HEART FAILURE UPDATE 2017 WORKSHOP

E-health:
Taking Advantage of Technology

Dr. Joseph Cafazzo
Ms. Nadia Thomson RN(EC) MN, Nurse Practitioner
Workshop Outline

- Current state of affairs
- Define Remote Patient Monitoring (RPM)
- Potential Benefits of RPM:
  - Support/enable HF self-care
  - Reduce hospitalizations
- Discuss RPM:
  - MEDLY™ (Multiple Chronic Disease Management Platform)
  - CardioMEMS™
- Case studies: Who is a candidate for RPM?
- Open Discussion
Improved Health Outcomes: Home Hemodialysis

- Normalization of blood pressure without the need for anti-hypertensive medications
- Normalization of abnormal wall thickness of the heart
- Restoration of impaired heart function
- Improvement in peripheral circulation
- Improvement in sleep quality
- Improvement in nutritional determinants
- Elimination of dietary restriction

- Patient autonomy
- Cost effective modality

Hanly et al.: NEJM, 2001
Pierratos et al.: JASN, 1998
Patient-Perceived Barriers to Home Hemodialysis

(Cafazzo and Chan, 2007)

- Perceived burden on family members
- Fear of self-cannulation
- Fear of a catastrophic event in the absence of nursing support
- Low self-efficacy
WHAT IF WE CLOSED THESE GAPS?
Picture and Video Spy ToolBox

Pro! Tap link to redeem:

11h

I hope we could keep the iPhone/ipod touch :(

1d

To y'all r lucky you get iPhones I got a iPod but o well it's still sick

1d

have u been to camp huronda
bant Reward


bant Reward

Enjoy "Night Vision Picture and Video Spy Toolbox - Pro"! Tap link to redeem: http://bit.ly/iITEYU

Experience Points

+70 XP for 4 readings. Sticking to it!

REWARDS
49.6% Daily Testing Frequency
Kevin @kevin
Have been noticing that the #tests is displayed after transferring a reading.

Elizabeth Hughes @eHughes
testing refresh with new asynchronous methods. #tests

Danny Bing @Bingster
@Kevin Got a flashing red light on bluglu. Was able to transfer on the second try.

Dr. Banting @drbanting
Try out the new app #bant, now available on the apple app store! #appstore

Dr. Banting @drbanting

Let's make sure we have this right before we move ahead.

4 High Dinner readings
Dec 1- Dec 3

Out of Range Wizard

1 2 3

Let's make sure we have this right before we move ahead.

Cause

Food    Activity    Stress
Adjust basal    Adjust bolus

Fix

Food    Activity    Stress
Insulin    Other
 Improve carb counting    Talk to someone
Illness    Other

Other
Let’s make sure we have this right before we move ahead.
Trend Wizard

High Dinner readings
Dec 1 - Dec 3

make sure we have this right before we move ahead.

Fix

Me

Rewards | My points | Leaderboard

Today | This week | All time | You are #2 of 75

#1 | C. Best | 4380

#2 | ElizabethHughes | 4300

#3 | McCleod | 4190

#4 | Dr. Banting | 3200
Awesome!
+460

Pro Tip! Fix a trend by getting the next 3 readings for that label in-range. Tap the trend button above to find out more.

Welcome to bant! Take your readings to travel the path and earn rewards, review your progress and share how you’re doing all in one place!
BANT 2

Diabetes management app for type 2 diabetes.
SELF-MANAGEMENT OF TYPE 2 DIABETES

- App customization through profile setup process
- Monitoring of blood glucose, steps, diet and weight
- Positive reinforcement
- Goal setting and planning
- Visualization of paired testing (pre and post prandial)
- Trends and analytics
- Information sharing
- Fast & discrete interactions
track meals
vs
BG
track activity
vs
BG
Trends

- Weight: No Change
- Activity: Low Average, 4,800 steps

Blood Glucose:
- Breakfast: 7 Meals, Pre: Up, Post: Up, Checkmark
- Lunch: 7 Meals, Pre: Up, Post: Up, Checkmark

Trends
detailed analysis
BLOOD PRESSURE TRANSMITTED AUTOMATICALLY TO BLACKBERRY
Pilot Results
Diabetic Hypertension

Effect of Home Blood Pressure Telemonitoring With Self-Care Support on Uncontrolled Systolic Hypertension in Diabetics


