



hSITE

Healthcare Support through Information
Technology Enhancements

DAY 2

Annual Research Review



hSITE

Healthcare Support through Information
Technology Enhancements

THEME 1

CLINICAL WORKFLOWS AND REQUIREMENTS



hSITE

Healthcare Support through Information
Technology Enhancements

THEME 1

CLINICAL WORKFLOWS AND REQUIREMENTS



Joe



Mark



Robin



Alex

Centre for Global eHealth Innovation



Joseph A. Cafazzo, PhD PEng
Lead, Centre for Global eHealth Innovation, University Health Network
Assistant Professor, Faculty of Medicine, University of Toronto

@JosephCafazzo



The Big 6

60% of all spending on
Chronic Disease

Diabetes

High Blood Pressure

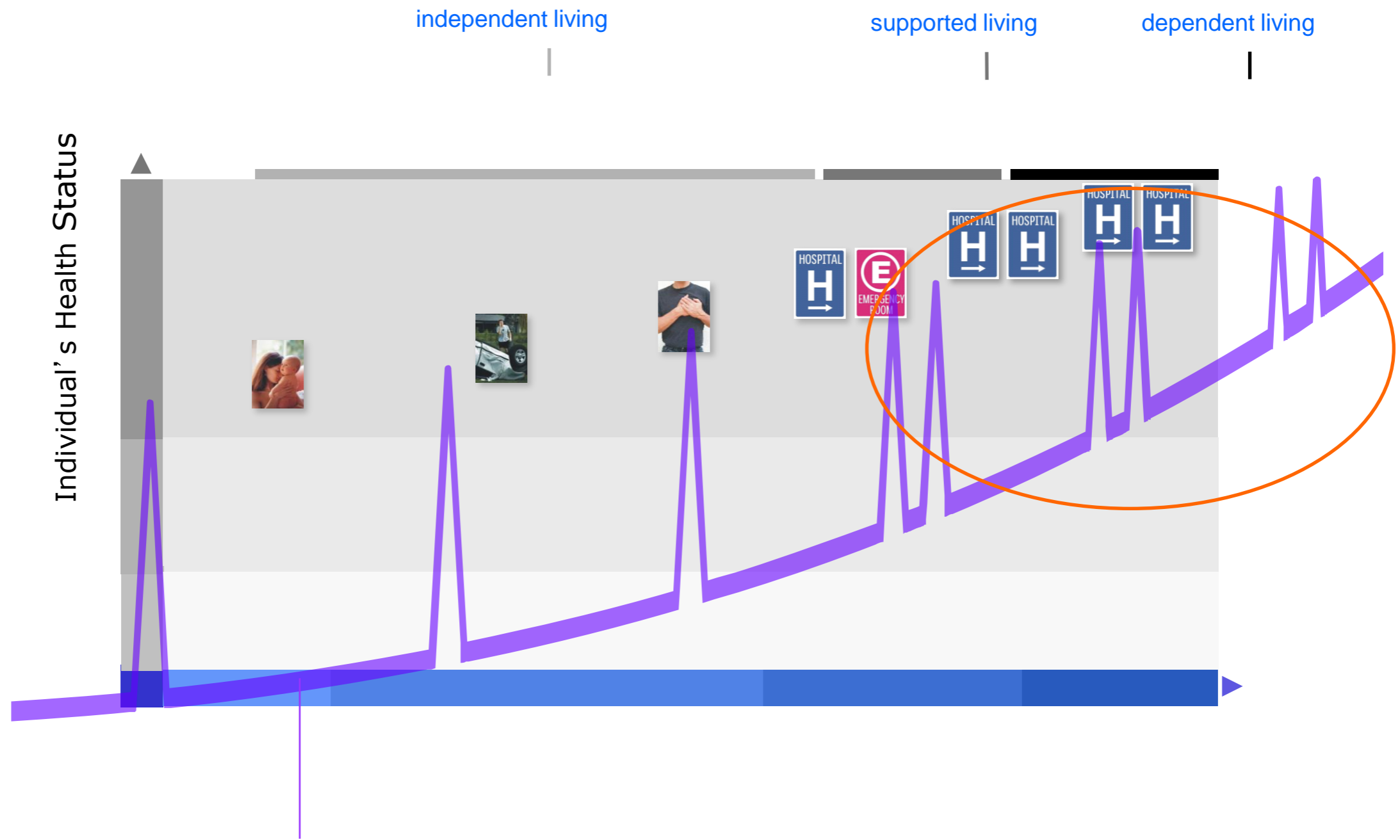
Kidney Disease

Heart Failure

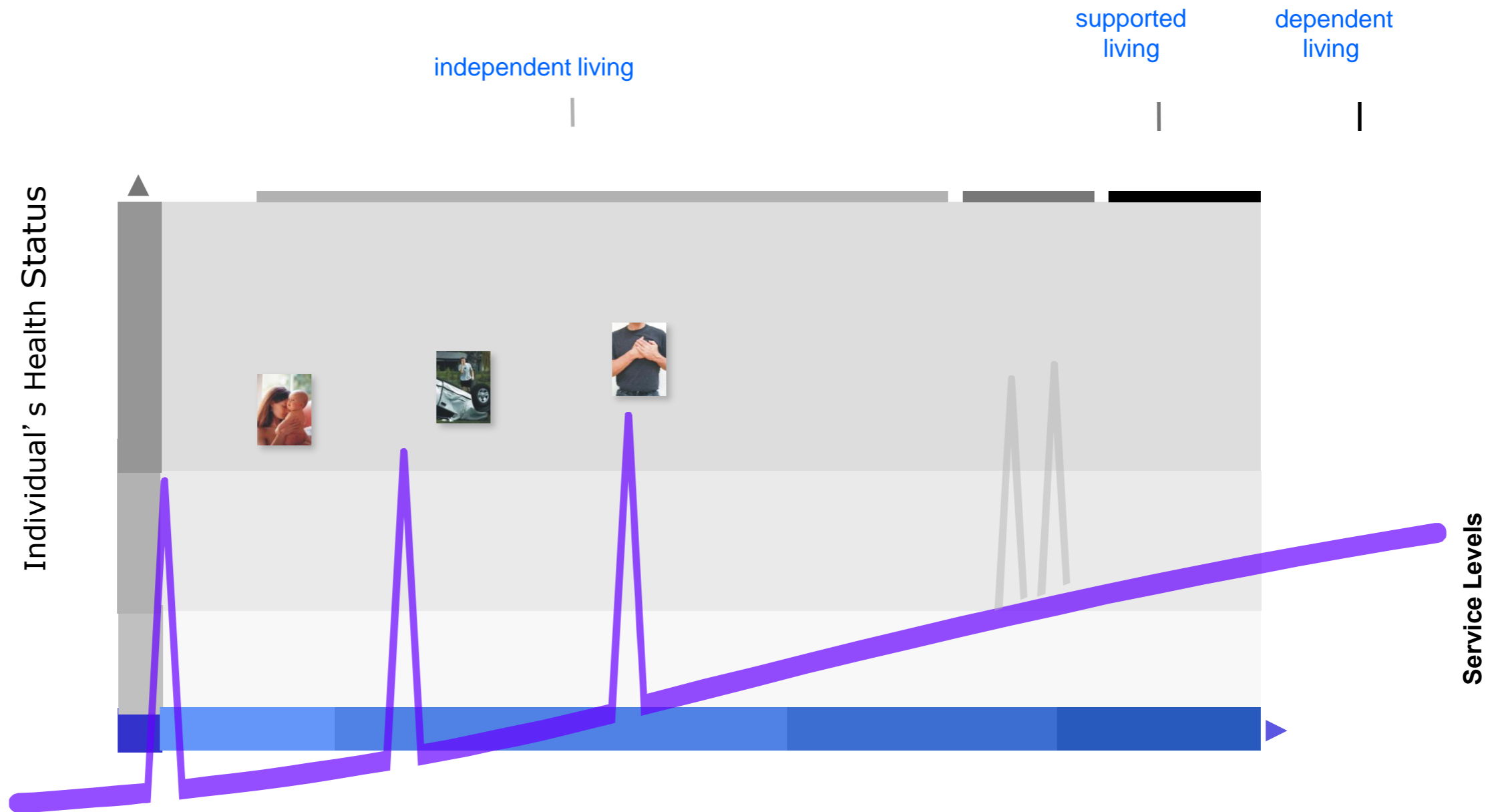
Lung Disease

