Managing Health Using Technology

Gail Nunlee-Bland, M.D.

Professor Medicine and Pediatrics

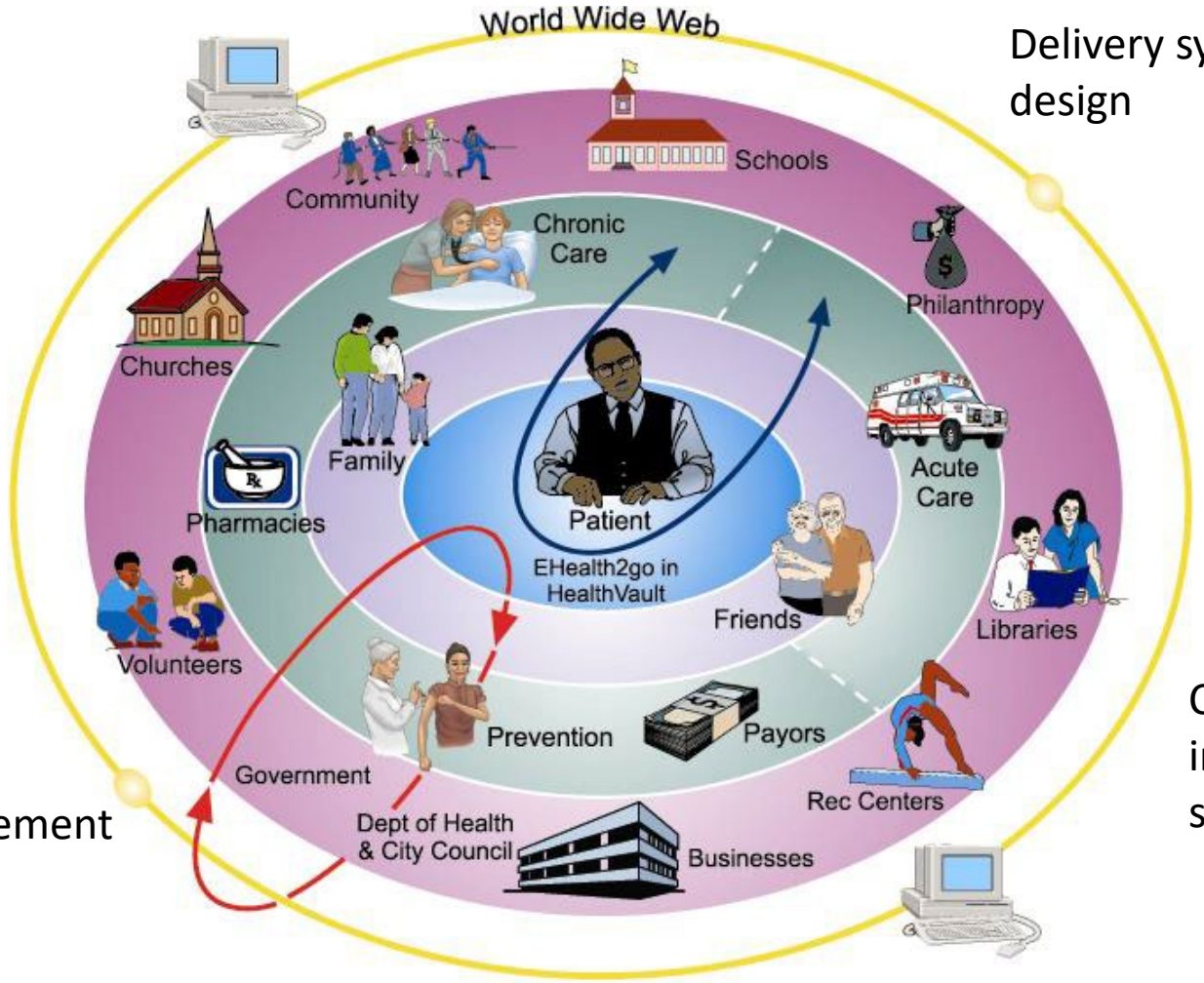
Howard University

eHealth Enhanced Chronic Care Model

Community resources

Health system support

Self-management support



Delivery system design

Decision support

Clinical information systems

eHealth for Chronic Illness

- Institute of Medicine, Agency for Healthcare Research and Quality recommend eHealth as a tool to support self-management in chronic illness
- eHealth technology should have a complete feedback loop of 5 stages
  - Transmission of data and information regarding the health status of the consumer
  - Interpretation of data and information using previously established knowledge and use of evidence- based standards
  - Address the specific need of the individual consumer
  - Timely feed back to the consumer addressing their requirements
  - Regular repetition of the feedback loop

Components of eHealth to Support Chronic Care Model

- Information technology
  - Internet for health information
- Social Networking
- Telehealth
- mHealth (including wearable devices)
- Electronic health records
- Personal health records

Internet for Self-Management Support

- Connecting providers and consumers to secure portals, health applications, social networks, and large databases

Patient Engagement Using Technology

- Traditional behavioral methods have shown efficacy, but require significant resources and patient commitment, limiting accessibility to large populations
- Mobile phone technologies have emerged as promising for patient engagement

Social Networking

- Disease oriented online community
- Virtual community
- May encourage consumer empowerment for improved patient-centered care

Telehealth

- Effective in the management of acute and chronic disease
- Nurse-led, multi-disciplinary telehealth interventions were effective in improving A1c outcomes
- Telehealth nurse coaching produced higher self-efficacy scores

mHealth (Wearable Technology)

- Low-cost clinically sensitive data for informed decision making between patient and provider
- Small devices with personalized data
- Possible integration into communication networks, facilitating remote monitoring

Electronic Health Records

Benefits

- Clinical
  - Improved quality
  - Reduced medical errors
- Organizational
  - Financial
  - Organizational
- Societal
  - Improved ability to conduct research
  - Improved population health
  - Reduced cost

Drawbacks

- High upfront acquisition costs
- Ongoing maintenance costs
- Temporary workflow disruption
- Perceived privacy concerns among patients and providers

Menachemi N, Collum TH. Benefits and drawbacks of electronic health record systems. Risk Manag Healthc Policy. 2011;4:47-55

Personal Health Records

- Patients can use personal health records (PHR)
  - To obtain updated information about their health and health care in a secure and confidential environment
  - Requires online log-in process
- PHR is often tethered to an EHR

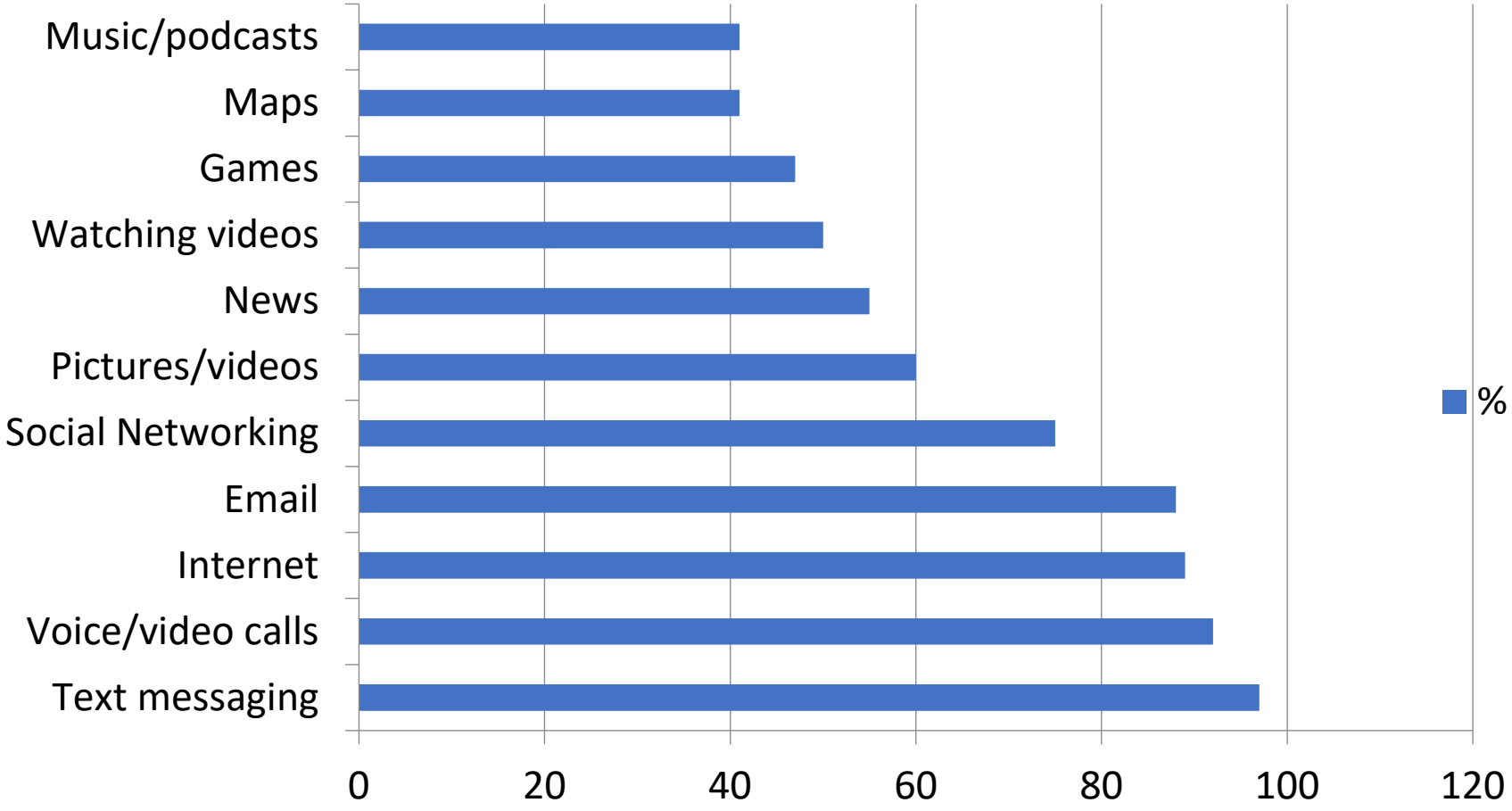
Taha J, Czaja SJ, Sharit J, Morrow DG. Factors affecting usage of a personal health record (PHR) to manage health. Psychol Aging. 2013;28(4):1124-1139