Abstract—Lowering blood pressure reduces cardiovascular risk, yet hypertension is poorly controlled in diabetic patients. In a pilot study we demonstrated that a home blood pressure telemonitoring system, which provided self-care messages on the smartphone of hypertensive diabetic patients immediately after each reading, improved blood pressure control. Messages were based on care paths defined by running averages of transmitted readings. The present study tests the system’s effectiveness in a randomized, controlled trial in diabetic patients with uncontrolled systolic hypertension. Of 244 subjects screened for eligibility, 110 (45%) were randomly allocated to the intervention (n=55) or control (n=55) group, and 105 (95.5%) completed the 1-year outcome visit. In the intention-to-treat analysis, mean daytime ambulatory systolic blood pressure, the primary end point, decreased significantly only in the intervention group by 9.1±15.6 mmHg (SD; P<0.0001), and the mean between-group difference was 7.1±2.3 mmHg (SE; P<0.005). Furthermore, 51% of intervention subjects achieved the guideline recommended target of <130/80 mmHg compared with 31% of control subjects (P<0.05). These improvements were obtained without the use of more or different antihypertensive medications or additional clinic visits to physicians. Providing self-care support did not affect anxiety but worsened depression on the Hospital Anxiety and Depression Scale (baseline, 4.1±3.76; exit, 5.2±4.30; P=0.014). This study demonstrated that home blood pressure telemonitoring combined with automated self-care support reduced the blood pressure of diabetic patients with uncontrolled systolic hypertension and improved hypertension control. Home blood pressure monitoring alone had no effect on blood pressure. Promoting patient self-care may have negative psychological effects. (Hypertension. 2012;60:00.)
NO CHANGE

- 9.1 mmHg systolic
- 4.6 mmHg diastolic
NO
NO ADDITIONAL MEDS
NO ADDITIONAL VISITS
SELF AWARENESS MED ADHERENCE
Mobile Phone-Based Telemonitoring for Heart Failure Management: A Randomized Controlled Trial

Emily Seto¹,², PhD, PEng; Kevin J Leonard¹,², PhD, MBA; Joseph A Cafazzo¹,²,³, PhD, PEng; Jan Barnsley², PhD; Caterina Masino¹, MA; Heather J Ross⁴,⁵, MD, MHSc, FRCP Tib

¹Centre for Global eHealth Innovation, University Health Network, Toronto, ON, Canada
²Department of Health Policy, Management and Evaluation, University of Toronto, Toronto, ON, Canada
³Institute of Biomaterials and Biomedical Engineering, University of Toronto, Toronto, ON, Canada
⁴Department of Medicine, University of Toronto, Toronto, ON, Canada
⁵Divisions of Cardiology and Transplant, University Health Network, Toronto, ON, Canada

Corresponding Author:
Emily Seto, PhD, PEng

Centre for Global eHealth Innovation
University Health Network
TGH/RFE Bldg, 4th Fl.
190 Elizabeth St.
Toronto, ON, M5G 2C4
Canada
Phone: 416 340 4800 ext 6409
Fax: 416 340 3595
Congestive Heart Failure Client

Summary
- Weight: 155.8 lbs (+0.4 lbs)
- BP: 102/74
- Pulse: 55 bpm
- Sympt.: Abnormal

Transmitting reading...

Press 1 for menu

Weight History (5 Items)
- Apr 12 2:34 PM: 155.8 lbs
- Apr 12 2:34 PM: 155.4 lbs
- Apr 12 2:32 PM: 155 lbs
- Apr 12 2:32 PM: 154 lbs
- Apr 12 2:32 PM: 153 lbs

Press 1 for menu

Symptoms
- Do you feel that your heart is beating unusually (e.g., pounding or unusual rhythm)?
  - 1. No
  - 2. Yes
  - 3. Cancel
Symptoms

Have you fainted?

1. No
2. Yes
3. Cancel
Symptoms

Has your breathing at night worsened?