Mental Health

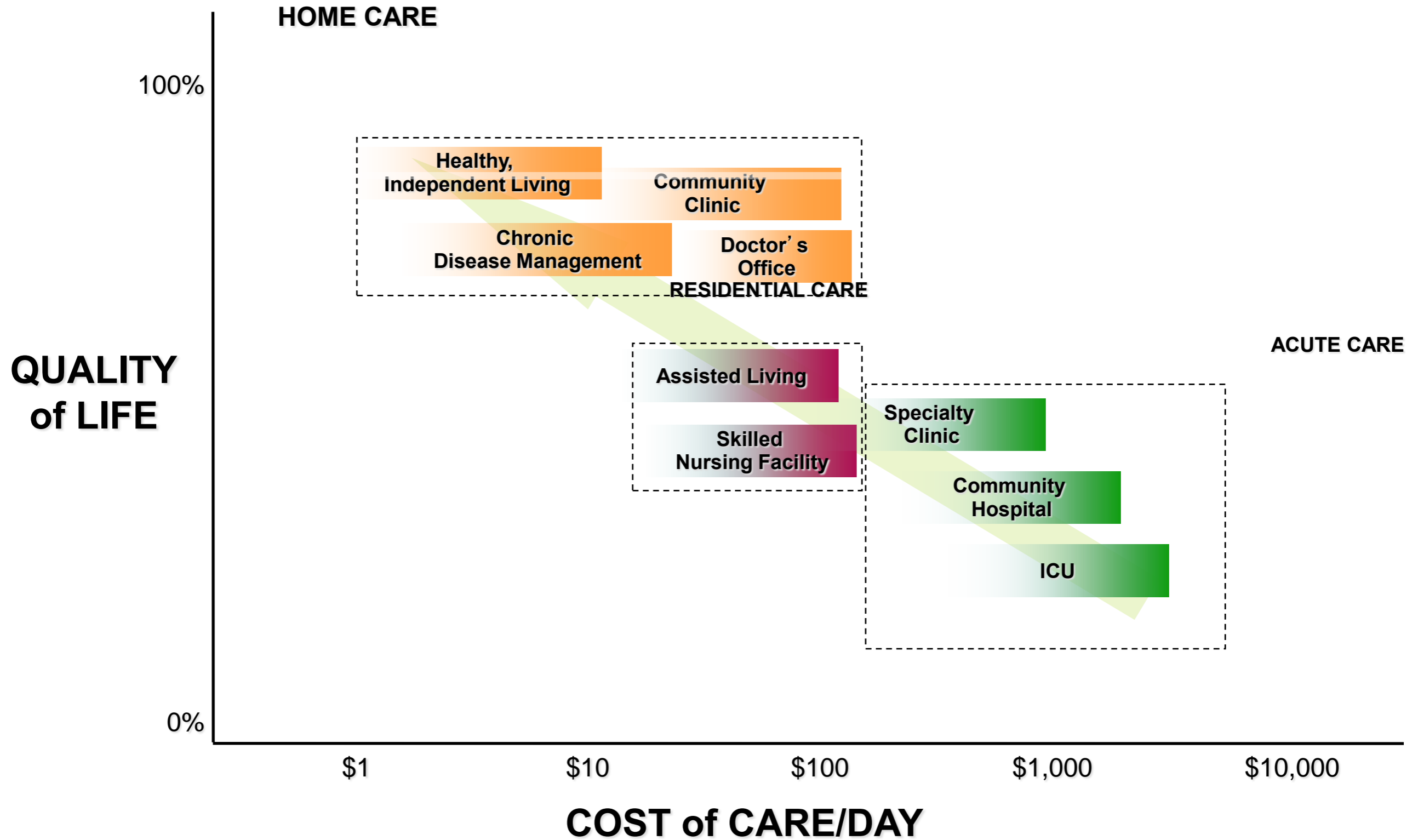
Current care models focus primarily on acute care



Can we suppress these acute events?



'Shift Left' of Healthcare through Technology¹



1) from Intel, and Center for Aging Services Technologies (CAST)

Remote Monitoring and Self-Care

“Classic” Remote Patient Monitoring

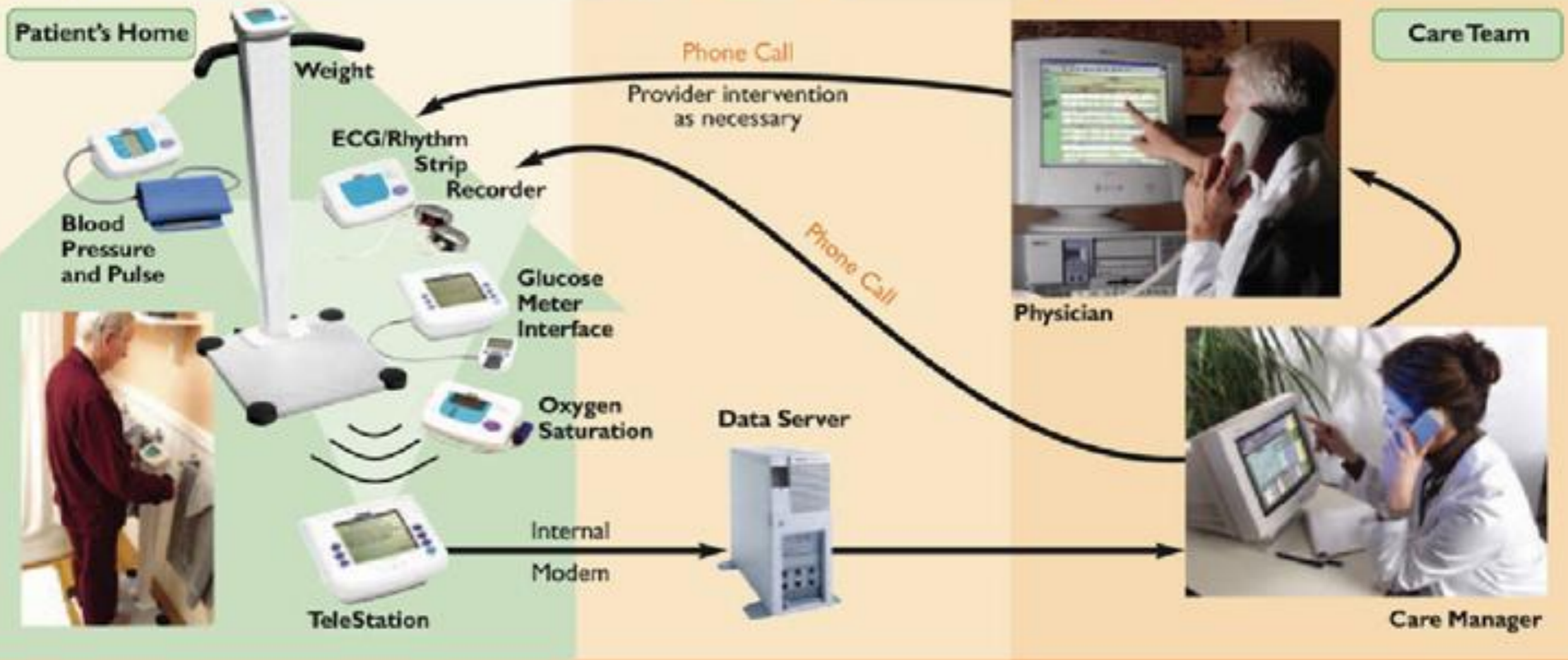


Joseph Hayduk, 86, is heart failure and uses a device that transmits his vital signs to a RN at Meridian Health. The RN calls all 18 patients in program daily. The New York Times Feb 13, 2009

VITAL SIGNS MEASUREMENTS AND SURVEY RESPONSES

AUTOMATIC DATA COLLECTION AND TRANSMISSION

DATA PRESENTATION AND CLINICAL REVIEW SOFTWARE



Members take their own measurements at home using the Philips Patient Telemonitoring Set.

