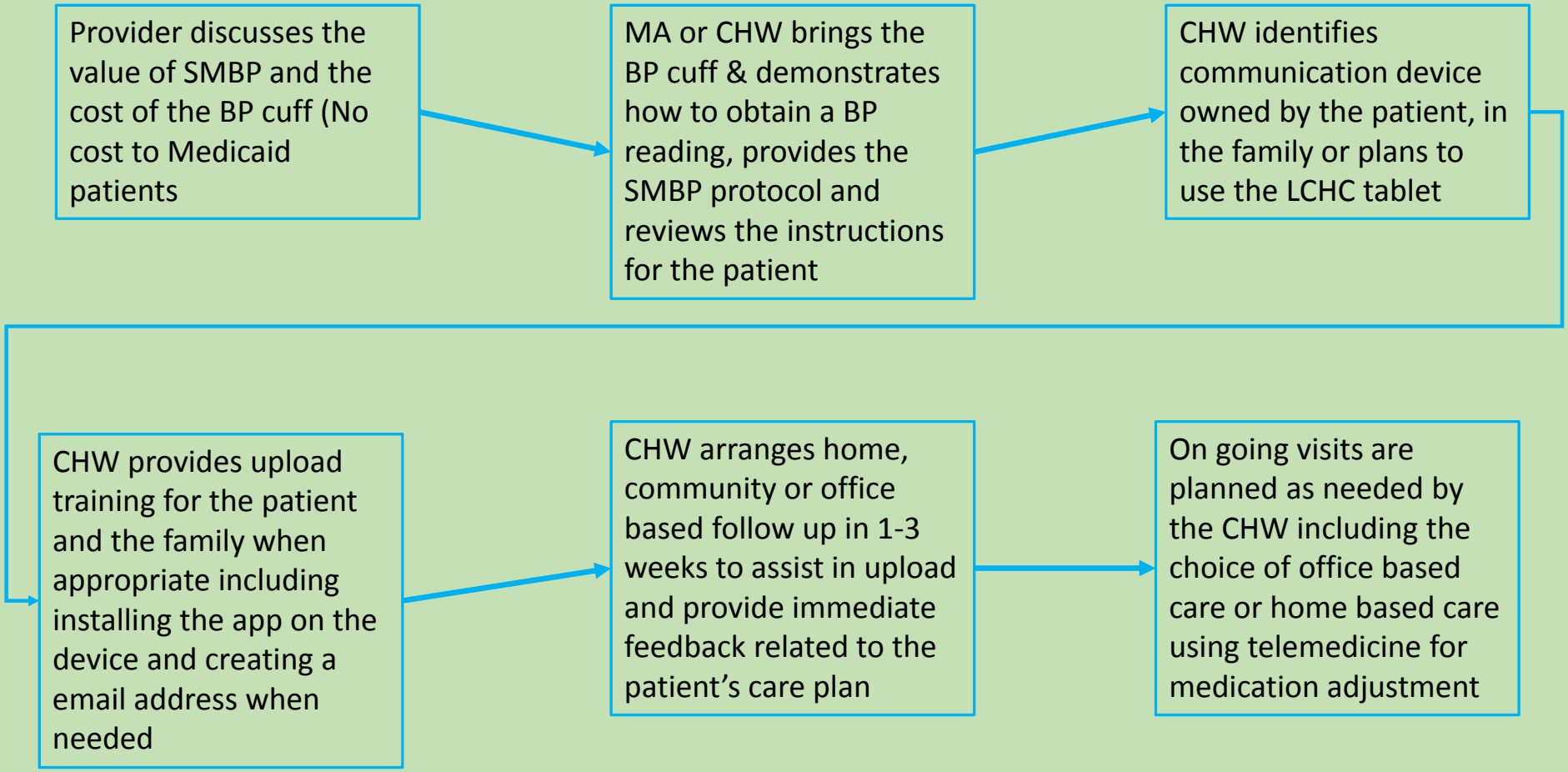
# LCHC SMBP TImeline



# Team-based care

- Patient engagement:  Self-management, data gathering and transmission, share decision making
- Roles of MAs and CHWs: Training and partnering with patients, BP data uploads and tracking, life style coaches and communication to providers
- Pharmacy integration:  Available clinical data including home BP and BG readings to assist in mediation management; partners in treatment protocol and providing medication management via telehealth
- Providers:  Standardized treatment protocol for uniform patient management, share decision making, interpretation of home readings and supervision of MAs and CHWs