1. No
2. Yes
3. Cancel
<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight 154.4</td>
</tr>
<tr>
<td>BP 105</td>
</tr>
<tr>
<td>78</td>
</tr>
<tr>
<td>Pulse 74/min</td>
</tr>
<tr>
<td>Sympt. Abnormal</td>
</tr>
</tbody>
</table>

Contact HF Clinic/ family Dr. Go to Emerg Dept if you feel you should

Press 1 for menu
Details Needed

110 / 80
Pulse: 74 /min

Taken Today 10:00 AM

Was this?
1 First thing in the morning
2 During the day
RCT Study design

• N=100
• duration 6 months
• daily measurements before 10 am - reminder call
• alert algorithm - messages direct to cardiologist
• control group - usual care
RCT Results

Congestive Heart Failure

- BNP: 150 pg/mL
- LVEF: 7.4%
- self-care: 7 points

No change in the control group
A Remote Patient Monitoring Platform for Multiple Chronic Conditions
Medly helps patients manage their chronic conditions by monitoring symptoms and measurements, and providing self-care guidance, all at home.

- CHF, diabetes, hypertension, CKD, COPD
- Receive feedback and instructions from their healthcare team
- Bluetooth enabled peripheral devices
medly
Remote monitoring platform for chronic illness
Morning Reading

9:35 am

- Weight: 120 lbs
- Blood Pressure: 122/86 mmHg
- Heart Rate: 60 bpm

Symptoms: none recorded

You're doing great. Keep it up!
READINGS
View your readings and feedback, all at a glance.

SYMPTOMS
Symptoms questionnaire to self-monitor

COMMUNITY
View trends and identify patterns
**HOME PAGE**

Shows your vital signs and symptoms. At a glance, you can see how you are doing.

**SYMPTOMS**

Symptoms survey for self-monitoring.

**TRENDS**

Graphs readings to highlight trends and patterns.
additional reading

3:30 pm

blood pressure

144

86

mmHg

heart rate

60

bpm

record symptoms

Your blood pressure is high.
Record your symptoms.

morning reading

9:35 am

weight

blood pressure

heart rate
The Medly Kit

- Patients record their symptoms and vital signs with a Bluetooth-enabled blood pressure cuff and weight scale.
- Data transfers wirelessly with no manual input.
- Medly transfers patient readings to the clinic and generates alerts.
LUBDUB

MONITORING OF HEART RATE AND ACTIVITY FOR HEART FAILURE PATIENTS
HOME

LOGIN

LUBDUB

HEART RATE MEASURED VIA APPLE WATCH
Average Heart Rate at 50 watts workload level
Average Heart Rate at 100 watts workload level

Heart Rate (bpm)

Holter  Fitbit  Watch
Step counts over a two week period

- Fitbit Charge HR
- Apple Watch
**BLOOD PRESSURE**
Track your blood pressure and get in-the-moment feedback.

**LAB RESULTS**
Integrates with UHN EPR to give access to labs at home.

**MEDICATIONS**
Track changes to meds between clinic visits.
Lab Results at Home

- Integrated with labs system to access real-time lab results before clinic visit
Active Medication Management

- Identification of medication changes between clinic visits
- Notification to clinicians triggering medication reconciliation
- Integration with clinic pharmacy database
Blood Pressure Management

- Track Blood Pressure seamlessly with a Bluetooth enabled cuff
- Get personalized feedback and action messages
Lab Results at Home

- Integrated with labs system to access real-time lab results before clinic visit
Integrating a Smartphone-Based Self-Management System into Usual Care of Advanced CKD

Stephanie W. Ong, Sarbjit V. Jassal, Judith A. Miller, Eveline C. Porter, Joseph A. Cafazzo, Emily Seto, Kevin E. Thorpe, and Alexander G. Logan

Abstract

Background and objectives Patient self-management has been shown to improve health outcomes. We developed a smartphone-based system to boost self-care by patients with CKD and integrated its use into usual CKD care. We determined its acceptability and examined changes in several clinical parameters.