Results are automatically transmitted via modem using an ordinary home telephone line to a dedicated server.

A care manager reviews patient information, and follows up with a phone call to members or their physician, as needed.

mRPM in homecare



ParaMed

Original Paper

Design of an mHealth App for the Self-management of A Type 1 Diabetes: A Pilot Study

Joseph A Cafazzo
Katzman^{4,5}, MD, FRCPC

- ¹Centre for Global eHealth
- ²Institute of Health Policy
- ³Institute of Biomaterials
- ⁴Division of Adolescent
- ⁵Department of Pediatrics
- ⁶Division of Endocrinology

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

Alexander G. Logan, M. Jane Irvine, Warren J. McIsaac, Andras Tisler, Peter G. Anthony Easty, Denice S. Feig, Joseph A. Cafazzo

Abstract—Lowering blood pressure reduces cardiovascular risk. We hypothesized that home blood pressure telemonitoring and self-care support would improve blood pressure control in diabetics.

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Original Paper

Mobile Phone-Based Telemonitoring for Heart Failure Management: A Randomized Controlled Trial

Emily Seto^{1,2}, PhD, PEng; Kevin J Leonard^{1,2}, PhD, MBA; Joseph A Cafazzo^{1,2,3}, PhD, PEng; Caterina Masino¹, MA; Heather J Ross^{4,5}, MD, MHSc, FRCPC

- ¹Centre for Global eHealth Innovation, University Health Network, Toronto, ON, Canada
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- ³Department of Materials and Biomedical Engineering, University of Toronto, Toronto, ON, Canada
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- ⁵Department of Health Policy, Management and Evaluation, University of Toronto, Toronto, ON, Canada

Original Paper

Mobile Phone-Based Telemonitoring for Heart Failure Management: A Randomized Controlled Trial

Emily Seto^{1,2}, PhD, PEng; Kevin J Leonard^{1,2}, PhD, MBA; Joseph A Cafazzo^{1,2,3}, PhD, PEng; Jan Barnsley², PhD; Caterina Masino¹, MA; Heather J Ross^{4,5}, MD, MHSc, FRCPC

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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.