# SMBP Bluetooth Implementation



# Off the shelf BP cuff, Certified BHS, avoid proprietary applications associated with remote monitoring devices

File Edit Format View Help

```
<?xml version="1.0" standalone="yes"?>
<NewDataSet>
  <Patient>
    <ID>A1234567890</ID>
    <FamilyName>Sample</FamilyName>
    <GivenNames>Patient</GivenNames>
    <Address>Max Schmidhelny Strasse 201 9435 Heerbrugg, Switzerland.</Address>
    <PhoneEmail>+41-71-727-7030/admin@microlife.ch</PhoneEmail>
    <DateOfBirth>1937-05-06T12:00:00-12:00</DateOfBirth>
    <Weight>94.34733</Weight>
    <Height>177.8</Height>
    <Sex>1</Sex>
    <Smoker>0</Smoker>
    <Diabetic>0</Diabetic>
    <Cholestrol>190</Cholestrol>
    <FamilyHistory>Not available.</FamilyHistory>
    <PatientNotes>This sample patient information will help you familiar with the "Blood Pressure Analyser" software by showing how new dat
  </Patient>
  <MeasureRec>
    <ID>A1234567890</ID>
    <RecID>1000000</RecID>
    <MAM>0</MAM>
    <Arrhythmia>0</Arrhythmia>
    <ReadingDate>2014-11-21T07:16:00-12:00</ReadingDate>
    <Sys>143</Sys>
    <Dia>92</Dia>
```

# BridgeIT-Population reporting and tracking

Main Form | CMS MH data2

| DatasetName | patientId | PatLastName | PatFirstName | LastAppt | dob | Age | MaxOfLDLres | ResultsLDL | Hipaiselastto | TotalChol | HDLdate | HiPraiseHDL | MaxOfEncDa | LastHDL | BPdate | BPSys | BPDia | primaryInsura | Ins |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lanai Communi | | | | 12/8/2015 | 3/30/1941 | 74 | | | | | | | 12/8/2015 | | 12/8/2015 | 140 | 85 | Medicare UB Cl | |
| Lanai Communi | | | | 12/8/2015 | 3/30/1941 | 74 | | | | | | | 12/8/2015 | | 12/8/2015 | 140 | 85 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 12/8/2015 | 3/30/1941 | 74 | | | | | | | 12/8/2015 | | 12/8/2015 | 140 | 85 | Medicare UB Cl | MB |
| Lanai Communi | | | | 5/9/2015 | 9/4/1938 | 76 | 1/16/2015 | 137 | 1/16/2015 | 161 | 1/16/2015 | 56 | 3/25/2015 | 1/16/2015 | 3/25/2015 | 130 | 90 | Medicare UB Cl | |
| Lanai Communi | | | | 5/9/2015 | 9/4/1938 | 76 | 1/16/2015 | 137 | 1/16/2015 | 161 | 1/16/2015 | 56 | 3/25/2015 | 1/16/2015 | 3/25/2015 | 130 | 90 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 5/9/2015 | 9/4/1938 | 76 | 1/16/2015 | 137 | 1/16/2015 | 161 | 1/16/2015 | 56 | 3/25/2015 | 1/16/2015 | 3/25/2015 | 130 | 90 | Medicare UB Cl | MB |
| Lanai Communi | | | | 4/6/2017 | 12/24/1936 | 80 | 1/25/2016 | 198 | 1/25/2016 | 216 | 1/25/2016 | 70 | 4/6/2017 | 1/25/2016 | 4/6/2017 | 155 | 94 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 4/6/2017 | 12/24/1936 | 80 | 1/25/2016 | 198 | 1/25/2016 | 216 | 1/25/2016 | 70 | 4/6/2017 | 1/25/2016 | 4/6/2017 | 155 | 94 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 4/6/2017 | 12/24/1936 | 80 | 1/25/2016 | 198 | 1/25/2016 | 216 | 1/25/2016 | 70 | 4/6/2017 | 1/25/2016 | 4/6/2017 | 155 | 94 | Medicare UB Cl | MB |
| Lanai Communi | | | | 9/24/2014 | 7/13/1934 | 80 | 1/24/2014 | 101 | 1/24/2014 | 167 | 1/24/2014 | 51 | 1/13/2014 | 1/24/2014 | 1/13/2014 | 0 | 55 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 9/24/2014 | 7/13/1934 | 80 | 1/24/2014 | 101 | 1/24/2014 | 167 | 1/24/2014 | 51 | 1/13/2014 | 1/24/2014 | 1/13/2014 | 0 | 55 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 9/24/2014 | 7/13/1934 | 80 | 1/24/2014 | 101 | 1/24/2014 | 167 | 1/24/2014 | 51 | 1/13/2014 | 1/24/2014 | 1/13/2014 | 0 | 55 | Medicare UB Cl | MB |
| Lanai Communi | | | | 9/21/2017 | 11/15/1942 | 74 | | | | | | | 5/6/2015 | | 5/6/2015 | 125 | 74 | Medicare UB Cl | |
| Lanai Communi | | | | 9/21/2017 | 11/15/1942 | 74 | | | | | | | 5/6/2015 | | 5/6/2015 | 125 | 74 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 9/21/2017 | 11/15/1942 | 74 | | | | | | | 5/6/2015 | | 5/6/2015 | 125 | 74 | Medicare UB Cl | MB |
| Lanai Communi | | | | 9/21/2017 | 11/15/1942 | 74 | | | | | | | 5/6/2015 | | 5/6/2015 | 125 | 74 | Medicare UB Cl | MC |
| Lanai Communi | | | | 3/31/2017 | 4/11/1936 | 80 | | | | | | | 1/4/2016 | | 1/4/2016 | 124 | 75 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 3/31/2017 | 4/11/1936 | 80 | | | | | | | 1/4/2016 | | 1/4/2016 | 124 | 75 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 3/31/2017 | 4/11/1936 | 80 | | | | | | | 1/4/2016 | | 1/4/2016 | 124 | 75 | Medicare UB Cl | MB |
| Lanai Communi | | | | 9/16/2015 | 8/27/1933 | 82 | | | | | | | 12/22/2010 | | 12/22/2010 | 117 | 68 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 9/16/2015 | 8/27/1933 | 82 | | | | | | | 12/22/2010 | | 12/22/2010 | 117 | 68 | Medicare UB Cl | MB |
| Lanai Communi | | | | 7/7/2017 | 5/18/1949 | 68 | 6/22/2017 | 180 | 6/22/2017 | 228 | 6/22/2017 | 61 | 6/21/2017 | 6/22/2017 | 6/21/2017 | 110 | 77 | Medicare UB Cl | |
| Lanai Communi | | | | 7/7/2017 | 5/18/1949 | 68 | 6/22/2017 | 180 | 6/22/2017 | 228 | 6/22/2017 | 61 | 6/21/2017 | 6/22/2017 | 6/21/2017 | 110 | 77 | Medicare UB Cl | C1 |
| Lanai Communi | | | | 7/7/2017 | 5/18/1949 | 68 | 6/22/2017 | 180 | 6/22/2017 | 228 | 6/22/2017 | 61 | 6/21/2017 | 6/22/2017 | 6/21/2017 | 110 | 77 | Medicare UB Cl | MB |