Design, setting, participants, & measurements We recruited patients with stage 4 or 5 CKD attending outpatient renal clinics who responded to a general information newsletter about this 6-month proof-of-principle study. The smartphone application targeted four behavioral elements: monitoring BP, medication management, symptom assessment, and tracking laboratory results. Prebuilt customizable algorithms provided real-time personalized patient feedback and alerts to providers when predefined treatment thresholds were crossed or critical changes occurred. Those who died or started RRT within the first 2 months were replaced. Only participants followed for 6 months after recruitment were included in assessing changes in clinical measures.
Pilot Evaluation Study

- Study conducted with UHN Renal Clinic
- Duration: 6 months (Sept 2014 to April 2015)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>47 (26 men, 21 women)</td>
</tr>
<tr>
<td>Average Age</td>
<td>59.5</td>
</tr>
<tr>
<td>Number of Medications</td>
<td>9.3 ± 4.1</td>
</tr>
<tr>
<td>Previous smartphone usage</td>
<td>38% smartphone users</td>
</tr>
<tr>
<td>Key comorbidities</td>
<td>Diabetes and Hypertension</td>
</tr>
</tbody>
</table>
Key Results

- Significant improvement in BP for those with uncontrolled hypertension
  
  Systolic BP
  ↓ 13.5 ± 21.5 mmHg

- Detected 127 medication discrepancies in 97 reports

- High adherence in taking readings

- 97% of users stated they would use it again

Detected Errors in Meds
> 50% of reports

User Adherence
> 80% met goals
Acceptability: user adherence rate
30 DAYS

Risk assessment app for cardiovascular disease.
30 Days to a healthier heart

Plan to have fish for dinner tonight. P.S. Fish and chips don’t count!

I’ll do it!

Pick again

Progress

0 Challenges completed
1 Awards earned
30 Days to go
70,000 downloads
15,000 > 2 weeks
6,000 all 30 days
#1 downloader:
young women
most frequent user: older woman
used the longest:
older men
30 Days
To a Healthier Heart
Do you feel any of these issues are affecting your personal health?
Tap all that apply to you

Weight
Stress

BADGE ACHIEVED!
HEALTHY LIVING PROMOTER

PICK A CHALLENGE
PHYSICAL ACTIVITY
1 x 1
Get up at least once an hour, every hour.
Do you feel any of these issues are affecting your personal health?
Tap all that apply to you

- Weight
- Stress
- Alcohol
- Smoking
- Unhealthy Diet
- Physical Activity
- None of the above

**HEALTHY LIVING PROMOTER**
You are a Healthy Living Promoter! You have completed 5 challenges since the beginning of your <30 Days journey.

**Share with Your Friends?**
- Facebook
- Twitter

**PICK A CHALLENGE**

**PHYSICAL ACTIVITY**
1 x 1
Get up at least once an hour, every hour.

**Why?**
Moving a little can help with your circulation.

Continue
Accept This Challenge
WHAT'S NEXT?

PERVERSIVE TECH

WEARABLES
Paced Breathing to Modify Heart Rate

Respiration

Heart Rate

Rob Nolan
Heart Rate Variability Biofeedback
BEAT

An application for a wearable cardiac sensor.
Are you wearing the ECG Monitor?

Yes! Let's Connect.

No! Help me.
Are you wearing the ECG Monitor?

Yes! Let's Connect.

No! Help me.
How To

To setup the ECG monitor you must have 3 electrodes, the Patch and the ECG Enclosure.
How To

Plug the ECG Enclosure into the patch. A green light should flash briefly, followed by a pulsing blue light.
How To
Snap the 3 electrodes on to the back of the Patch and peel off the plastic backing.
Question 1
Eos et accusamus et iusto odio dignissimos ducimus qui blanditiis praesentium voluptatum deleniti atque corrupti quos dolores et quas molestias excepturi sint occaecati cupiditate non provident, similique sunt in culpa qui officia?

We're in the process of collection you're baseline reading, this can take up to 5 minutes, please;

Sit Comfortably
Breath Normally
Remain Silent

Heart Rate  RMSSD  SDDN

Test 2
Completed January 2nd, 2014
Your heart rate variability decreased, this could be cause by lack of concentration. Don't worry its an easy fix.
NEW SPACES

Your Home
Pharmacies
Remote Communities
School & Work
PERSONALIZED HEALTH & MEDICINE
- IMPROVED HEALTH MANAGEMENT BY TURNING DATA INTO PREDICTIVE TOOLS
- IMPROVED CLINICAL OPERATIONS & REDUCED COSTS
- IMPROVED CLINICAL OUTCOMES & QUALITY OF LIFE

DATA WAREHOUSE / DATA ANALYTICS / CANCER KNOWLEDGE NETWORK

FAMILY

CLINICIAN
DIABETES  HIGH BLOOD PRESSURE  LUNG DISEASE  CANCER
KIDNEY DISEASE  HEART FAILURE  MENTAL HEALTH
Patient Heal Thyself: Technology for Self-Care