Smartphone Use in America

- 97% of U.S. adults own a cellphone of some kind in 2021 with 85% owning a smartphone
- Young adults, minorities and lower-income Americans – depend on their smartphone for internet use
- Smartphones serve as an access point for navigating a wide array of important life events, from health conditions to new jobs

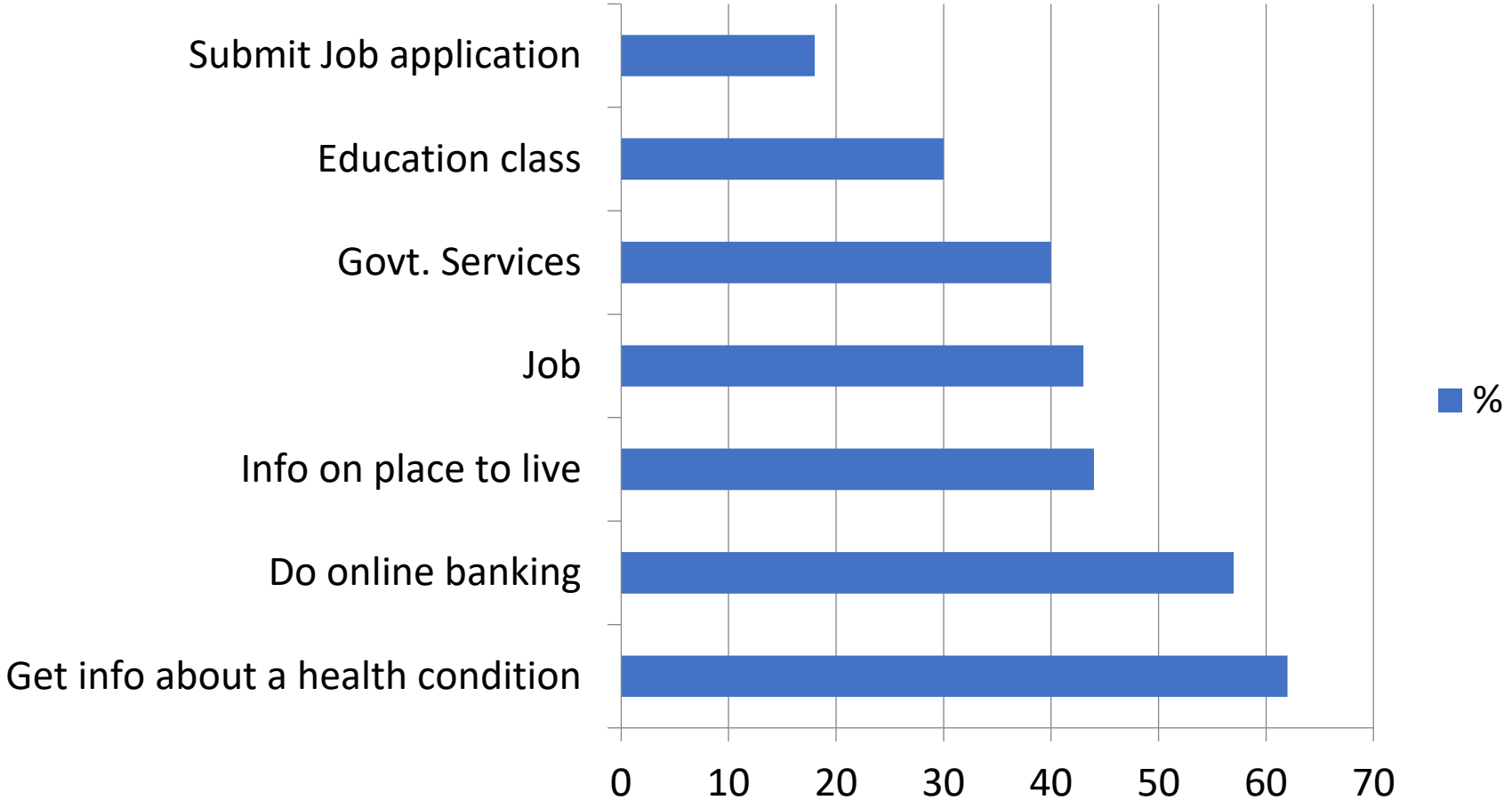
https://www.pewresearch.org/internet/fact-sheet/mobile/

Smartphone Use



http://www.pewinternet.org/files/2015/03/PI_2015-04-01_smartphones_03.png

Smartphone Use



http://www.pewinternet.org/files/2015/03/PI_2015-04-01_smartphones_03.png

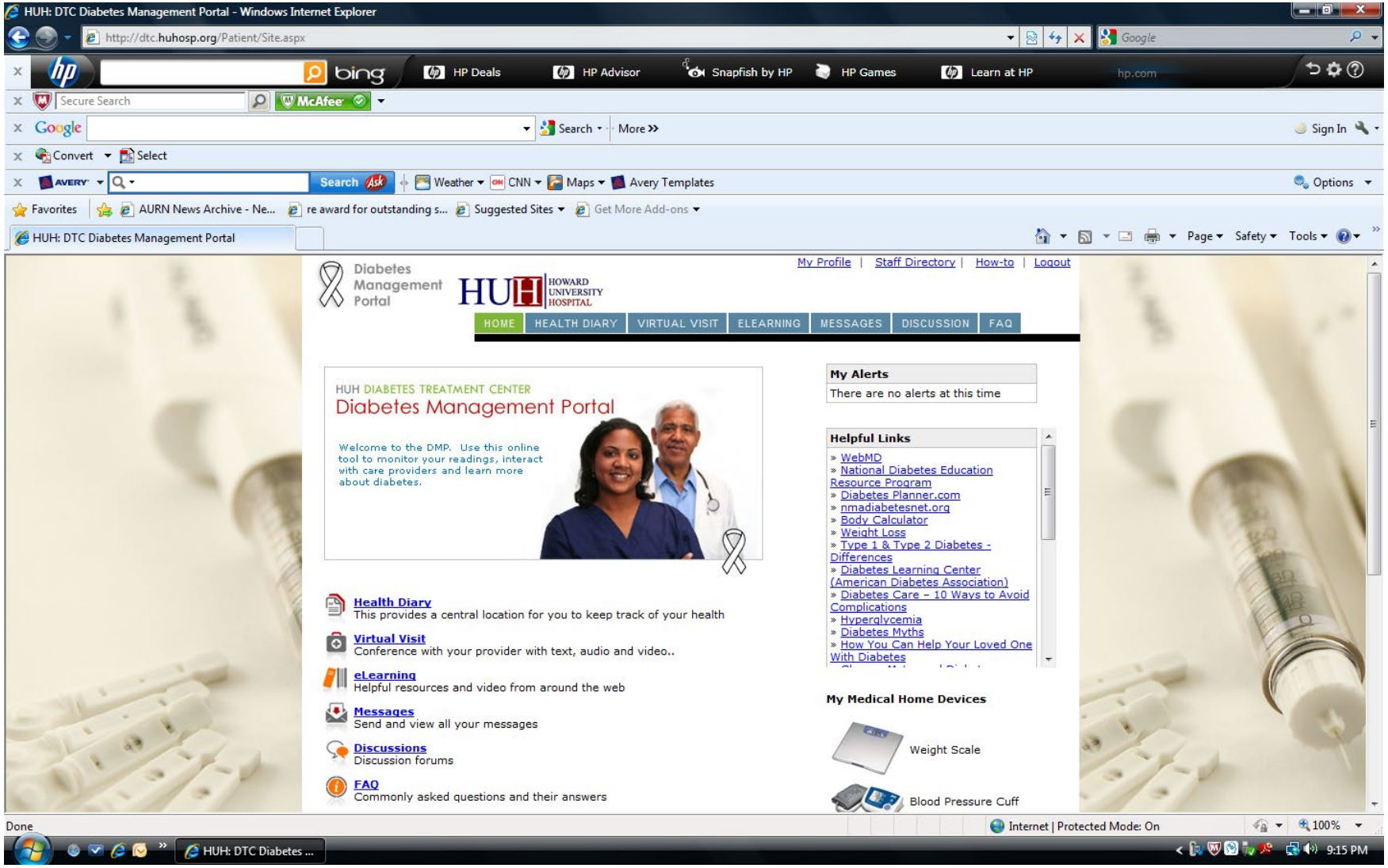
eHealth Howard University Hospital

A Patient-Centric, Provider-Assisted Diabetes Telehealth Self-management Intervention for Urban Minorities

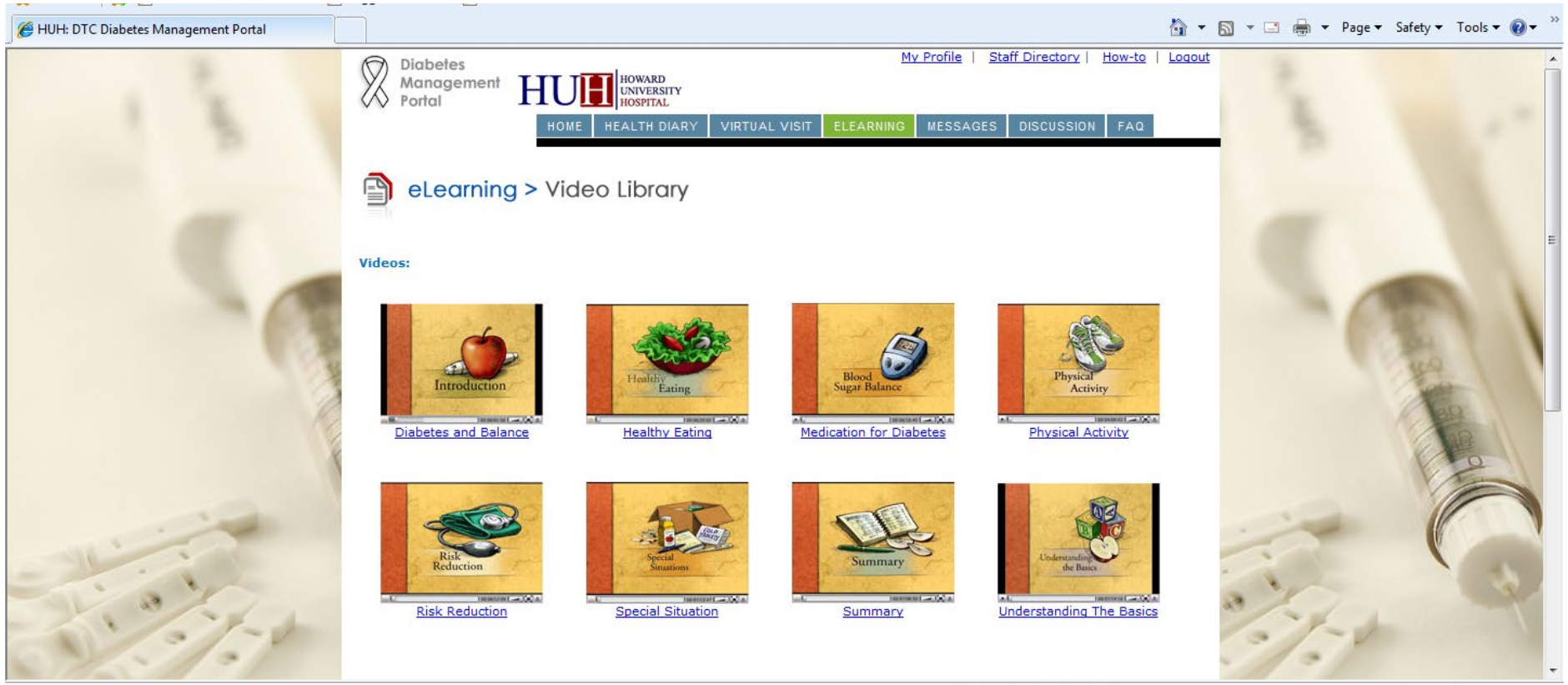
Ernest Carter, MD PhD, Gail Nunlee-Bland, M.D. and Clive Callender, M.D.