Close | Workbook | Filtering | Reports | Export

Main Form | CVS BP cuff

| DatasetName | MedName | | | |
|---|---|---|---|---|
| Lanai Communi | CVS Blood Pressure Monitor | 757286 | 10/6/2017 | 15301 |
| Lanai Communi | CVS Blood Pressure Monitor | 606332 | 1/14/2017 | 15341 |
| Lanai Communi | CVS Blood Pressure Monitor | 669216 | 11/15/2016 | 15448 |
| Lanai Communi | CVS Blood Pressure Monitor | 751246 | 8/22/2017 | 15507 |
| Lanai Communi | CVS Blood Pressure Monitor | 745270 | 9/13/2017 | 15613 |
| Lanai Communi | CVS Blood Pressure Monitor | 752070 | 9/27/2017 | 15651 |
| Lanai Communi | CVS Blood Pressure Monitor | 406606 | 9/29/2015 | 15703 |
| Lanai Communi | CVS Blood Pressure Cuff | 756096 | 6/27/2017 | 15861 |
| Lanai Communi | CVS Blood Pressure Monitor | 741408 | 9/8/2017 | 15864 |
| Lanai Communi | CVS Blood Pressure Cuff | 757332 | 10/6/2017 | 15951 |
| Lanai Communi | CVS Blood Pressure Monitor | 680452 | 5/18/2017 | 16051 |
| Lanai Communi | CVS Blood Pressure Series 800 | 747864 | 9/13/2017 | 16063 |
| Lanai Communi | CVS Blood Pressure Monitor | 698849 | 6/20/2017 | 16066 |
| Lanai Communi | CVS Blood Pressure Monitor | 718298 | 6/14/2017 | 16166 |
| Lanai Communi | CVS Blood Pressure Monitor | 739340 | 6/14/2017 | 16246 |
| Lanai Communi | CVS Blood Pressure Series 800 | 757347 | 10/5/2017 | 16313 |
| Lanai Communi | CVS Blood Pressure Monitor | 754017 | 9/12/2017 | 16348 |
| Lanai Communi | CVS Blood Pressure Monitor | 406688 | 9/29/2015 | 16411 |
| Lanai Communi | CVS Blood Pressure Monitor | 742867 | 9/11/2017 | 16419 |
| Lanai Communi | CVS Blood Pressure Monitor | 747268 | 9/15/2017 | 16430 |
| Lanai Communi | CVS Blood Pressure Series 800 | 725993 | 7/31/2017 | 16489 |