@JosephCafazzo PhD PEng
Heart Failure Impact

- HF most rapidly rising cardiovascular disease
  - 1% patients > 65 years, 4% patients > 70 years
  - 50% of new cases occur in age > 80 years
- Currently ~ 1 000 000 Canadians living with HF
  - > 50 000 Canadians are diagnosed with HF each year
  - 1 in 5 lifetime risk for those > 40 years
- One year mortality after diagnosis is between 25-40%
- Median life expectancy is 2.1 years
- HF costs are more than $3 billion/year
- Associated with increased rates of hospital readmission


What is Remote Patient Monitoring (RPM)?

- Technology connects patient with a health care team
- Involves the transfer of physiological data (BP, weight, electrocardiographic signals, or oxygen saturation) through technology such as telephone lines, broadband, satellite, or wireless networks

Why do we need RPM?

- Because Heart Failure COSTS!!
- All-cause readmission rates are high:
  - 25% within 30 days of HF discharge
  - 50% within 6 months
- Each hospitalization averages 6 days
Inadequate Self-Care in Heart Failure

Self-care and Quality of Life of Heart Failure Patients at a Multidisciplinary Heart Function Clinic

Emily Seto, MSc, PEng; Kevin J. Leonard, PhD, MBA; Joseph A. Cafazzo, PhD, PEng; Caterina Masino, MA; Jan Barnsley, PhD; Heather J. Ross, MD, MHSc, FRCPa

Barriers to Self Care

Lack of self-care knowledge
Lack of perceived benefit
Low self-efficacy
Financial constraints

TED ROGERS CENTRE FOR HEART RESEARCH
Do Self-Management Interventions Work in Patients With Heart Failure?

**Conclusions:** This study shows that self-management interventions had a beneficial effect on time to HF-related hospitalization or all-cause death and HF-related hospitalization alone and elicited a small increase in HF-related quality of life.
How can we improve self-care behaviour?

There are 6.8 billion people on the planet. 5.1 billion of them own a cell phone.....but only 4.2 billion own a toothbrush.............

Source: Mobile Marketing Association Asia, 2011
Smartphone Users

• 91% of smartphone owners keep their smartphones within 3 feet, 24 hours a day...
  ....Morgan Stanley

• 87% of smartphone users report that they could not live without their smartphone

• Smartphone users check their smartphones 150× per day


## Types of Health Apps

% of health app users who use apps to track...

<table>
<thead>
<tr>
<th>All health app users (n=254)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise, fitness, pedometer or heart rate monitoring</td>
<td>38%</td>
</tr>
<tr>
<td>Diet, food, calorie counter</td>
<td>31%</td>
</tr>
<tr>
<td>Medication management (tracking, alerts, etc)</td>
<td>2%</td>
</tr>
<tr>
<td>Mood</td>
<td>*</td>
</tr>
<tr>
<td>Sleep</td>
<td>*</td>
</tr>
<tr>
<td>Other</td>
<td>14%</td>
</tr>
</tbody>
</table>

An estimated 20% of US adults now use at least one form of wearable device to track their health

Source of Table: Pew Research Report (US study), 2012 data
Patients Comfortable with using mHealth

Patients & Clinicians want Telemonitoring if...

- Easy to use
- Tangible Benefits
- Maintain good patient-provider communication
- No increased clinical workload
- It was SAFE
Potential Benefits of RPM

- Increasing adoption of RPM strategies across Canada to manage patients with chronic diseases (i.e. HF, COPD, DM)

- RPM strategies *may*:
  - Reduce ER visits and hospitalizations (HF)
  - Reduce all-cause mortality
  - Reduce costs compared to usual care
  - Improve self-reported QOL for HF patients
  - +/- Improve self-care behaviour
  - Patients report satisfaction with use of telemedicine & high compliance with use of technology

Self-Care Management in Heart Failure

What is ‘Self-Care’?

“...a naturalistic decision making process of maintaining health through positive health practices (self-care maintenance) and managing illness and disease (self-care management).”