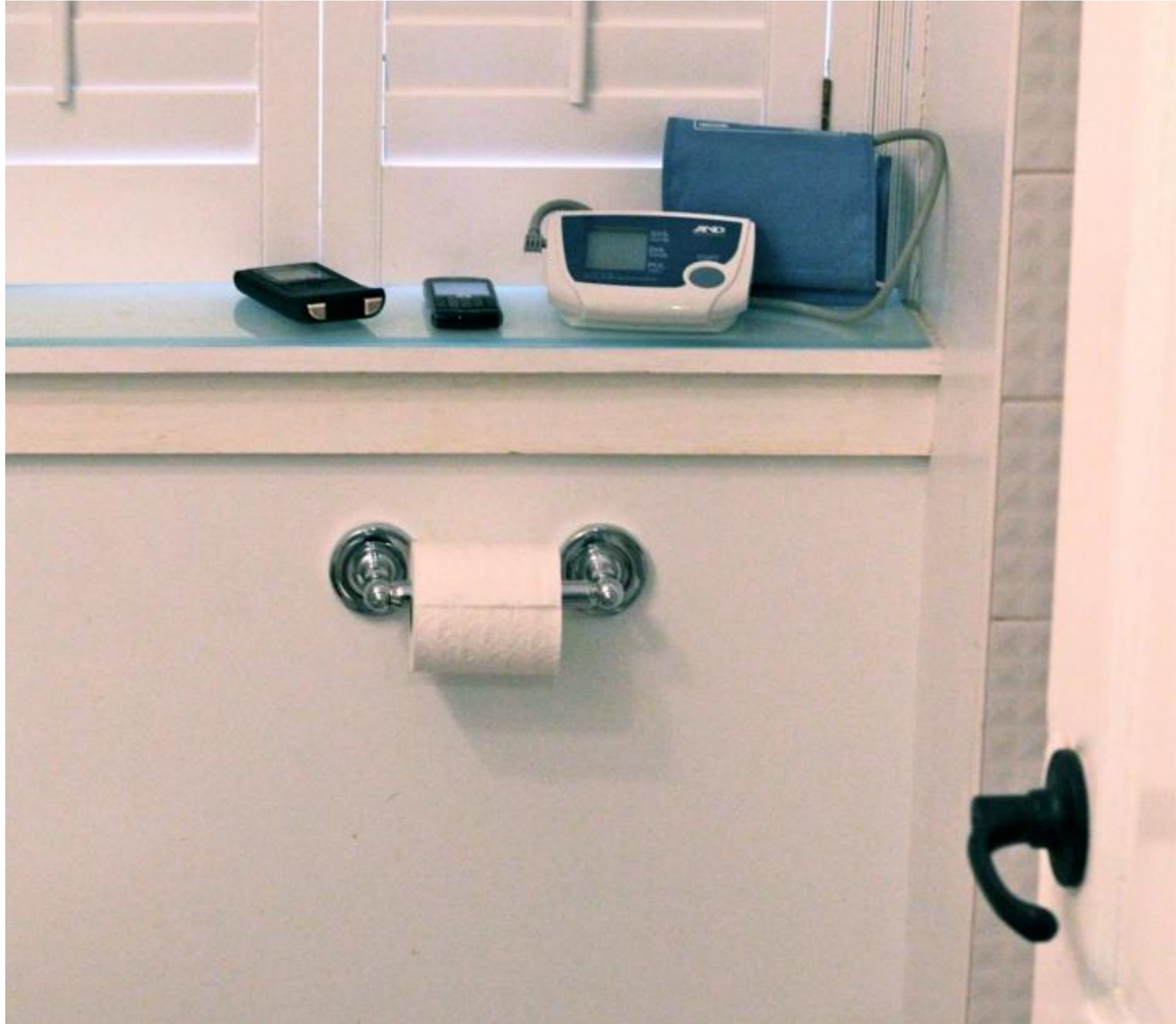
190 Elizabeth St.
Toronto, ON, M5G 2C4

Canada

Phone: 1 416 340 4800 ext 6409
1 416 340 3595

Congestive Heart Failure Client

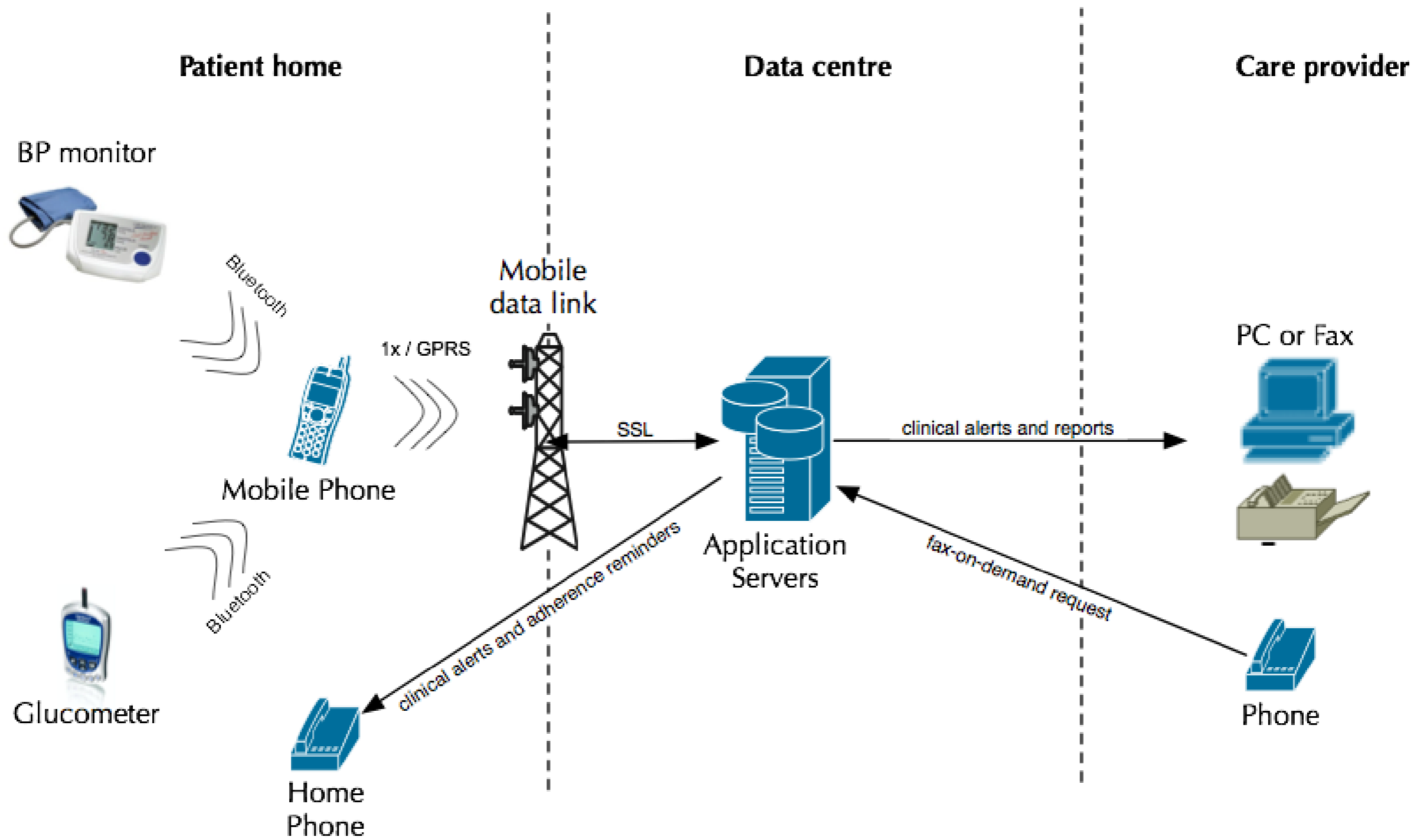

















 BlackBerry

Symptoms

Have you fainted?

- 1** No
- 2** Yes
- 3** Cancel

BlackBerry

Symptoms

Has your breathing at night worsened?

- 1 No
- 2 Yes
- 3 Cancel

BlackBerry

Summary

Weight **154.4** (-0.2)

BP **105**
78

Pulse **74** /min

Sympt. **Abnormal**

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

Press 1 for menu



BlackBerry

Details Needed

110 / 80

Pulse: 74 /min

Taken Today 10:00 AM

Was this?