| dob | sex | doctorID | EncDate | itemName | VitalsValue | BPStr | BPSys | BPDia | ColonPOS | SysBP | DiaBP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/24/1945 | female | 16685 | 12/15/2015 | BP | 148/90 | 148/90 | 148 | 90 | 0 | Yes | Yes |
| 8/24/1945 | female | 16685 | 7/3/2017 | BP | 164/93 L | 164/93 L | 164 | 93 | 0 | Yes | Yes |
| 8/24/1945 | female | 16685 | 6/21/2016 | BP | 141/82 home | 141/82 home | 141 | 82 | 0 | Yes | No |
| 8/24/1945 | female | 16685 | 12/20/2016 | BP | 148/94 | 148/94 | 148 | 94 | 0 | Yes | Yes |
| 8/24/1945 | female | 17186 | 3/10/2017 | BP | 132/79 | 132/79 | 132 | 79 | 0 | No | No |
| 8/24/1945 | female | 18017 | 9/9/2016 | BP | na | na | | | 0 | | |
| 5/8/1971 | female | 17186 | 12/30/2016 | BP | 156/114 L | 156/114 L | 156 | 114 | 0 | Yes | Yes |
| 5/8/1971 | female | 18613 | 7/26/2016 | BP | 142/93 | 142/93 | 142 | 93 | 0 | Yes | Yes |
| 5/8/1971 | female | 18613 | 7/13/2016 | BP | 153/99 | 153/99 | 153 | 99 | 0 | Yes | Yes |
| 5/8/1971 | female | 18089 | 8/22/2017 | BP | 151/102 L | 151/102 L | 151 | 102 | 0 | Yes | Yes |
| 5/8/1971 | female | 17186 | 1/10/2017 | BP | 144/109 | 144/109 | 144 | 109 | 0 | Yes | Yes |
| 11/2/1986 | female | 18089 | 8/19/2016 | BP | 113/83 | 113/83 | 113 | 83 | 0 | No | No |
| 11/2/1986 | female | 17186 | 11/26/2016 | BP | 113/73 | 113/73 | 113 | 73 | 0 | No | No |
| 11/2/1986 | female | 18089 | 5/25/2017 | BP | 106/66 | 106/66 | 106 | 66 | 0 | No | No |
| 11/2/1986 | female | 18089 | 12/7/2016 | BP | 123/81 | 123/81 | 123 | 81 | 0 | No | No |
| 11/2/1986 | female | 18089 | 4/21/2017 | BP | 114/76 | 114/76 | 114 | 76 | 0 | No | No |
| 2/20/1969 | male | 16685 | 10/12/2015 | BP | 118/73 | 118/73 | 118 | 73 | 0 | No | No |
| 4/4/1991 | male | 17186 | 11/3/2015 | BP | 135/86 | 135/86 | 135 | 86 | 0 | No | No |
| 4/4/1991 | male | 17186 | 8/26/2016 | BP | * | * | | | 0 | | |
| 2/9/1964 | female | 18017 | 8/4/2017 | BP | na | na | | | 0 | | |
| 8/17/1995 | female | 17186 | 12/29/2015 | BP | 126/81 | 126/81 | 126 | 81 | 0 | No | No |
| 3/7/1980 | male | 16685 | 11/16/2015 | BP | 122/82 | 122/82 | 122 | 82 | 0 | No | No |
| 3/7/1980 | male | 17186 | 11/11/2015 | BP | 127/73 | 127/73 | 127 | 73 | 0 | No | No |
| 7/6/1975 | female | 18089 | 9/28/2017 | BP | 135/88 | 135/88 | 135 | 88 | 0 | No | No |
| 7/6/1975 | female | 17186 | 6/14/2017 | BP | 136/75 | 136/75 | 136 | 75 | 0 | No | No |

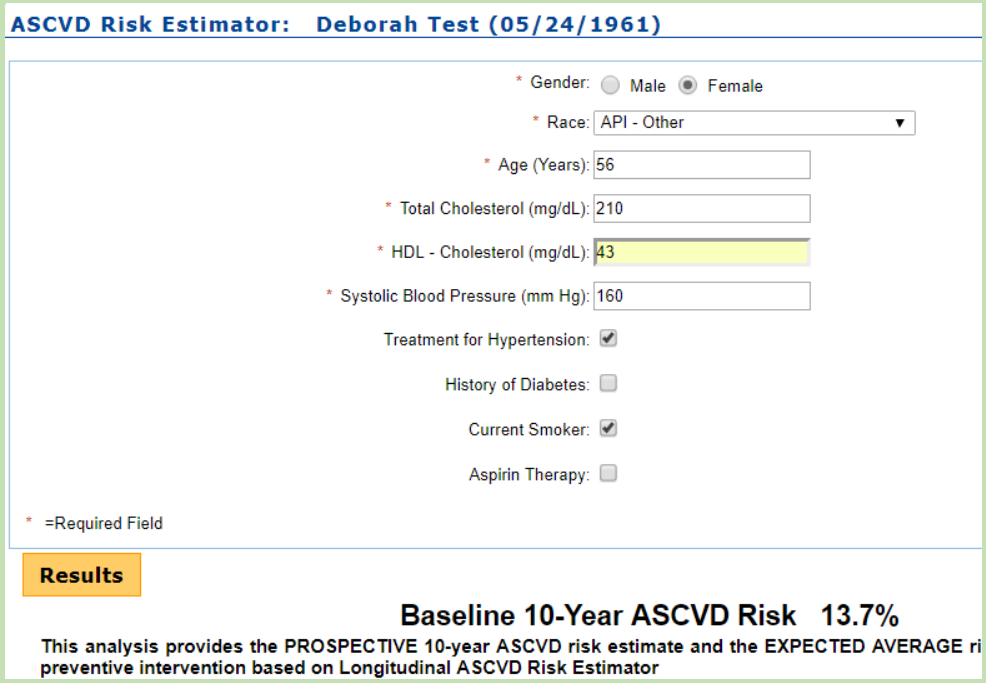
## Poor Reliability and Poor Adherence to Self-Monitoring of Blood Glucose Are Common in Women With Gestational Diabetes Mellitus and May Be Associated With Poor Pregnancy Outcomes