• Educating patients on HF self-care is a focus in all HF practice guidelines
• Poor self-care is a cause (contributor) for HF hospital readmission
• Self-care impacts QOL, symptom burden & functional status

RPM and HF Self-Care

- Technology can support engagement in self-care practices & comprehension of key HF education:
  - Importance of daily weight monitoring
  - Maintaining Na/fluid restrictions
  - Adherence to medication regimens
  - Recognition of HF symptoms and understanding of their *meaning*
  - Evaluation of a treatment (i.e. instructed to take an extra dose of diuretic for weight gain)

- Self-care involves complex processes and is a learned process/set of skills
Re-hospitalization

Many readmissions triggered by potentially remediable factors (50-66%):
- Poor discharge planning
- Non-adherence:
  - Diet & medical Rx
- Inadequate follow-up
- Poor social supports
- Delays in seeking medical attention

Need to restructure the delivery of care:
- Reduce fragmentation
- Enhance patient self-efficacy
- Improve cost-effectiveness
- Quality
- Clinical outcomes
- Transition from hospital to home

How many of you have used RPM in your practice?
What has your experience been with RPM?
RPM: Medly™ System

- Multiple Chronic Disease Management Platform
- Medly™ refers to a medley of chronic patient conditions
- Rolled out in UHN HF Clinic summer 2016
- Similar program began ~1 yr. ago in the renal clinic eKidneyCare
• Smart Phone (Medly™ app)
• BP Cuff
• Weight Scale
• Wireless Technology
The Promise of a Healthy Heart
### Pulse

- **Average Pulse:** 97.3 bpm
- **Normal Range:** 50-150 bpm
- **Out of Range Readings:** 0
- **Total Readings:** 0

### Symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Oct 31</th>
<th>Nov 25</th>
<th>Nov 29</th>
<th>Nov 27</th>
<th>Nov 28</th>
<th>Nov 30</th>
<th>Dec 01</th>
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<tr>
<td>Fatigue</td>
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<td>ICD Flick</td>
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<td></td>
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<tr>
<td>Night breathing worsened</td>
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<td></td>
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<td></td>
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<td>More chest pain</td>
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<td></td>
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<td></td>
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<tr>
<td>More tired</td>
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<td></td>
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<tr>
<td>Shortness of breath</td>
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<tr>
<td>Swollen ankles</td>
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<tr>
<td>Unusual heart beat</td>
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<td>Light headed</td>
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<td></td>
</tr>
<tr>
<td>Reduced activities</td>
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</tr>
<tr>
<td>Number of pills</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
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</table>

**Legend:**
- **No:**
- **Yes:**
Team Medly™ - PMCC

- MD lead, 2 NPs in Heart Function Program (Medly ‘super users’) & telehealth design team

- Clinical alerts emailed to MD – collaborate with NPs who view patient data (alerts) on Medly dashboard

- NPs contact patients via phone/email & provide instruction on medication adjustment, arrange for outpatient labs, +/- urgent assessment in HF clinic

- NPs reinforce HF self-care management principles (fluid/sodium restrictions, meaning of HF symptoms)
Team Medly™

- NPs ensure dashboard has up-to-date patient information (i.e. medication list, recent labs)
- Build relationships with patients and supports continuity of care (clinic/hospital → home)
- Patients identified as in need of urgent assessment can be seen by NPs in RAPID-HF clinic, treat with IV Lasix OP setting
- Patients call/email with concerns or questions
- Patient ratio – likely will grow to ~200 patients per NP
Anecdotal Feedback from Patients on Medly™

“I love this system, it makes us feel so much more secure knowing you are keeping an eye on us.”

“I think it is great. I feel reassured that you guys are watching.”

“I think I'm more responsible for myself, or more accountable... I know what's happening with me for that day... If my weight is higher then I make sure that I make changes in the diet…”

“I felt like I was participating in trying to keep my health.”
CardioMEMS™ HF System

- Implantation of a sensor into the pulmonary artery via RHC; Remote monitoring of daily PA pressures

- Indicated for NYHA III patients who have been hospitalized with HF in the last one year (HFrEF & HFpEF)

- **Adjust medical therapy based on PA pressure range**

- **CHAMPION trial**: pressure-guided HF management superior in maintaining stability of high-risk patients, less hospitalization for ADHF & hospital readmission at 30 days