- 1 First thing in the morning
- 2 During the day

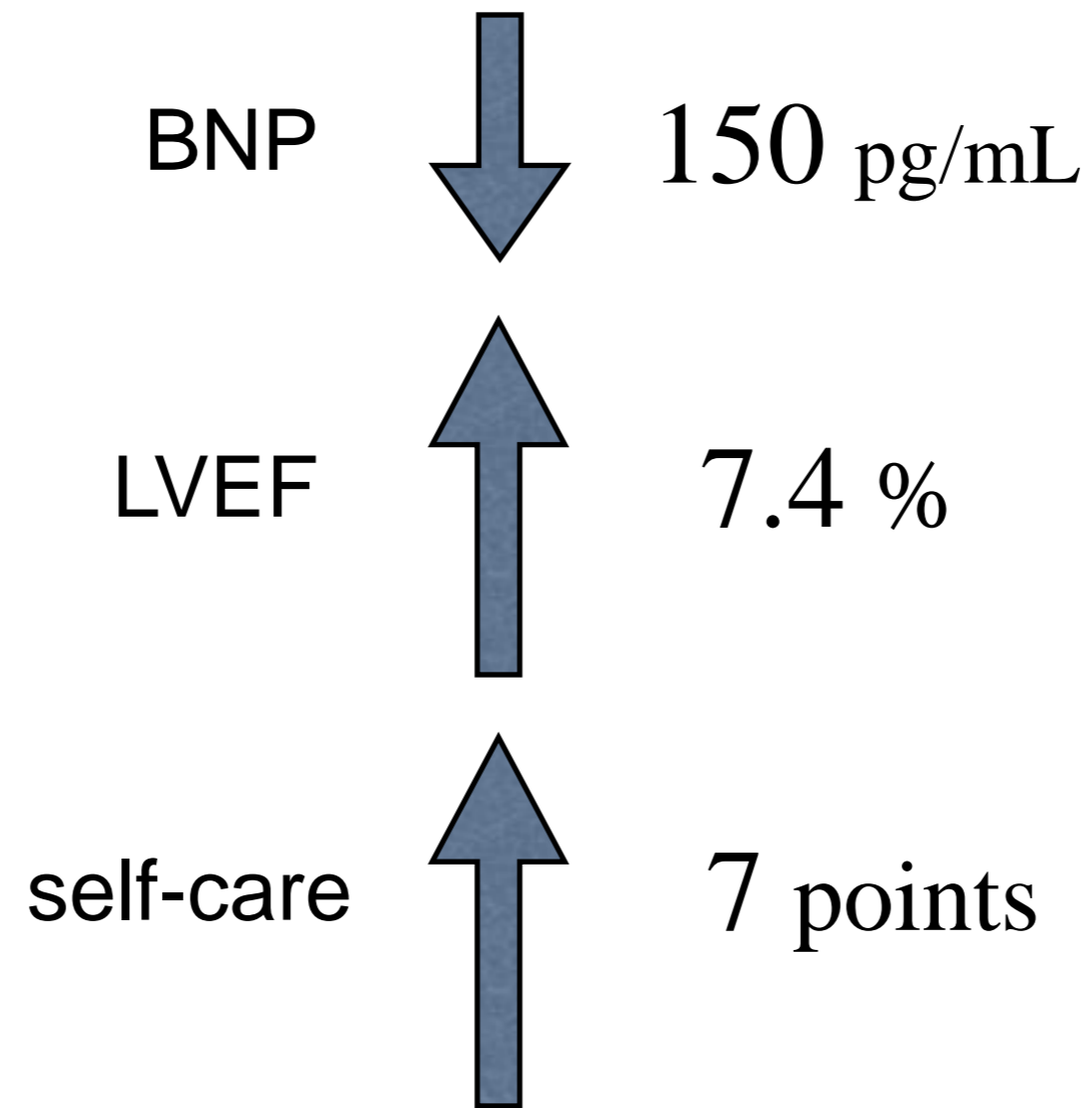


RCT Study design

- 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



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

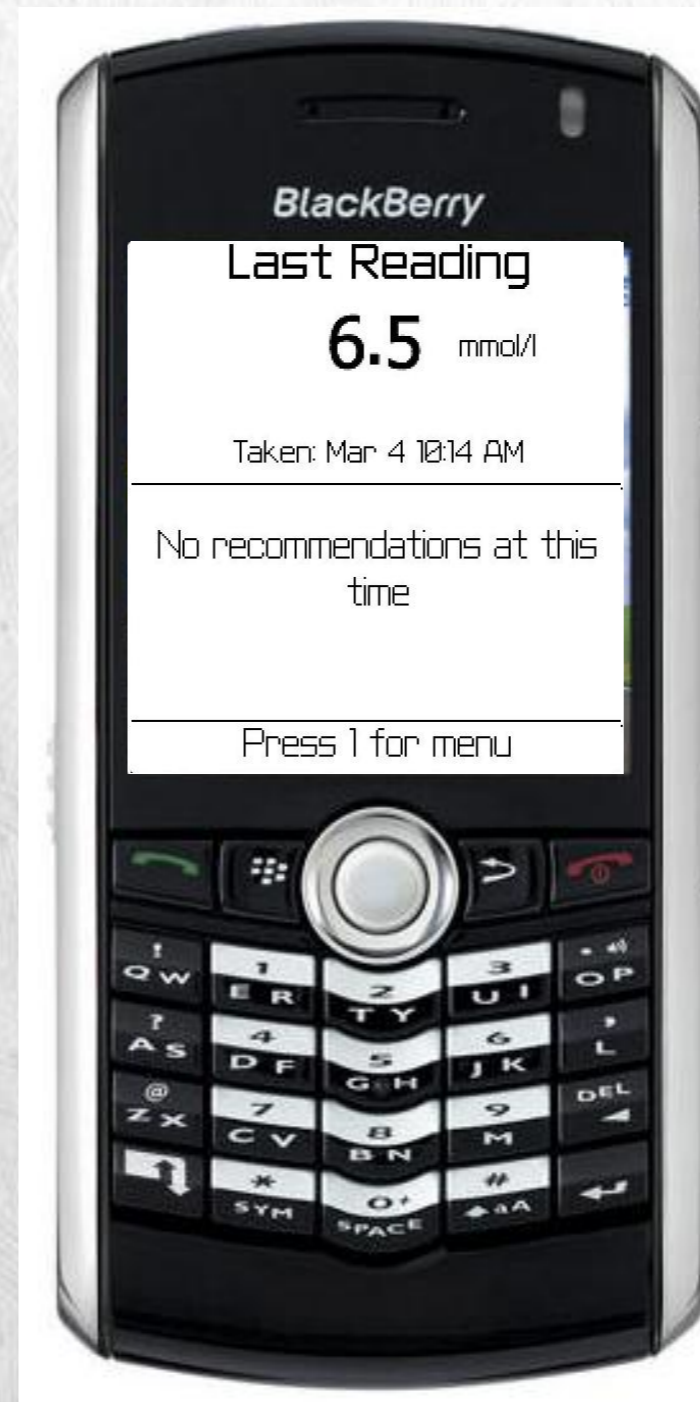
Alexander G. Logan, M. Jane Irvine, Warren J. McIsaac, Andras Tisler, Peter G. Rossos, Anthony Easty, Denice S. Feig, Joseph A. Cafazzo

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

Blood Pressure
automatically
transmitted to
BlackBerry



Blood Sugar
readings
automatically sent
to BlackBerry



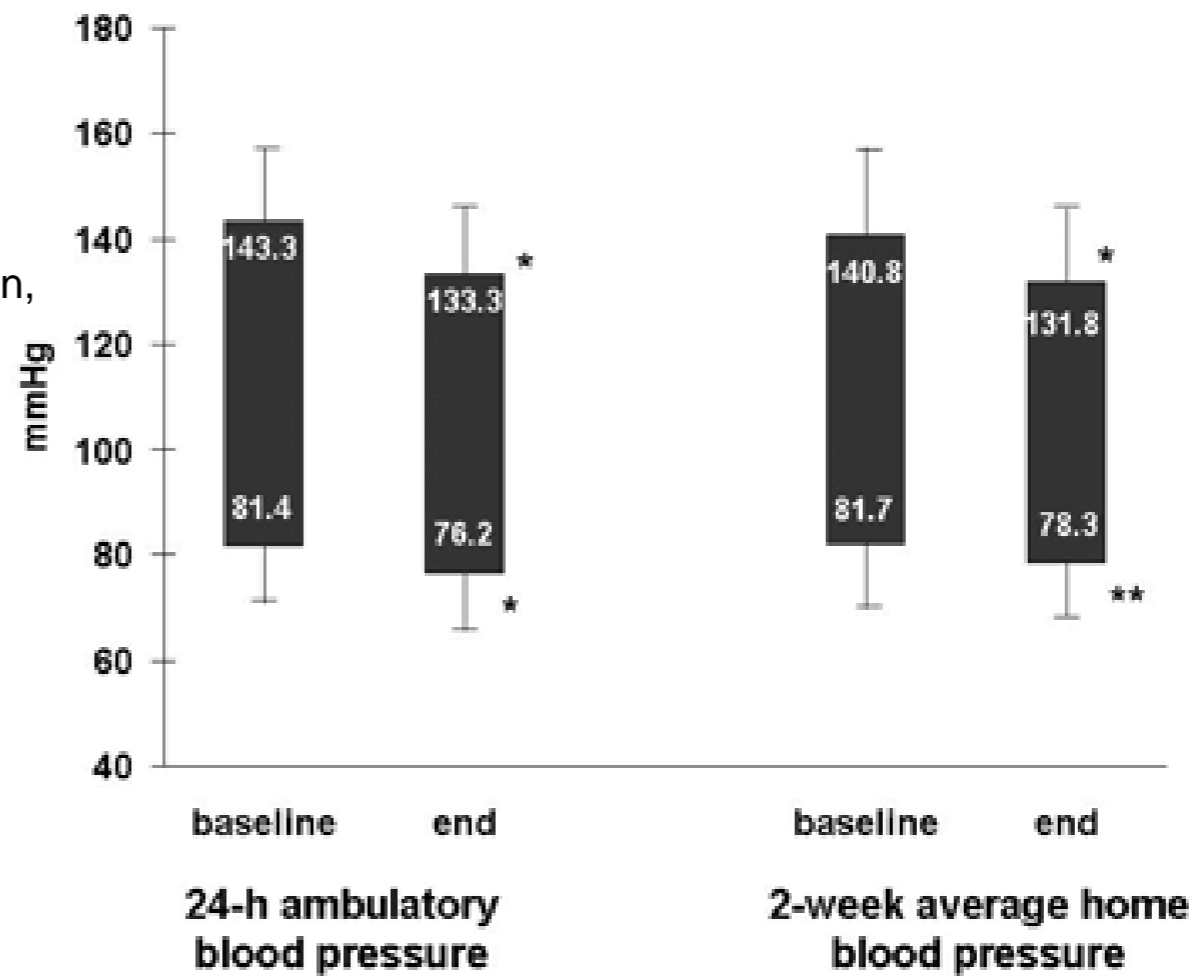
Results can be graphed to show progress and trends



Pilot Results

Diabetic Hypertension

American Journal of Hypertension,
20(9), pp. 942-948, 2007



Intervention group (55 patients)




Control group (55 patients)



Intervention group
(55 patients)

Control group
(55 patients)

systolic  -9.1 mmHg

diastolic  -3.2 mmHg

no change

What else did we learn?

the physicians weren't responsible for the improvement

no additional meds
no significant changes in management

Design of an mHealth App for the Self-management of Adolescent Type 1 Diabetes: A Pilot Study

Joseph A Cafazzo^{1,2,3}, PEng, MHSc, PhD; Mark Casselman¹, MSc; Nathaniel Hamming¹, PEng, MHSc; Debra Katzman^{4,5}, MD, FRCPC; Mark R Palmert^{5,6}, MD, PhD

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⁴Division of Adolescent Medicine, The Hospital for Sick Children, Toronto, ON, Canada