- "A total of 23.1% of women had <90% matched values in diary and meter memory"
- **"CONCLUSIONS:** Although women with GDM are considered to be highly motivated, SMBG adherence and reliability are of concern and may be associated with poor gestational prognosis, suggesting that caregivers should systematically check the glucose meter memory to improve GDM management."
- SMBP automated data collection is an essential component to avoid errors in recording and management

http://care.diabetesjournals.org/content/40/9/1181

# CMS MH CVD Risk Model

## CDMP



# CDMP BP presentation with graphs and charts

**Patient Blood Pressure Data: Trinidad Agmata**

**Earliest Blood Pressure Reading:** 09/13/2017 **Most Recent Blood Pressure Reading:** 10/03/2017

**Type of Graph to Create:** Percent by Target Graph ▾

* **From:** 09/19/2017 * **To:** 10/03/2017

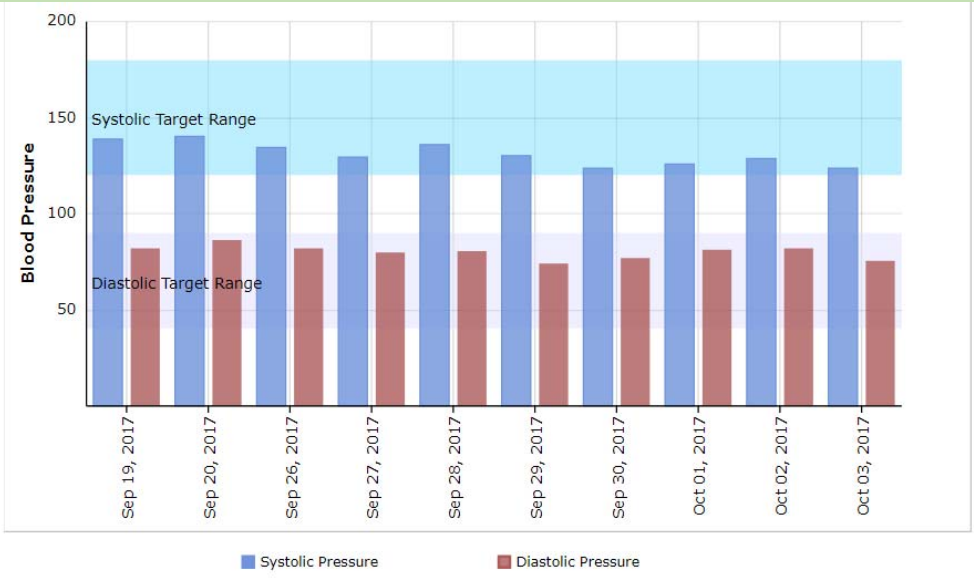
Search Print Upload

* = Required Field

**Blood Pressure Log**

| Date | 12am - 4am | 4am - 8am | 8am - 12pm | 12pm - 4pm | 4pm - 8pm | 8pm - 12am | Total Daily Readings | Daily Average |
|---|---|---|---|---|---|---|---|---|
| 10/03/2017 | | | | | | 128/79, 120/72 | 2 | 124/75.5 |
| 10/02/2017 | | 132/87 | | | | 125/77 | 2 | 128.5/82 |
| 10/01/2017 | | | | | | 126/81 | 1 | 126/81 |
| 09/30/2017 | | 130/81 | | | | 118/73 | 2 | 124/77 |
| 09/29/2017 | | 137/79 | | | | 123/69 | 2 | 130/74 |
| 09/28/2017 | | 147/89 | | | | 125/72 | 2 | 136/80.5 |
| 09/27/2017 | | 127/81 | | 132/79 | | | 2 | 129.5/80 |
| 09/26/2017 | | 137/84 | | | | 132/80 | 2 | 134.5/82 |
| 09/20/2017 | | 146/90 | | | | 139/82, 136/86 | 3 | 140.33/86 |
| 09/19/2017 | | | | | | 139/82 | 1 | 139/82 |
| Average | | 136.57/84.43 | | 132/79 | | 128.27/77.55 | | |