Perspect Health Inf Manag. 2011 Winter; 8(Winter): 1b.

Diabetes Education Portal



Video eLearning



Diabetes Workbook

Diabetes Balance and Health:

My Personal Road Map Workbook

Funded by MOTTEP
(Minority Organ and Tissue Transplant Education Program)

Supported by the Howard University Hospital Diabetes Treatment Center

Designed and Produced by Susan Chapman Herbert, RN CDE

Telehealth Study Summary

- Treatment group reported increased knowledge of diabetes and improved adherence
- Behavior change in better self-management
- More likely to reach a healthy BMI
- More likely to reach and A1c of < 7

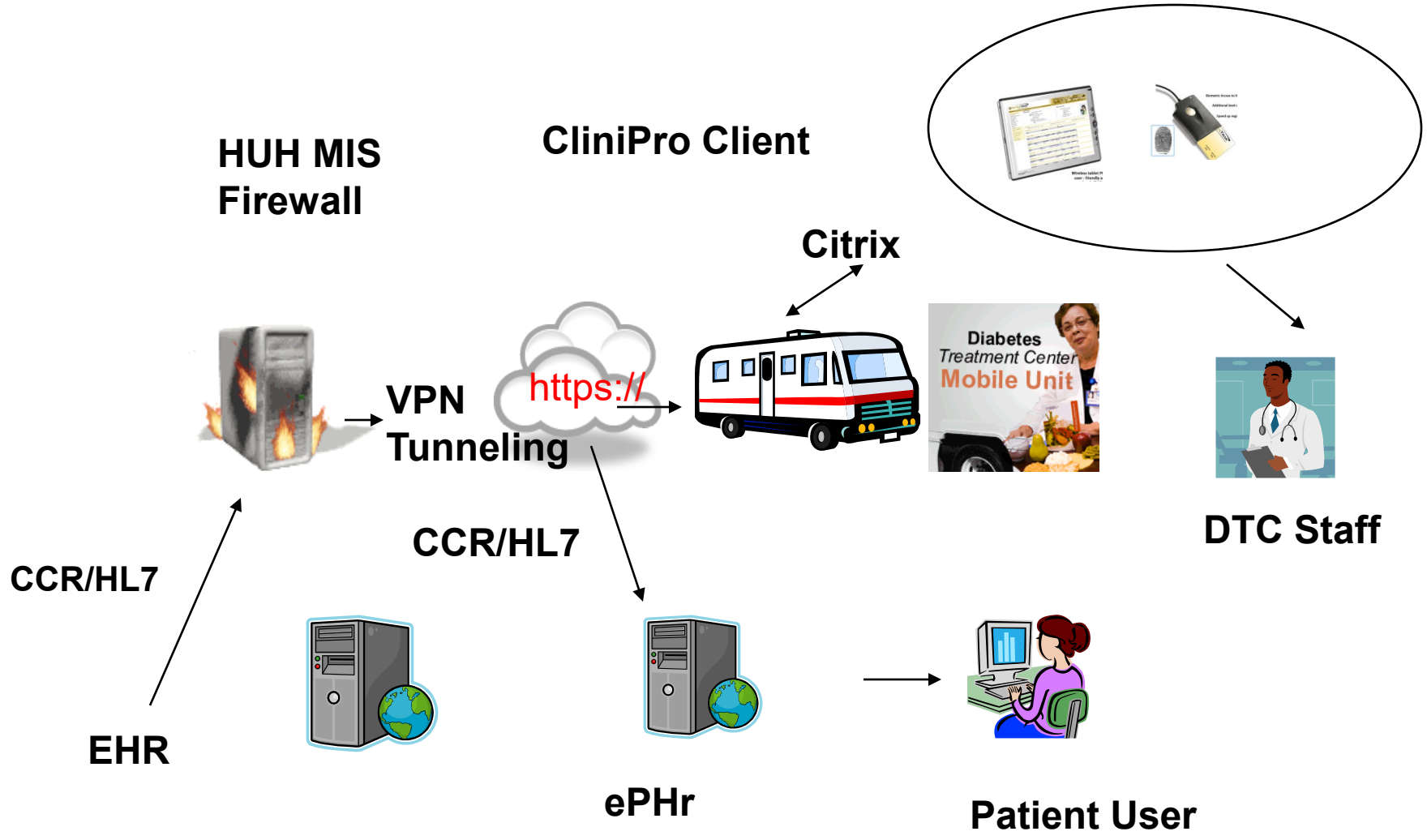
Implications

- Online intervention increased the accessibility of services and created a patient-provider partnership that endured for 9 months for underserved inner-city African Americans
- Patient empowerment for improved diabetes self-care

Challenges

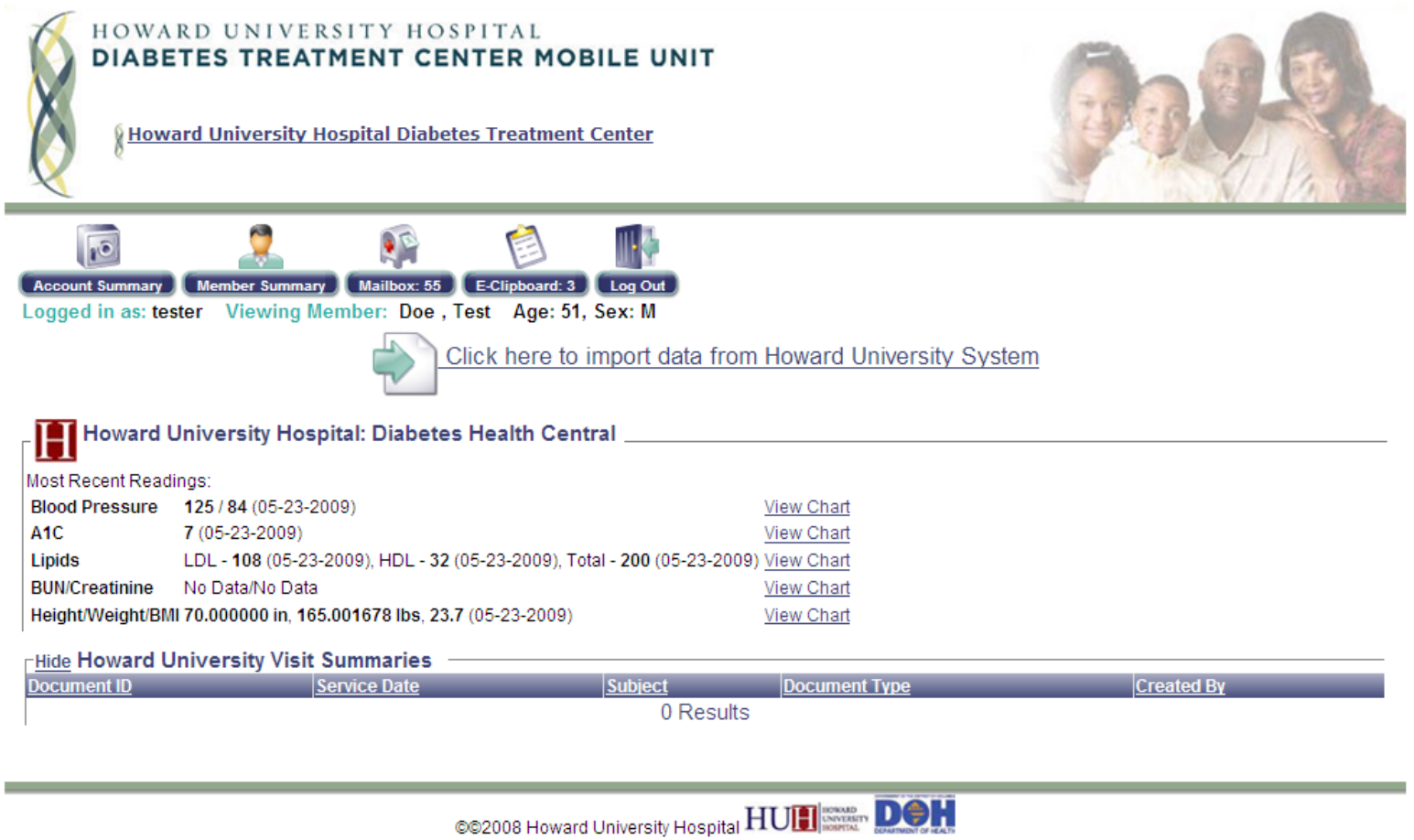
- Costs of internet access, laptops and peripherals (glucometers, blood pressure cuffs, and weight scales)
- Patients with less than an 8th grade reading level