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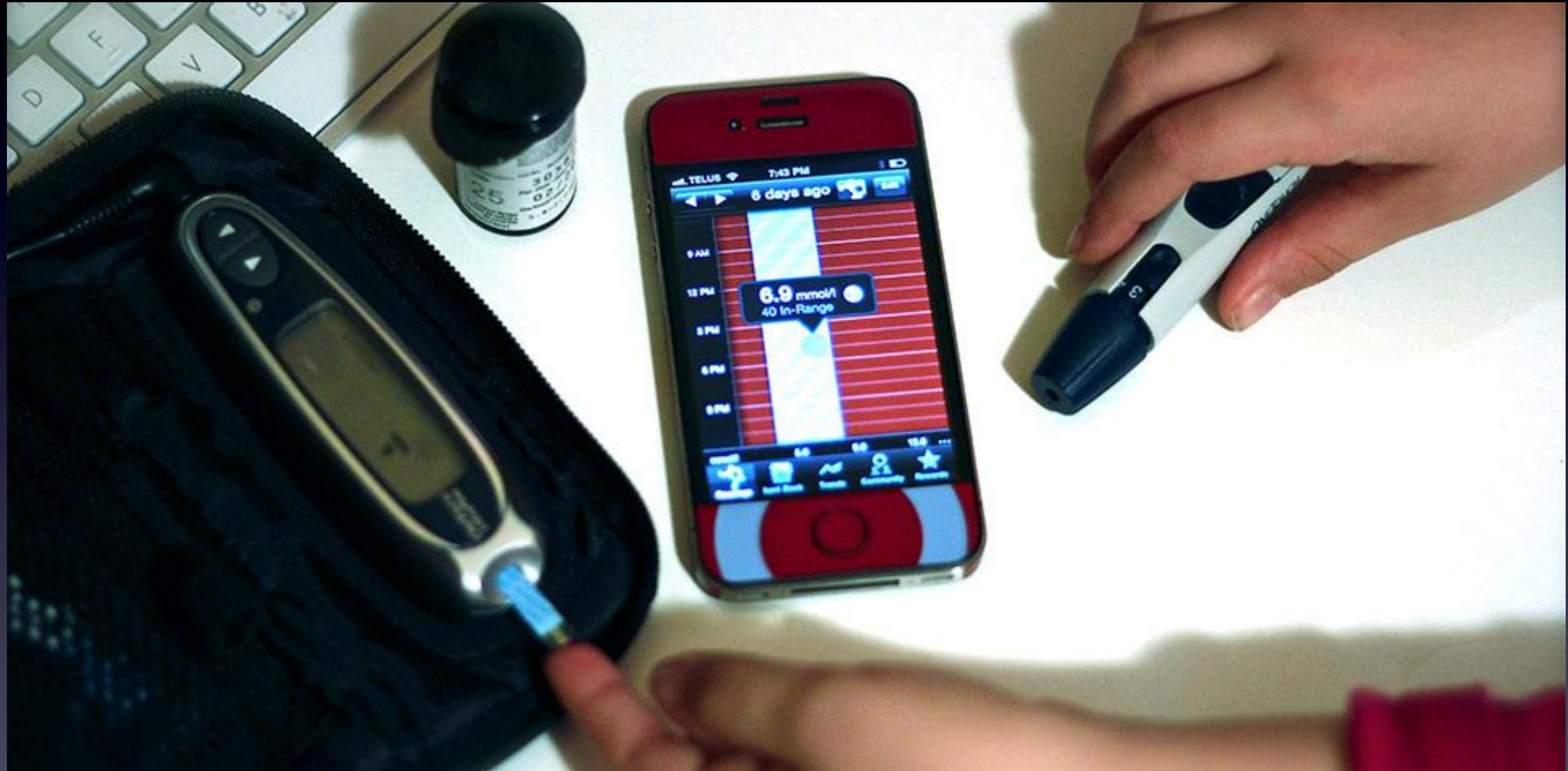
⁶Division of Endocrinology, The Hospital for Sick Children, Toronto, ON, Canada

Corresponding Author:

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Centre for Global eHealth Innovation

Mobile apps are a natural, ubiquitous means for the potential delivery of health services to young diabetes patients.







Carrier



6:04 PM



Settings

Done

Readings Graph

Labels, Colors & Reminders >

Day starts at 6:00 AM >

Sharing

Connects with
 TELUS health space™ >



Email >

About

Feedback >

Community



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



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



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



have u been to camp huronda

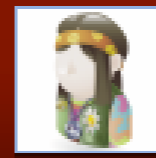
Community



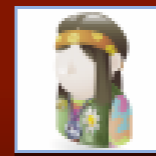
I might go



what thing and when



Sorry meant: is anyone going :P



Hey.. I'd anyone going to the diabetes day thing?



hola welcome to the knew improve future lol I'm joking

Criteria:

- Regular Glucose Measurements
- Participation in Communities
- Therapy Control



Readings



History

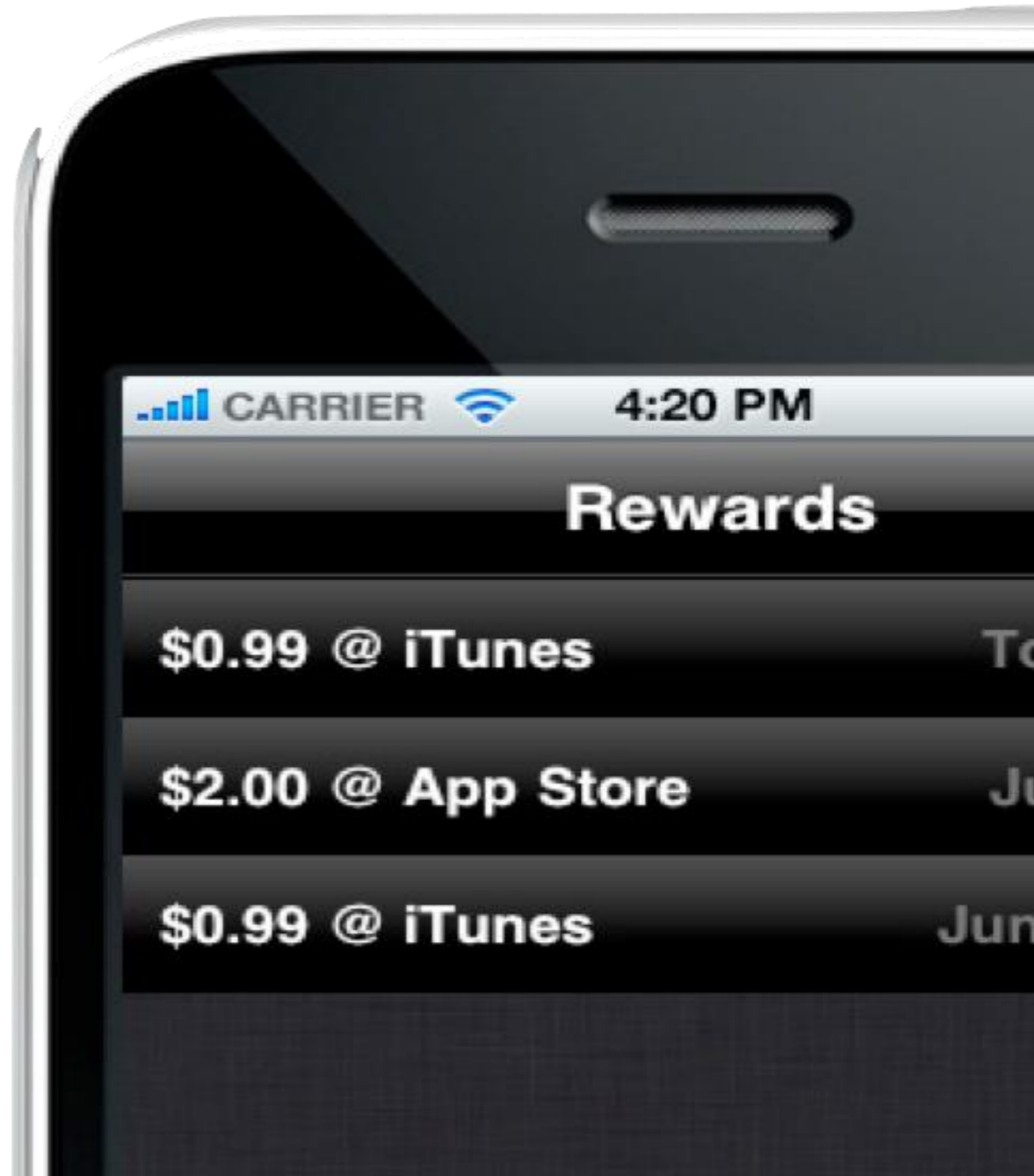


Sharing



Rewards

bant encourages
positive
health behaviours
through rewards



Reward Messages



-  **Experience Points** 2h
+100 XP for 4 readings. Sticking to it!
-  **bant Reward** 10h
Enjoy "Angry Birds Rio" !!! Tap link to redeem: <http://bit.ly/dNXYZv>
-  **bant Reward** 10h
Enjoy "Night Vision Picture and Video Spy Toolbox - Pro"! Tap link to redeem: <http://bit.ly/iITEYU>
-  **Experience Points** 1d
+70 XP for 4 readings. Sticking to it!



Reward Messages



Experience Points

2h

+100 XP for 4 readings. Sticking to it!



bant Reward

10h

Enjoy "Angry Birds Rio" !!! Tap link to redeem: <http://bit.ly/dNXYZv>



bant Reward

10h

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



Experience Points

1d

+70 XP for 4 readings. Sticking to it!



Readings



bant Book



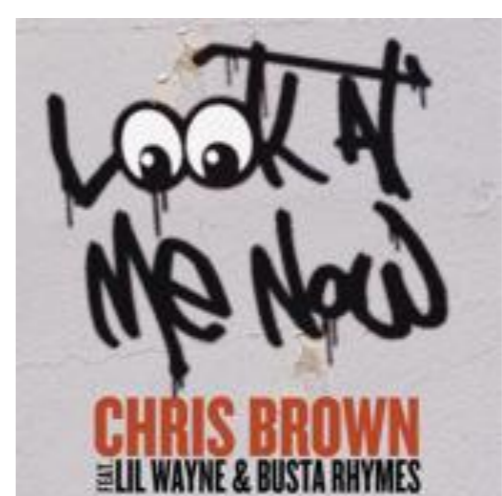
Trends



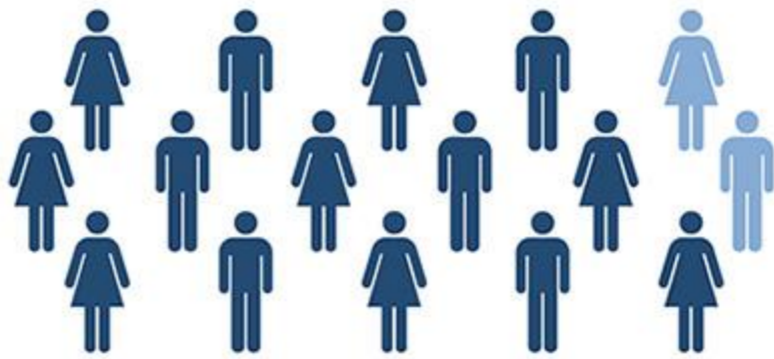
Community



Rewards



Pilot Data



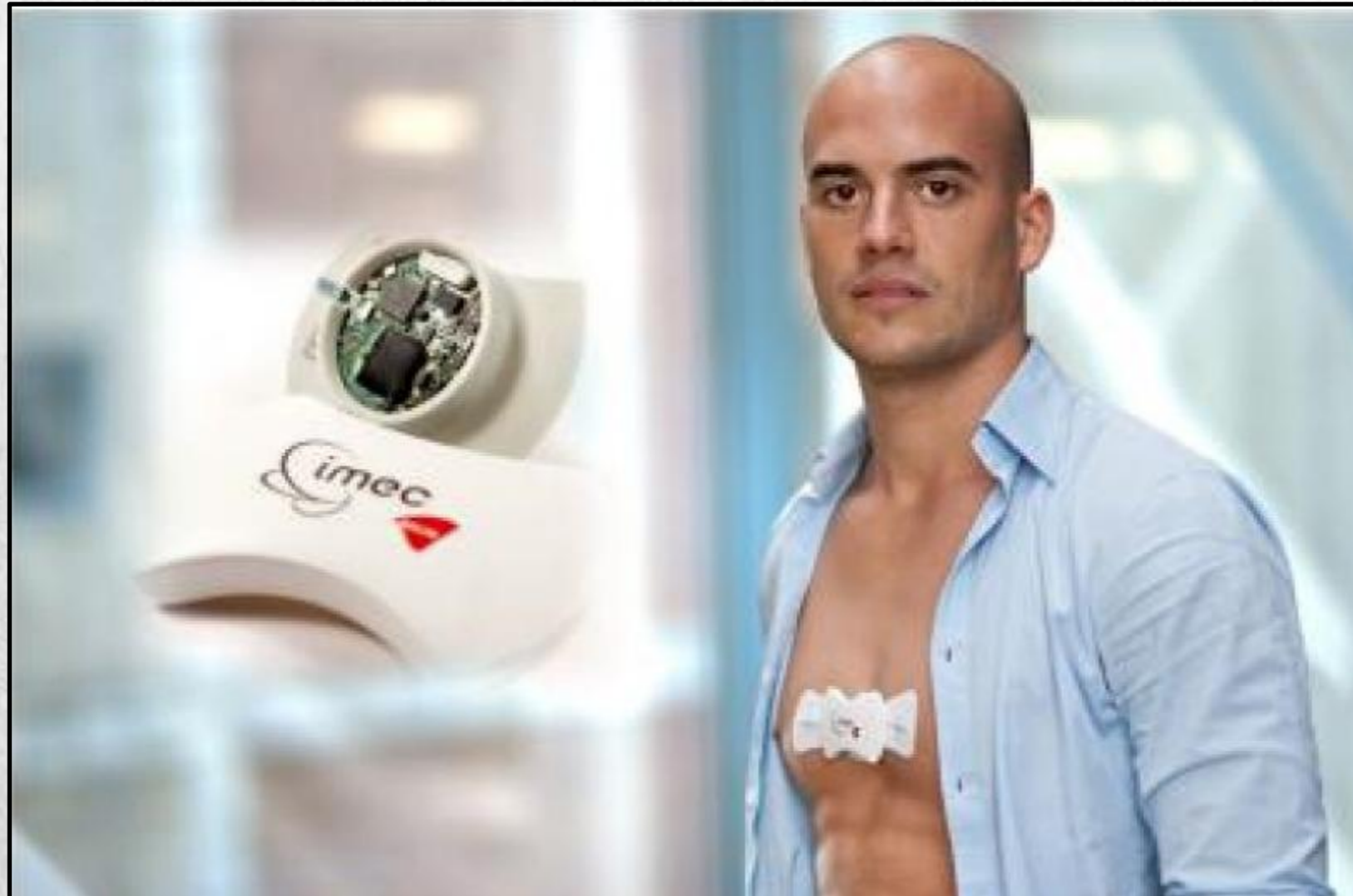
Satisfaction was high, with 87.5% (14 of 16 subjects) stating that they would continue to use the system.