CardioMEMSTM HF System

- **PA Sensor** (size of a dime)
- **Patient Electronics System** (specialized pillow)
  - daily PA readings
- Data transmitted to secure database
- Clinician email notification when PA mean pressure threshold exceeded
Stable Compensated HF à ADHF

Earliest signs of worsening HF:
\[ \uparrow \text{Intracardiac & PA pressures} \]

-30
-20
-10
Time preceding hospitalization (days)

Filling pressure increase
Autonomic adaptation
Intrathoracic impedance changes
Symptoms
Weight change
Hospitalization
Decompensation
Presymptomatic congestion

Hemodynamically stable

Monitoring PA Pressures

- Review PAP measurements daily or 2-3x week
- Info. is used with daily weights, signs/symptoms & labs

**HYPOVOLEMIC**
- PAP < target range
  - Lower diuretic
  - Stop diuretic
  - Lower (hold) vasodilators

**EUVOLEMIC**
- PAP within range
  - No medication changes

**HYPERVOLEMIC**
- PAP > target range
  - Add or ↑ diuretic
  - Clinic for IV diuretic
  - Add or ↑ vasodilators
RPM: Case Studies
Meet Mary

68-year-old with HFrEF (diagnosed 3 years ago). Comorbidities include: DM, HTN and mild chronic renal insufficiency.

In the last year she has had 2 admissions for ADHF. Currently NYHA Functional Class III.

When she was last admitted, she was ~ 20 lbs. above her target weight. Her BMI is 38.2 and assessment of JVP can be challenging.
Is RPM a Good Fit for Mary?

- ‘Frequent flyer’ – 2 admits for HF in last year
- **Chronic diseases:** DM, HTN, renal impairment
  - … likely complex medication regimen
- At last admission, may not have recognized the signs/symptoms of decompensation early on as 20 lbs. above TW
- Supports self-care behaviour

Age? Comfortable with using technology?
Over 55 yrs. fastest growing smartphone market
Meet Lewis

55-year-old man with ischemic cardiomyopathy and a history of 3 HF admissions in the last 2 years. He has a CRT-D.

He has HTN and progressive renal dysfunction. Now on IHD three times per week.

Lives with his family who are in good health.

He tells you, “I have never used a smartphone and am not good with computers”.

The Promise of a Healthy Heart.
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Is RPM a Good Fit for Lewis?

- Perhaps not cardiac Medly™ alone, but in conduction with eKidneyCare
  
  ........... RPM daily weights useful in adjusting oral diuretic doses to maintain euvoolemia (or target weight)

- Patients perceived lack of knowledge (engagement) with using technology
  
  ........... but lives with family who may be able to help
Meet Jiang

72-year-old woman, who lives alone, in a remote town in Northern Ontario. English is her 2nd language.

Valvular cardiomyopathy (moderate to severe LV dysfunction) with a recent prolonged admission for ADHF (first admit for HF).

During hospitalization she received ++ counseling on HF self-care.

Comorbidities include AF, Parkinson’s and mild cognitive impairment … but HF team feels she is able at present to live/function independently.
Is RPM a Good Fit for Jiang?

- Level of English proficiency … not necessarily a barrier to RPM
- Cognitive impairment à ability to use the technology?
- Parkinson’s with tremor à can they use the equipment?
- She has a new diagnosis of HF:
  - will likely need further home teaching/support on self-care
  - lives alone
What do you think some of the challenges are for implementing this technology into your clinical practice?
Would you consider adopting RPM in your practice to manage HF patients?
Patient Selection for RPM

- Is this patient appropriate for RPM?
  - Beware of digital divide

- What are we trying to do with this technology?
  - Want to improve self help, enabling patients in self management to improve QoL, reduce hospitalization, improve survival

- How do we select patients?
  - Recent admissions – ward or ED
  - High BNP
  - Fluctuating weight
  - Those at risk of decompensation – (Functional Class, BNP, LVEF)
  - Those coming from remote locations
  - NYHA FC ≥ II
Final Thoughts

Implementation of RPM – Considerations for Success:

- Associated workload for clinical team
- Costs of devices/technology
- Ability to respond timely to clinical data and make treatment decisions
  - Adjusting medical therapy is a key factor for success
- Needs to be easy for patients to use; Benefits must be perceived for long term adherence
- RPM program needs to ensure safety
Thank you