Other Technologies


HUH MIS
Firewall
CliniPro Client
Citrix
VPN
Tunneling
https://
Diabetes
Treatment Center
Mobile Unit
DTC Staff
CCR/HL7
CCR/HL7
EHR
ePHr
Patient User

Branded PHR

Integrated with EHR



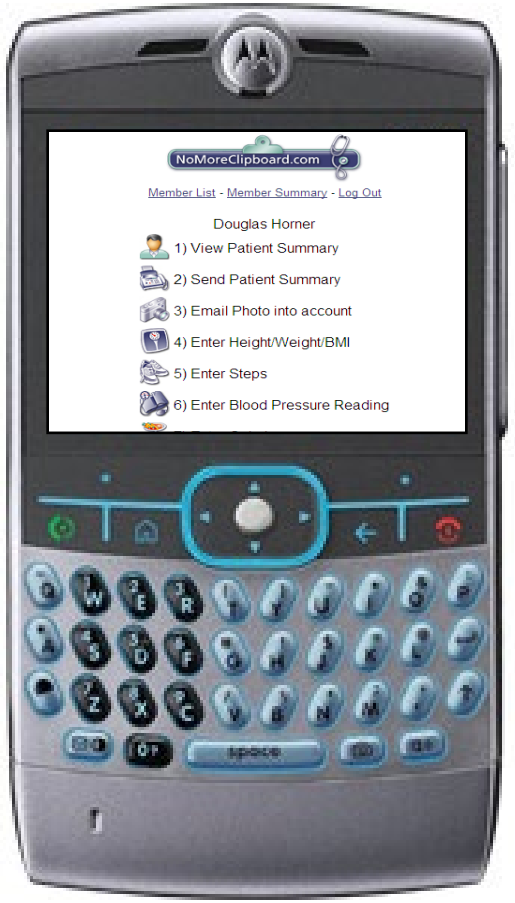
Perceived PHR Benefits

- Improved communication between patient and providers
- Portability across insurance plans
- Patient engagement

PHR Barriers

- Username and password forgotten
- Physician not accepting the data from the PHR

Managing DC diabetes – phase two



GOVERNMENT OF THE DISTRICT OF COLUMBIA
DOH
DEPARTMENT OF HEALTH
Promote. Prevent. Protect.

MEDICAL FACULTY ASSOCIATES
THE GEORGE WASHINGTON UNIVERSITY

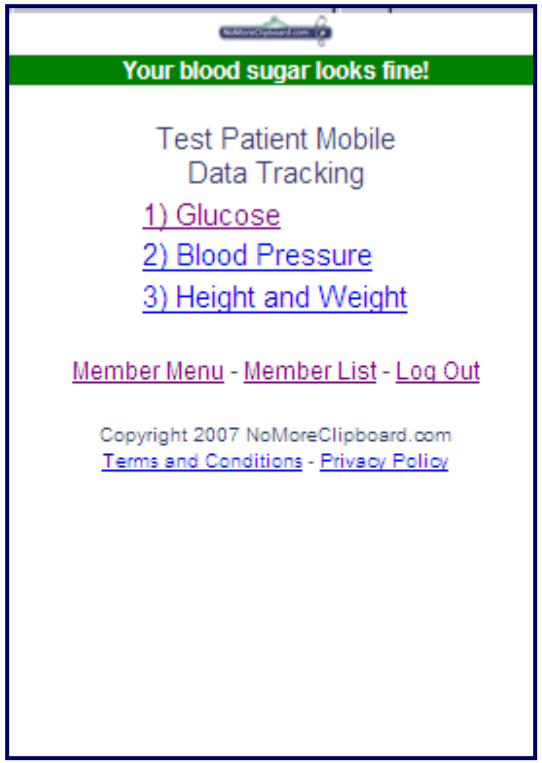
Community Health Workers & Cell Phone Intervention

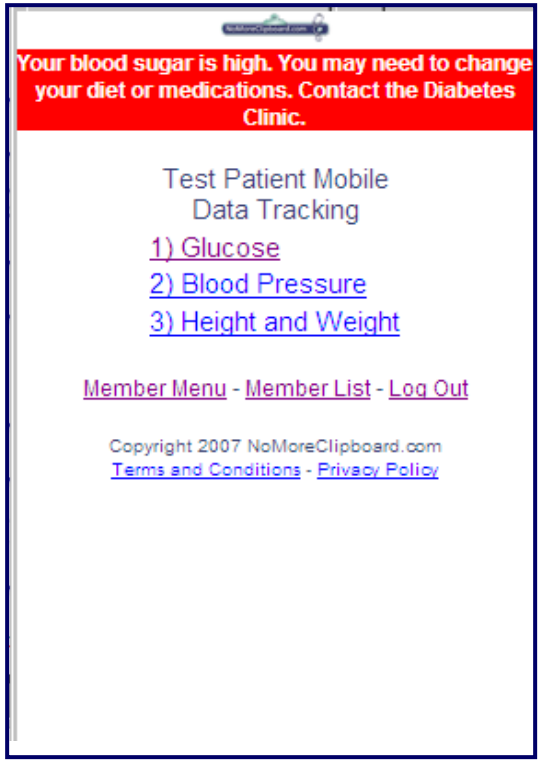
- Specific Aim – To compare the effectivenss of A1c reduction using cell phone text reminders, CHWs and the combination of both in a Medicaid population
- Methods
  - 18-70 years
  - A1c >8%
  - Randomly assigned to cell phone, CHW, cell phone plus CHW
  - Medicaid or Medicare
  - Baseline, 3 month, 6 month A1cs obtained

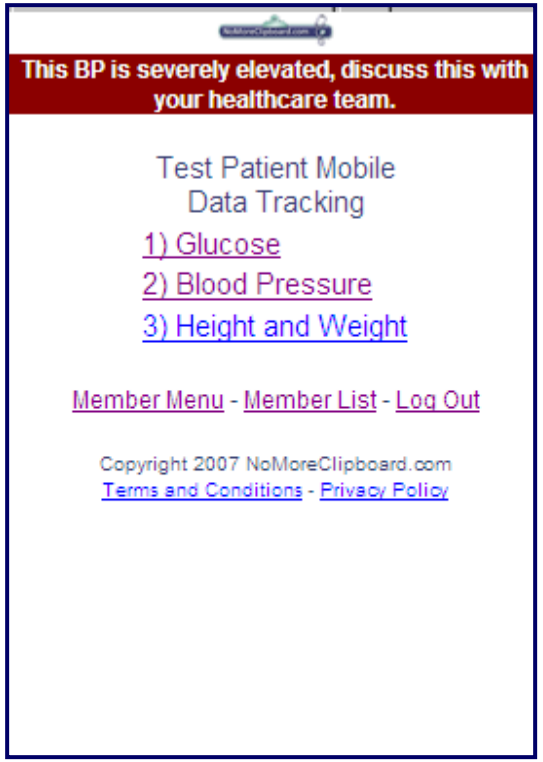
Medical Minutes

- Patients are provided with Medical Minutes as an incentive to ensure compliance
- Medical Minutes offset voice and data plan costs, but patient has skin in the game
- Patients have options
  - Sprint pre-paid phone
  - Not device or carrier specific

Immediate feedback and clinical alerts





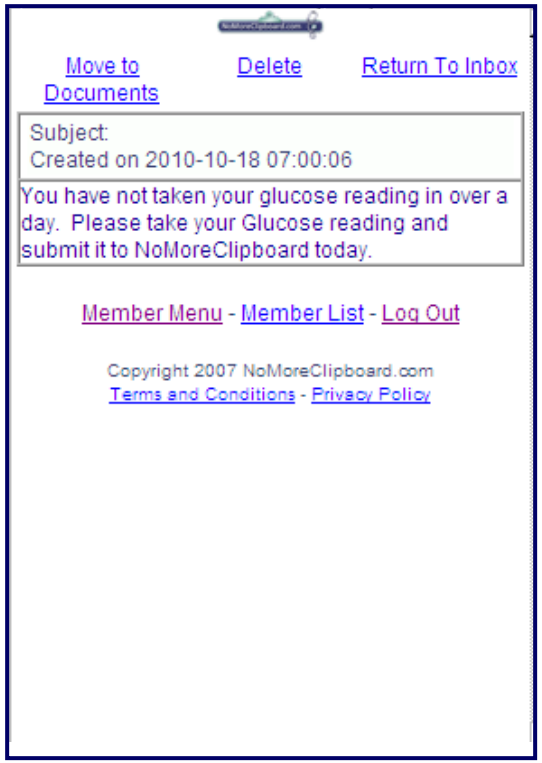


HEDIS questions

Howard University questionnaire summary:

Have you had your hemoglobin A1c blood test done in the past 3 months?
Have you been in the hospital in the past 3 months?
Have you gone to an emergency room in the past 3 months?
Have your medications been changed in the past 3 months?
Do you need medication prescriptions refilled?
Do you need blood sugar test supplies?
Have you had your foot exam in the past year?
Have you had your eye examination in the past year?
Have you had your clinic blood and urine tests in the past year?
Have you had your blood pressure checked in the past 6 months?
Have you had your flu shot in this year?
Have you had a pneumococcal vaccine to prevent pneumonia?
Have you been smoking this past year?
Have you met with a diabetes educator or nutritionist?
Are you sad or depressed?