- Below the Target Range ( 120/40 ) - Within the Target Range - Above the Target Range ( 180/90 )



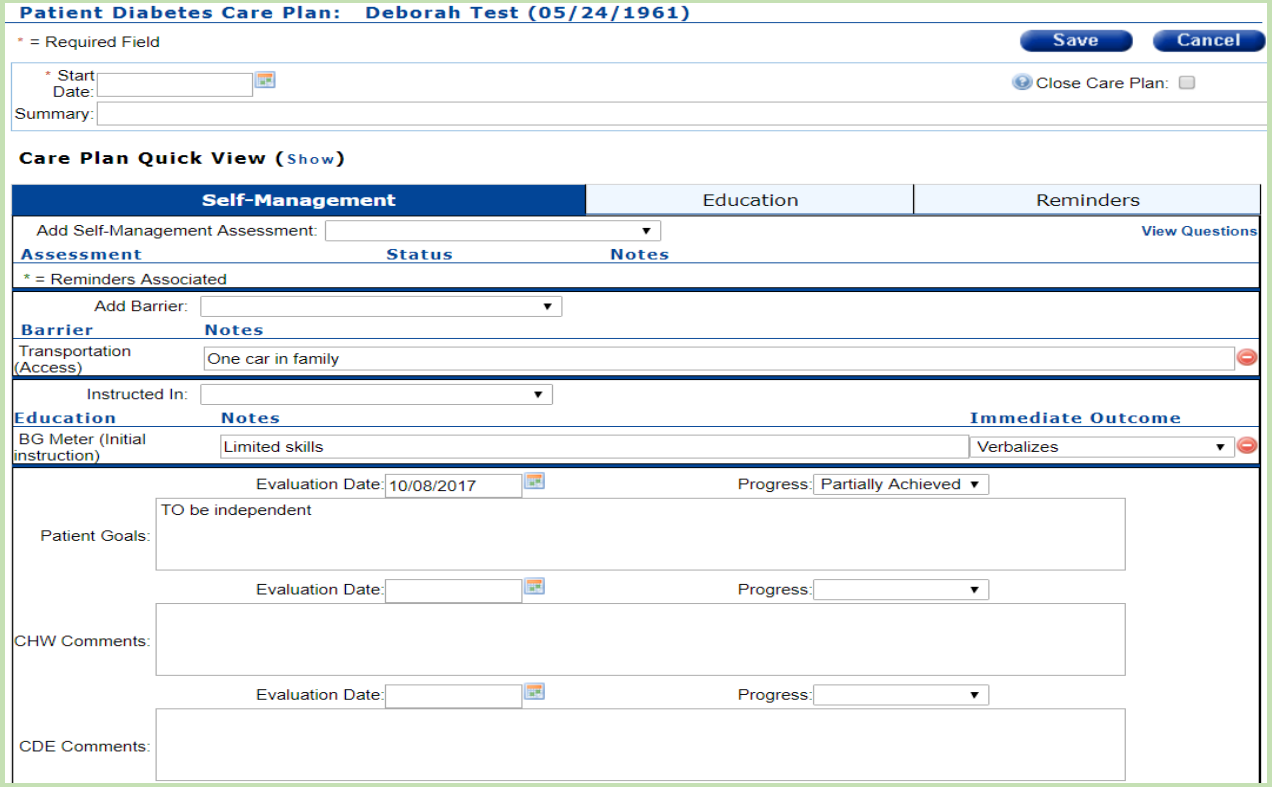

**Statistics**

**Systolic Data**
Highest Reading: 147
Lowest Reading: 118
Average Reading: 131.5
Standard Deviation: 7.9
Readings Above Target: 0
Readings Within Target: 18
Readings Below Target: 1