49.6%

Daily average frequency of blood glucose (BG) measurement increased 49.6% (from 2.38 to 3.56, $p=0.006$).



imec







Heart Monitor

An ambulatory ECG, heart rate, and stress monitor





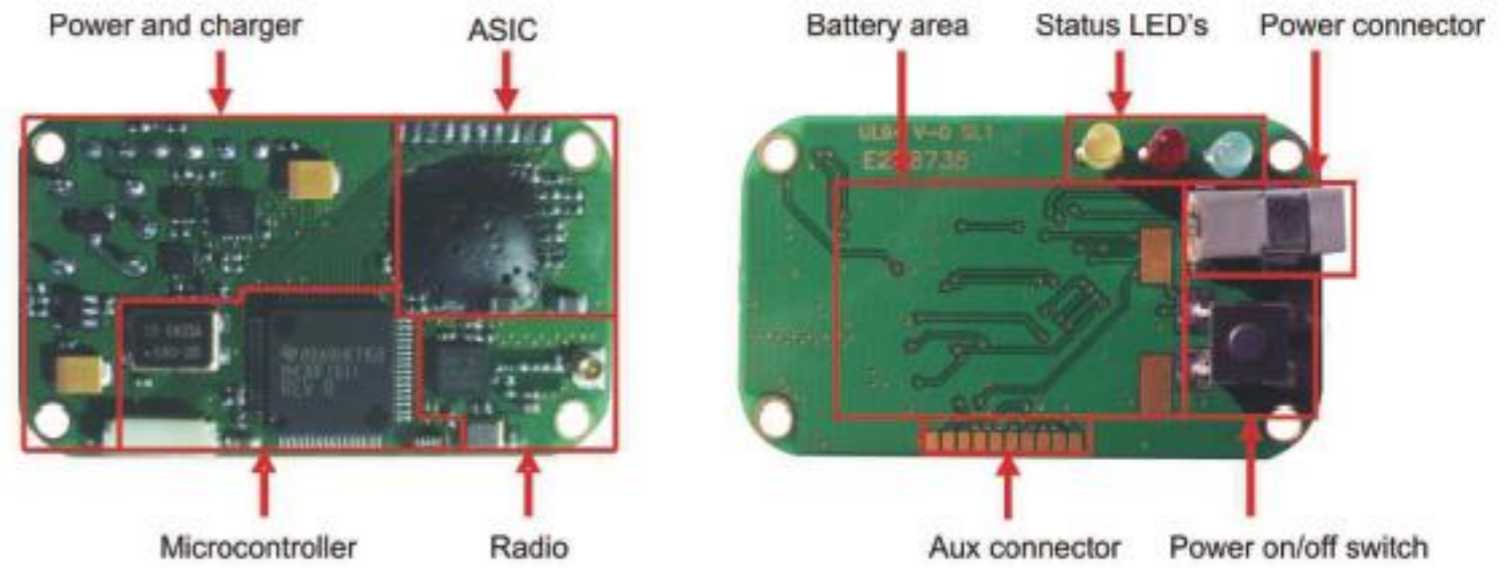


Fig. 1. Wireless 8-channel EEG Sensor Platform

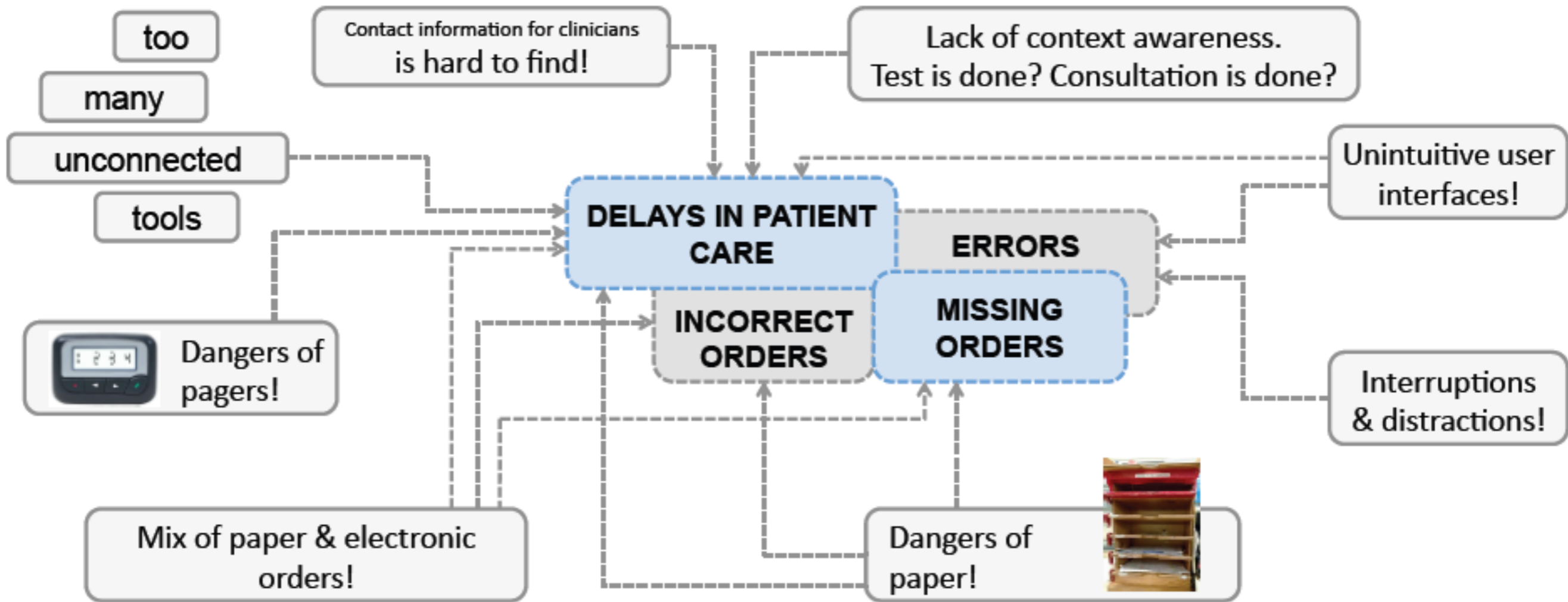


Fig. 2. Wireless EEG Headset

Clinical Collaboration App



Communication issues



-
- ▶ Adverse events in **7.5%** of hospitalizations*
 - ▶ **37%** of these are preventable
 - ▶ Poor communication is a main root cause



▶ *Baker GR, Norton PG, Flintoft V, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *CMAJ*. 2004;170(11):1678-1686.



IDN 123454
DOB 13-Jan-1941
☎ (416) 865-1234
📠 (905) 565-1234
🏠 570 Spadina Ave,
M5V 3A6 Toronto, ON

Patient Summary
74 yo man with hearth failure, atrial fibrillation, poorly controlled diabetic, renal failure. He has mild cognitive impairment. He lives with his daughter who cares for him.


Edit

+ HTN Falls Meds Renal Failure Cognitive Status

+ Glenn Briley Family MD
Cameron Leblanc Care Coordinator
Joseph Hulbert Cardiologist
Ruth Lawrence Geriatrics
Jacob Metz Nephrologist

+ Create New Message

Mark all as viewed

 **Jacob Metz - Nephrologist** Notified - J.Hulbert, R. Lawrence, G. Briley
New Edema. BP see that BB Lasix . New - 10 minutes ago
Unsure of the best course of action.
Can we consider an echo? Can we decide on meds & have the FP write the scripts?
?BP re A u/s @ TGH

HTN Falls Meds Renal Failure

 **New Category - system message**
Created Category - Renal Failure - Jacob Metz New - 10 minutes ago

HTN Falls Meds Renal Failure Cognitive Status

Glenn Briley Family MD Cameron Leblanc Care Coordinator Joseph Hulbert Cardiologist Ruth Lawrence Geriatrics Jacob Metz Nephrologist

New Message Discard Next

compose message > tag issues > notify team members

Create message for the care team...

Previous Next Ruth Lawrence- Geriatrics Notified - G. Briley

Q W E R T Y U I O P A S D F G H J K L Z X C V B N M Search



NSERC
CRSNG



DEMOS from the Centre for Global eHealth Innovation



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