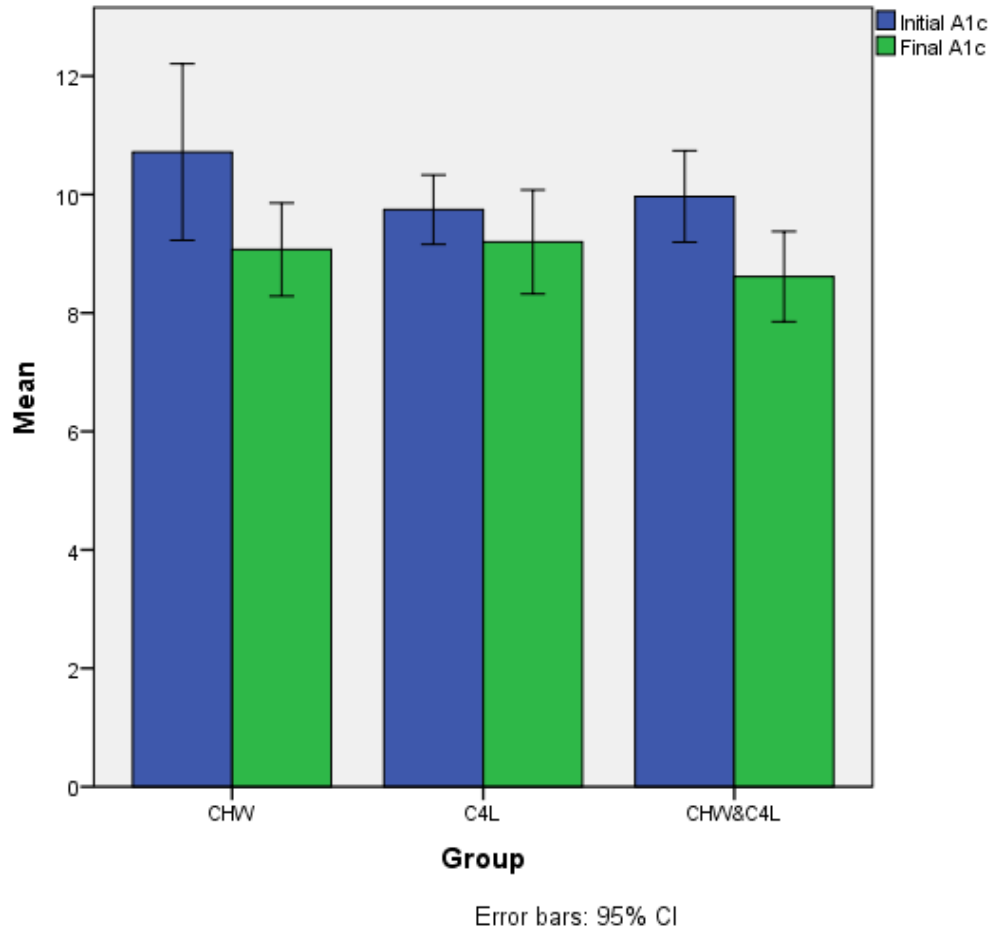
Compliance reminders



Observations

- Participation enhances consumer *and* clinician awareness of standards of care
- Improved dialog between patients and providers
- Communication is more frequent, complete and accurate
- Howard University Hospital staff more diligent about adding information and documenting care
- Clear identification of who is participating and who needs intervention
- Patients see the impact

Community Health Workers & Cell Phone Intervention



N= 20 CHW

N=19 cell phone

N= 24 CHW + cell phone

Outcomes

- Reduced hemoglobin A1C
- Reduced blood pressure
- Reduced cholesterol
- Fewer ER visits
- Fewer hospital readmissions
- Among an economically disadvantaged population with limited access to care where the differences in diabetes care are most dramatic

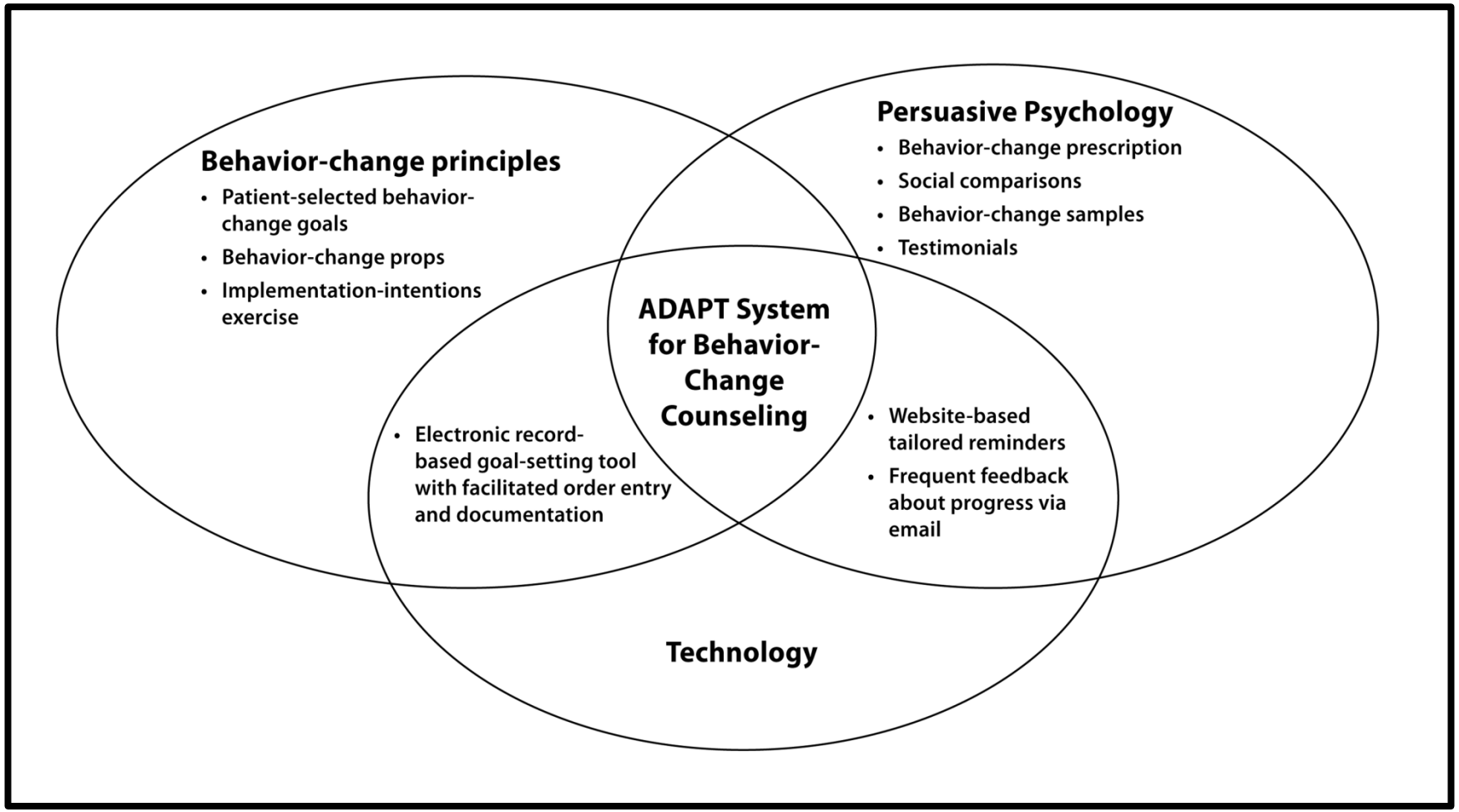
Diabetes Prevention

Lifestyle Intervention

- Weight loss alone reduced an individuals chance by 16% for developing type 2 diabetes
- Exercise along with weight loss reduced type 2 diabetes development by 44%

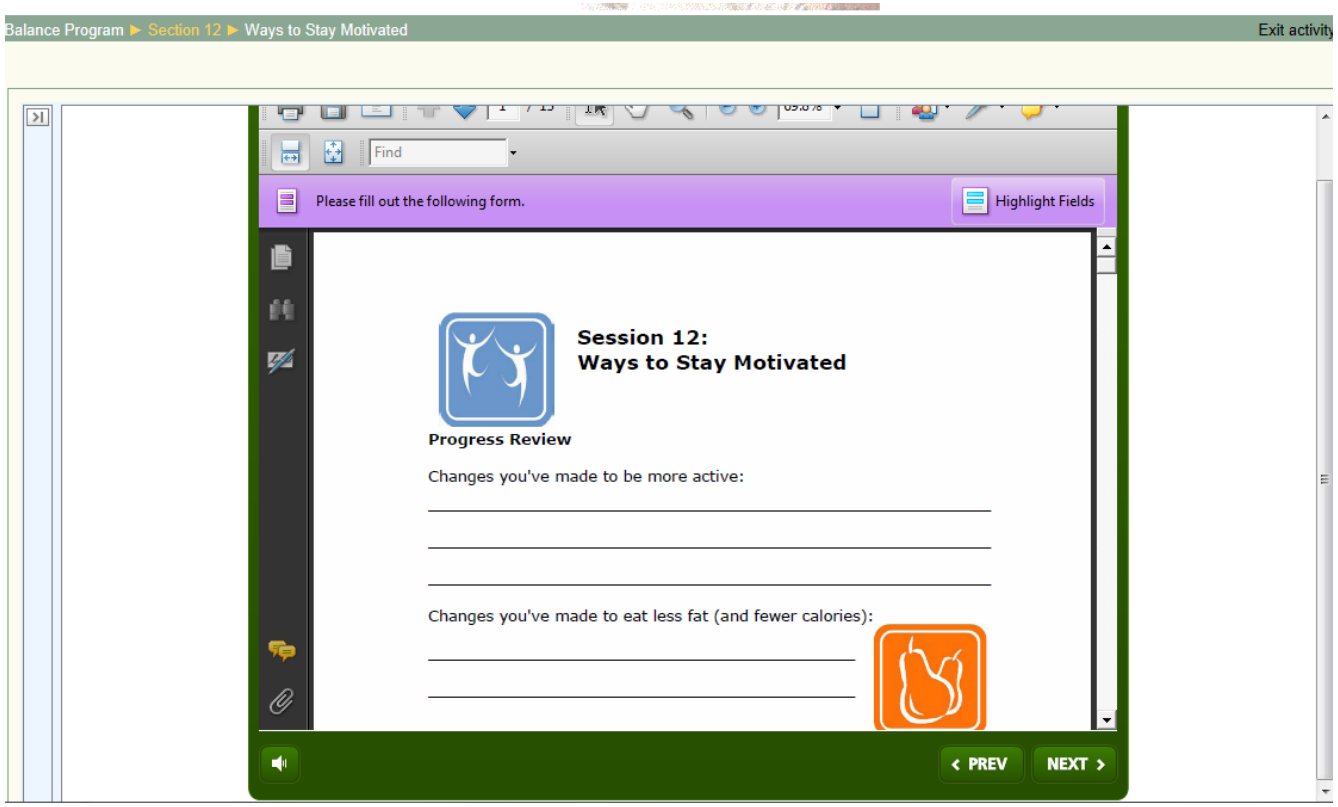
Diabetes Care 2006:Vol 29 no.9 2101-2107