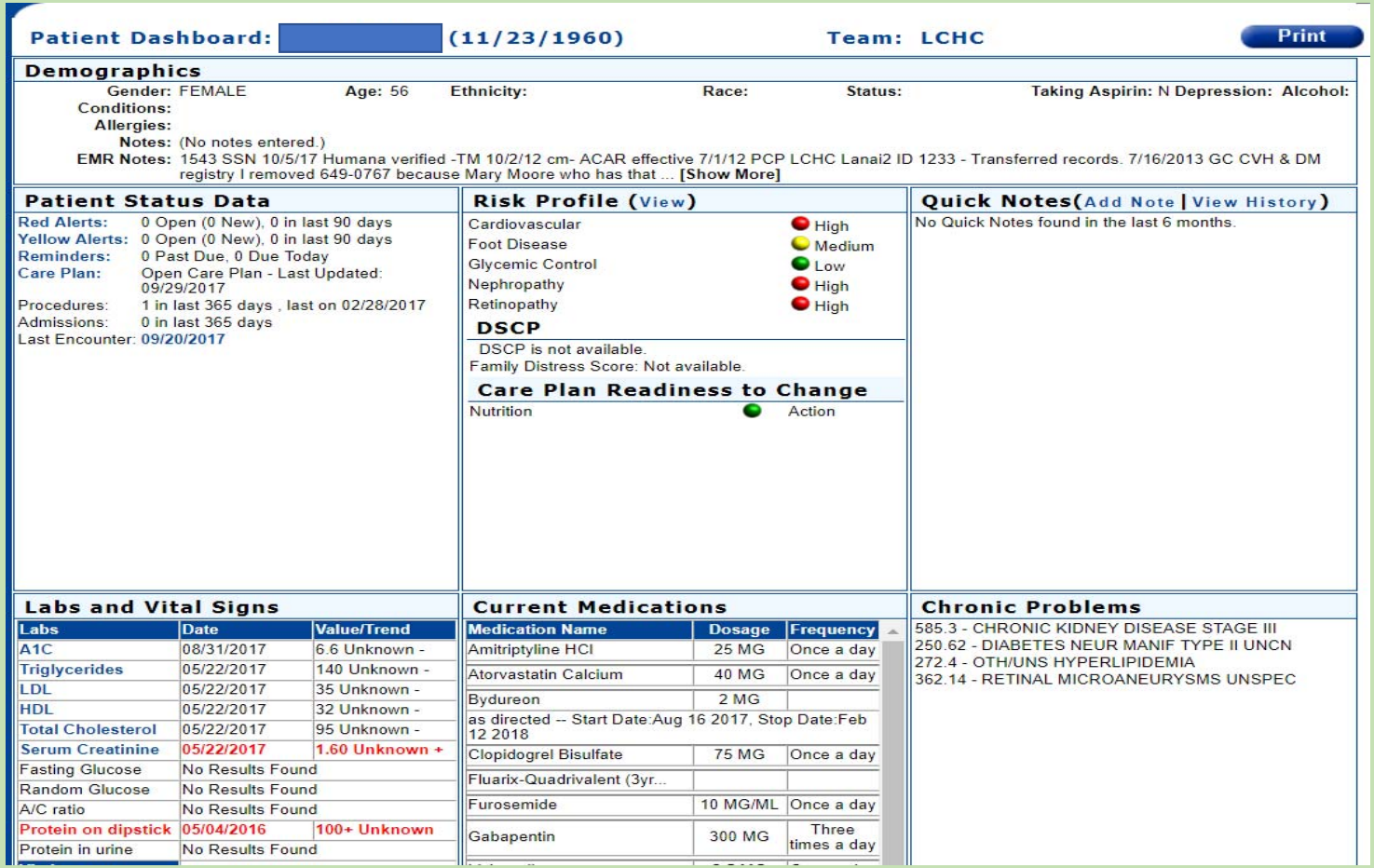
**Diastolic Data**
Highest Reading: 90
Lowest Reading: 69
Average Reading: 80.2
Standard Deviation: 5.6
Readings Above Target: 0
Readings Within Target: 19
Readings Below Target: 0

Total Readings: 19

# CDMP Structured Care



# CDMP Dashboard
# Pharmacy management and others



**Patient Dashboard:** [redacted] (11/23/1960) **Team:** LCHC Print

**Demographics**

Gender: FEMALE Age: 56 Ethnicity: Race: Status: Taking Aspirin: N Depression: Alcohol:
Conditions:
Allergies:
Notes: (No notes entered.)
EMR Notes: 1543 SSN 10/5/17 Humana verified -TM 10/2/12 cm- ACAR effective 7/1/12 PCP LCHC Lanai2 ID 1233 - Transferred records. 7/16/2013 GC CVH & DM registry I removed 649-0767 because Mary Moore who has that ... [Show More]

**Patient Status Data**

| | |
|---|---|
| Red Alerts: | 0 Open (0 New), 0 in last 90 days |
| Yellow Alerts: | 0 Open (0 New), 0 in last 90 days |
| Reminders: | 0 Past Due, 0 Due Today |
| Care Plan: | Open Care Plan - Last Updated: 09/29/2017 |
| Procedures: | 1 in last 365 days , last on 02/28/2017 |
| Admissions: | 0 in last 365 days |
| Last Encounter: | 09/20/2017 |

**Risk Profile (View)**

| | |
|---|---|
| Cardiovascular | High |
| Foot Disease | Medium |
| Glycemic Control | Low |
| Nephropathy | High |
| Retinopathy | High |

**DSCP**

DSCP is not available.
Family Distress Score: Not available.

**Care Plan Readiness to Change**

| | |
|---|---|
| Nutrition | Action |

**Quick Notes(Add Note | View History)**

No Quick Notes found in the last 6 months.