Primary Care-Based Counseling for T2DM Prevention: ADAPT



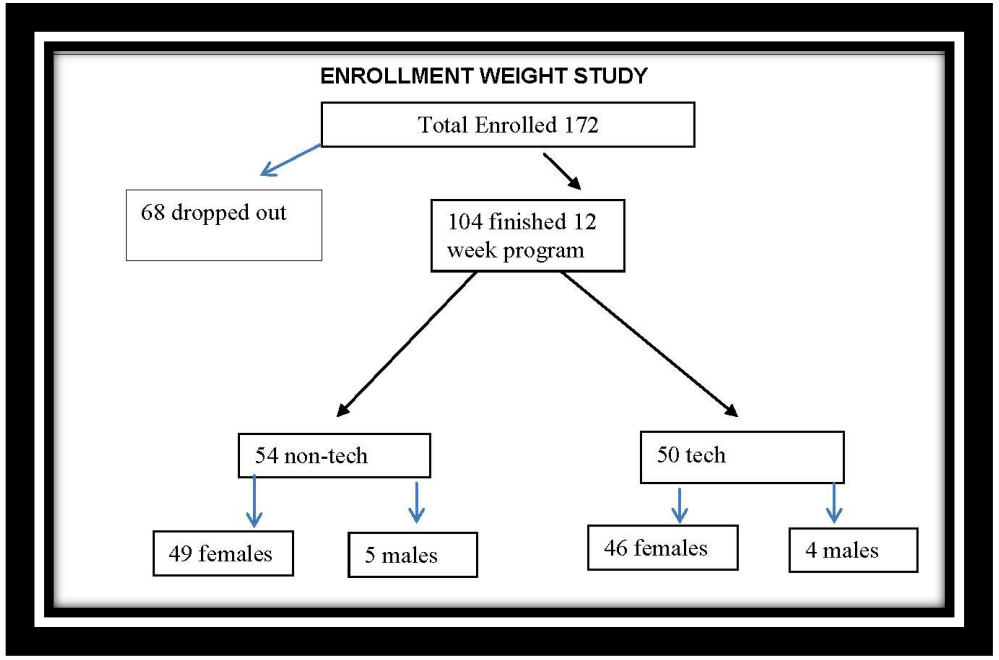
Specific Aim

- To compare the effectiveness of a lifestyle change intervention delivered either using state-of-the-art communications and networking technologies or using Lifestyle Group Visits

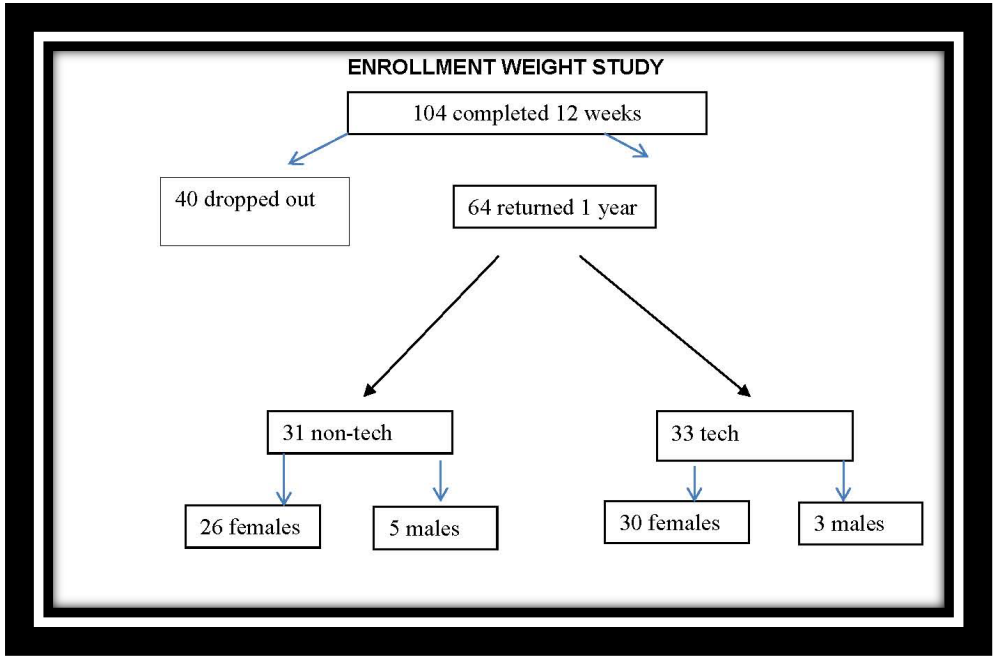

Balance Program ▶ Section 12 ▶ Ways to Stay Motivated
Exit activity
Find
Please fill out the following form.
Highlight Fields
Session 12:
Ways to Stay Motivated
Progress Review
Changes you've made to be more active:
Changes you've made to eat less fat (and fewer calories):
PREV
NEXT

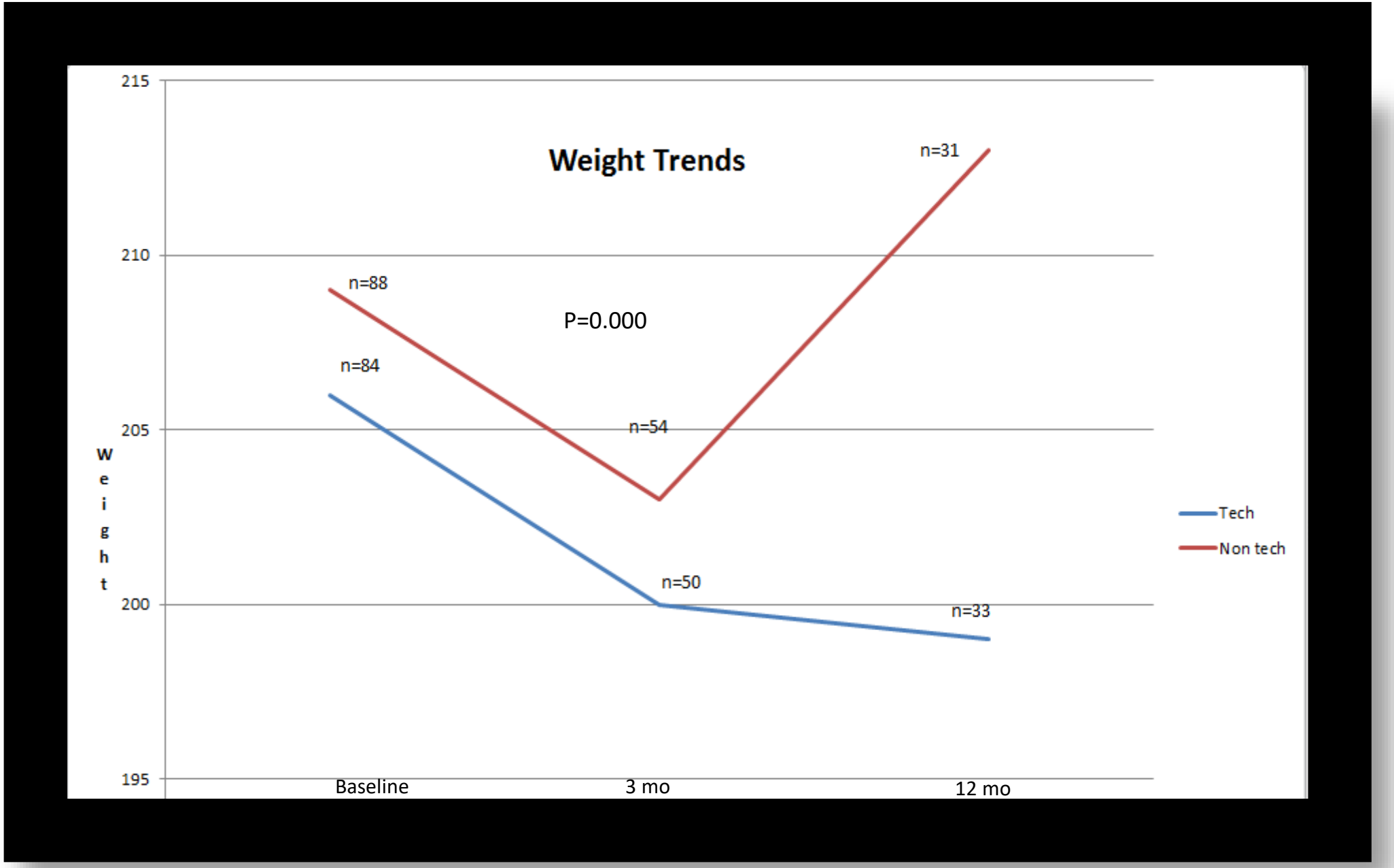
Results

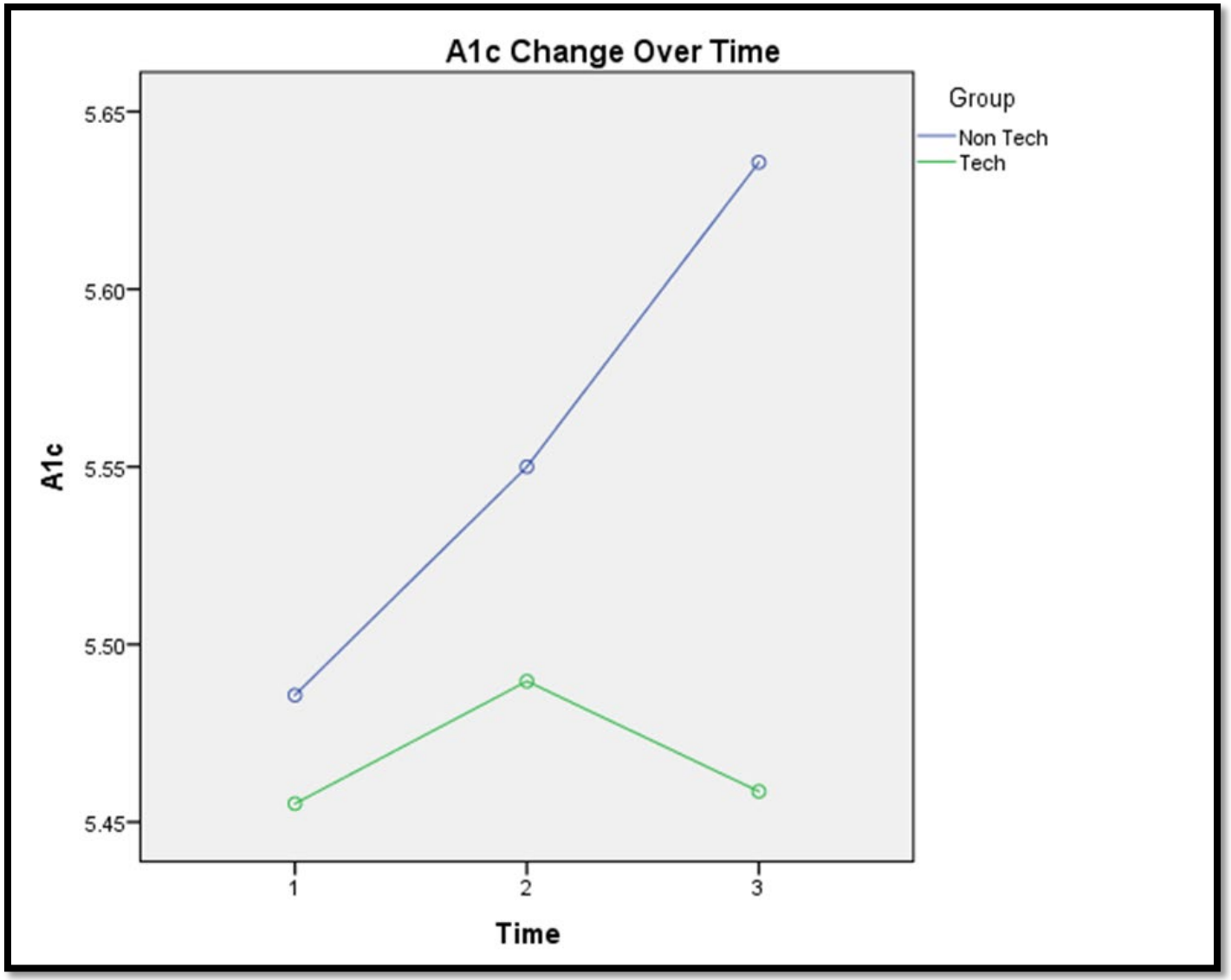
12 Weeks



1 Year



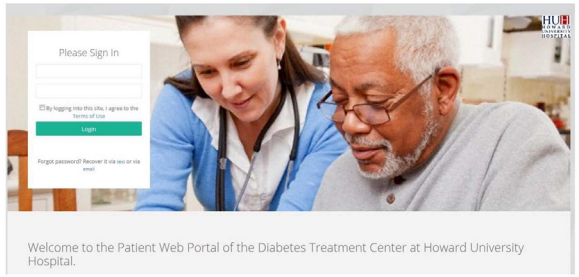

Weight Trends
215
210
205
200
195
Weight
n=88
n=84
n=54
n=31
n=50
n=33
P=0.000
Baseline
3 mo
12 mo
Tech
Non tech

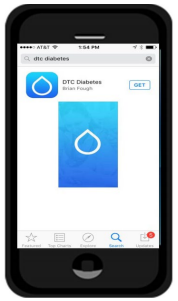

A1c Change Over Time
Group
Non Tech
Tech
5.65
5.60
5.55
5.50
5.45
A1c
1
2
3
Time

Conclusion

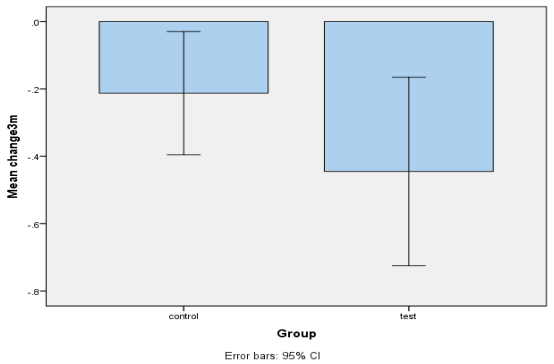
- Both groups benefited from the intervention
- Improved Patient Activation was statistically significant in the Tech group
- Statistically significant reduction in BMI overall for both groups after 3 months
- The data suggests that BMI reduction may be more sustained with the use of technology in this adolescent/young adult population
- No statistically significant reduction in A1c, but the Tech group did not have an increase in A1c