**Labs and Vital Signs**

| Labs | Date | Value/Trend |
|---|---|---|
| A1C | 08/31/2017 | 6.6 Unknown - |
| Triglycerides | 05/22/2017 | 140 Unknown - |
| LDL | 05/22/2017 | 35 Unknown - |
| HDL | 05/22/2017 | 32 Unknown - |
| Total Cholesterol | 05/22/2017 | 95 Unknown - |
| Serum Creatinine | 05/22/2017 | 1.60 Unknown + |
| Fasting Glucose | No Results Found | |
| Random Glucose | No Results Found | |
| A/C ratio | No Results Found | |
| Protein on dipstick | 05/04/2016 | 100+ Unknown |
| Protein in urine | No Results Found | |

**Current Medications**

| Medication Name | Dosage | Frequency |
|---|---|---|
| Amitriptyline HCl | 25 MG | Once a day |
| Atorvastatin Calcium | 40 MG | Once a day |
| Bydureon | 2 MG | |
| as directed -- Start Date:Aug 16 2017, Stop Date:Feb 12 2018 | | |
| Clopidogrel Bisulfate | 75 MG | Once a day |
| Fluarix-Quadrivalent (3yr... | | |
| Furosemide | 10 MG/ML | Once a day |
| Gabapentin | 300 MG | Three times a day |

**Chronic Problems**

585.3 - CHRONIC KIDNEY DISEASE STAGE III
250.62 - DIABETES NEUR MANIF TYPE II UNCN
272.4 - OTH/UNS HYPERLIPIDEMIA
362.14 - RETINAL MICROANEURYSMS UNSPEC

# Current status of hypertension-LCHC

- Number of Hypertension patients: UDS  196 (12/7/2016-12/7/2017)
- Number of Hypertension patients: DX  245 (12/7/2016-12/7/2017)
- Number of BP Cuffs (Estimate): 150 (Each cuff can have 2 patients)
- Number of CVS Series 800 (Bluetooth): 40
- Note:
  - Not all HBP patients are managed by LCHC and the Dx total includes dental
  - Not all BP cuffs stay with the patients, some are given away, and some patients who had other BP cuffs and are doing SMBP, but elected not to purchase a new cuff

# Cost of hypertension

Total costs associated with high blood pressure in 2011 in the US were $46 billion in health care services, medications, and missed days of work.

This estimate does not include the cost of the co-morbidities: Heat attacks, heart fail, stroke, renal disease

https://www.cdc.gov/bloodpressure/faqs.htm

# Value
## accessible, easy, and convenient

- Hypertension is now well established to be better managed in the home.  Office visits may be required to calibrate or validate the home BP cuff, but BP management can be safely done in the non-clinical setting
- Off-the-shelf BP cuffs make the essential equipment easily available at a very reasonable price; patients can purchase
- The effective use of CHWs improves e-health patient literacy in using communication technology to upload data and other information
- CHWs increase contact time for the patient providing the home as an option to an office visit in most situation and the use of ZOOM to access a provider when necessary

# Value
## Cost savings

- SMBP led to 4 patients (out a 100) being identified in the first year as misdiagnosed and HBP was removed from the problem list; reduces misdiagnosis and treatment resulting in cost savings
- SMBP is a better predictor for CVD risk and should be used in HBP management. Most home readings are lower than office readings (White coat hypertension) resulting in both the right medications being used and an overall reduction in total medication
- CHWs and home and community based care reduces the need for office visits and the associated costs including time away from work
- Reduced CVD mortality & morbidity with the associated cost savings

# Value
## Improved quality of care

- Patient engagement is significantly improved with knowledge of what a normal BP is and the immediate feedback on results leading to improved self-management and life style change
- High level of data integrity through technology; recommendations are to collect serial morning blood pressures and average the results over several days to establish the most accurate reporting of a patients true resting BP, providing a level of data integrity that cannot be obtained through a patient generated log
- Digitally collected data allowing for population-based analysis and reporting; with large data sets, there is potential for active research leading to improved management strategies

# Data analysis within CDMP
(development in progress)

- SMBP results fall into 3 categories:
  - Diagnosis of hypertension: Two or more readings morning and night for 3 days out of the week for two weeks (24 readings)
  - Management of hypertension: Two or more readings morning and night for 3 days out of the week for at least 1 week.
  - Maintenance of hypertension: Two or more readings in the morning for 3 days out of the week for at least 1 week

# Real world BP readings

## Data scrubbing required

Problem:

- Patients do not follow the protocol and get readings at the wrong time of day or after activity (i.e., not at rest)
- Patients fail to use appropriate technique to obtain the BP

Solutions:

- There is a running average for 3 months for systolic and diastolic readings; Values that are 2 standard deviations from the mean are not used in the calculation
- Readings that are not in the timeframe for morning and evening are discarded as outside to morning and evening time range

# Transformation of the Delivery System

- Good science
- Patient engagement
- Team-based care
- System supported by integrated health information technology: access, analysis, integrity, and outcomes

Pau!

**The staff of Lana’i Community Health Center**