Patient Web Portal

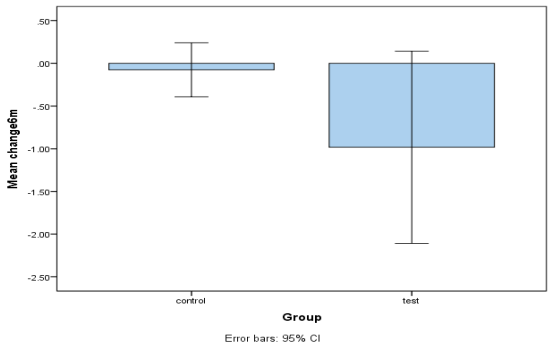




3-month A1c

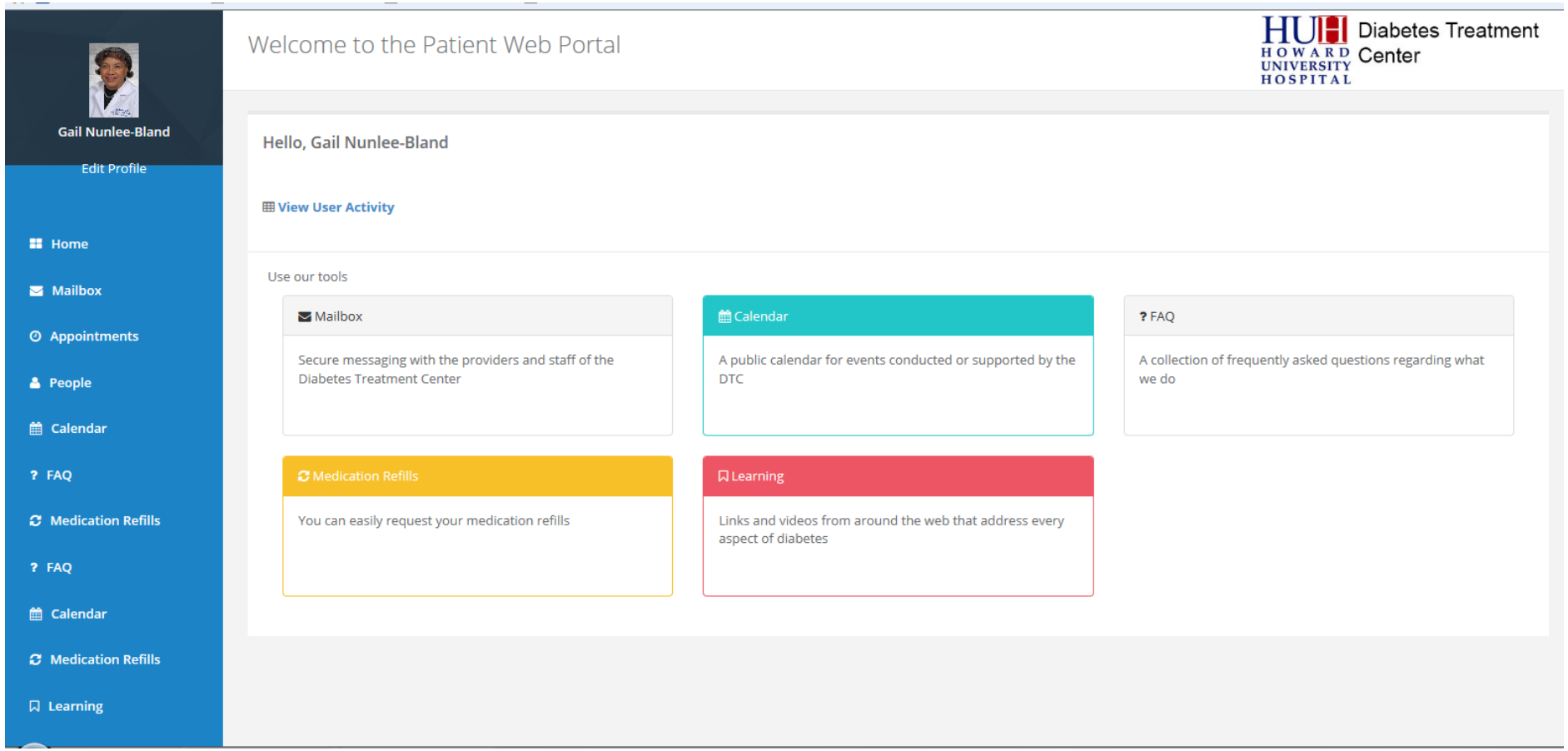


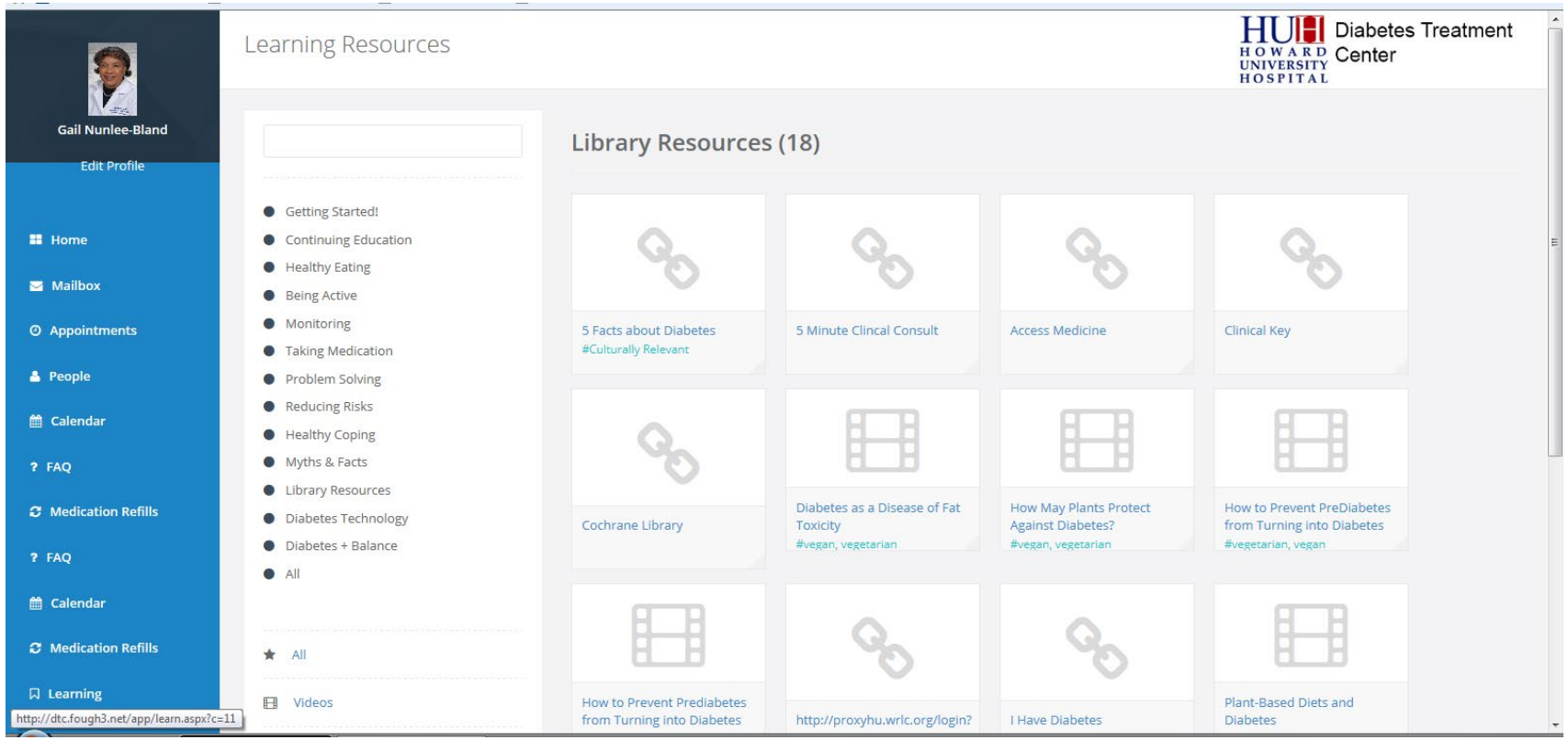
6-month A1c

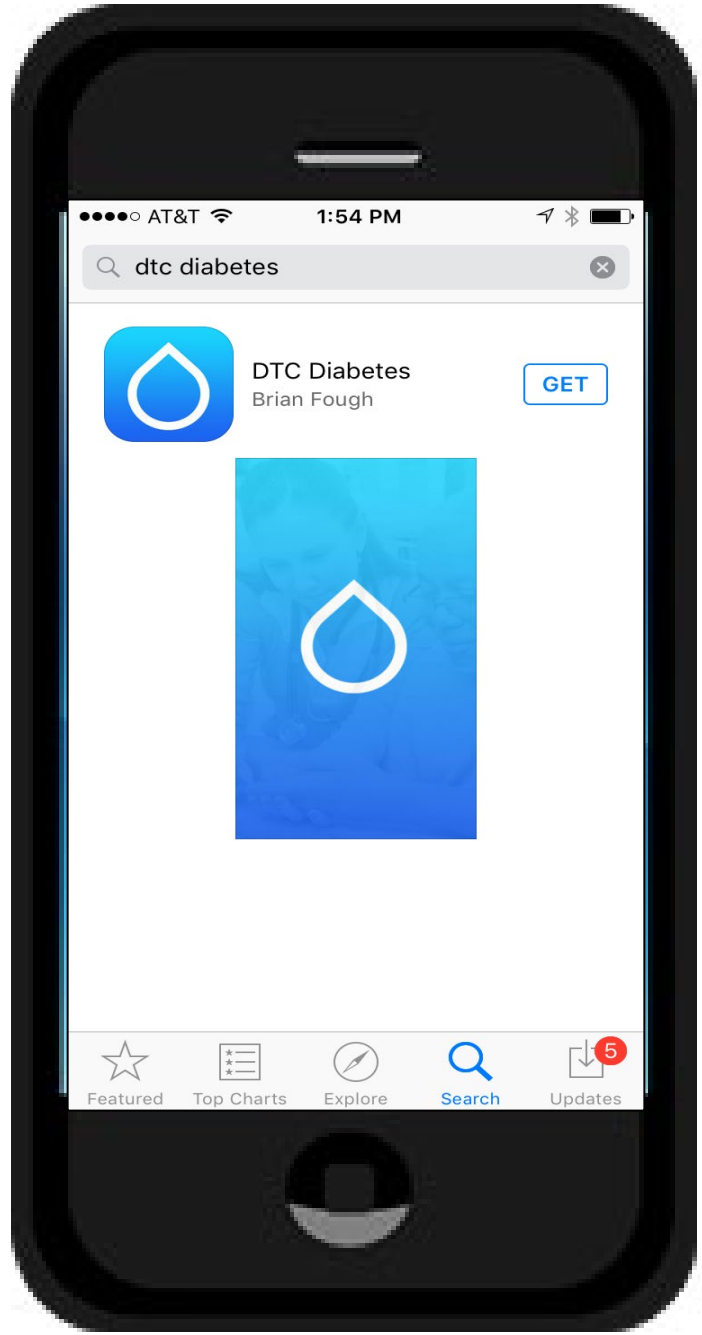


Patient Demographics		
	Test group	Control group
Number (n)	165	202
Age (yrs)	54.3 +/- 14.14	60.27 +/- 12.96
Female (%)	66.1	64.9
Male (%)	33.9	35.1

"This project has been funded in whole or in part with Federal funds (1G08LM011545-01) from the National Institute of Health National Library of Medicine. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health."


Gail Nunlee-Bland
Edit Profile
Home
Mailbox
Appointments
People
Calendar
FAQ
Medication Refills
FAQ
Calendar
Medication Refills
Learning
Welcome to the Patient Web Portal
HOWARD UNIVERSITY HOSPITAL
Diabetes Treatment Center
Hello, Gail Nunlee-Bland
View User Activity
Use our tools
Mailbox
Secure messaging with the providers and staff of the Diabetes Treatment Center
Calendar
A public calendar for events conducted or supported by the DTC
FAQ
A collection of frequently asked questions regarding what we do
Medication Refills
You can easily request your medication refills
Learning
Links and videos from around the web that address every aspect of diabetes


Gail Nunlee-Bland
Edit Profile
Home
Mailbox
Appointments
People
Calendar
FAQ
Medication Refills
FAQ
Calendar
Medication Refills
Learning
http://dtc.fough3.net/app/learn.aspx?c=11
Learning Resources
HUH HOWARD UNIVERSITY HOSPITAL Diabetes Treatment Center
Getting Started!
Continuing Education
Healthy Eating
Being Active
Monitoring
Taking Medication
Problem Solving
Reducing Risks
Healthy Coping
Myths & Facts
Library Resources
Diabetes Technology
Diabetes + Balance
All
All
Videos
Library Resources (18)
5 Facts about Diabetes
#Culturally Relevant
5 Minute Clincal Consult
Access Medicine
Clinical Key
Cochrane Library
Diabetes as a Disease of Fat Toxicity
#vegan, vegetarian
How May Plants Protect Against Diabetes?
#vegan, vegetarian
How to Prevent PreDiabetes from Turning into Diabetes
#vegetarian, vegan
How to Prevent Prediabetes from Turning into Diabetes
http://proxyhu.wrlc.org/login?
I Have Diabetes
Plant-Based Diets and Diabetes


AT&T
1:54 PM
dtc diabetes
DTC Diabetes
Brian Fough
GET
Featured
Top Charts
Explore
Search
Updates
5

Summary

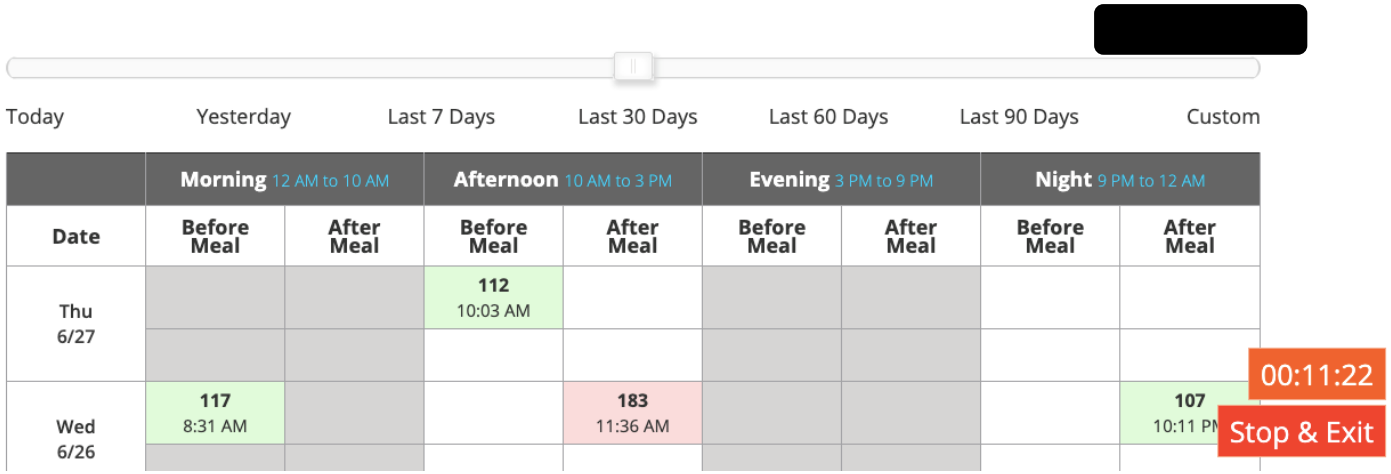
- Technology can enhance diabetes patient's self-management skills with reduction in A1c in underserved populations
- Technology appears to work best with a literacy level of 8th grade or better
- Patients 65 years or older may need additional assistance in the use of technology or a different approach for patient empowerment in better diabetes self-management
- Smartphone and web-based learning technology may be a useful in diabetes prevention in a younger population

Remote Patient Monitoring

Cellular Enabled Smart Meter

- Patients are able to share real-time data with the providers through a cell-enabled technology that eliminates the need for manual logbooks or downloads.
- Patients receive daily notifications and reminders.

Physician Dashboard



https://www.smartmetercorporation.com/

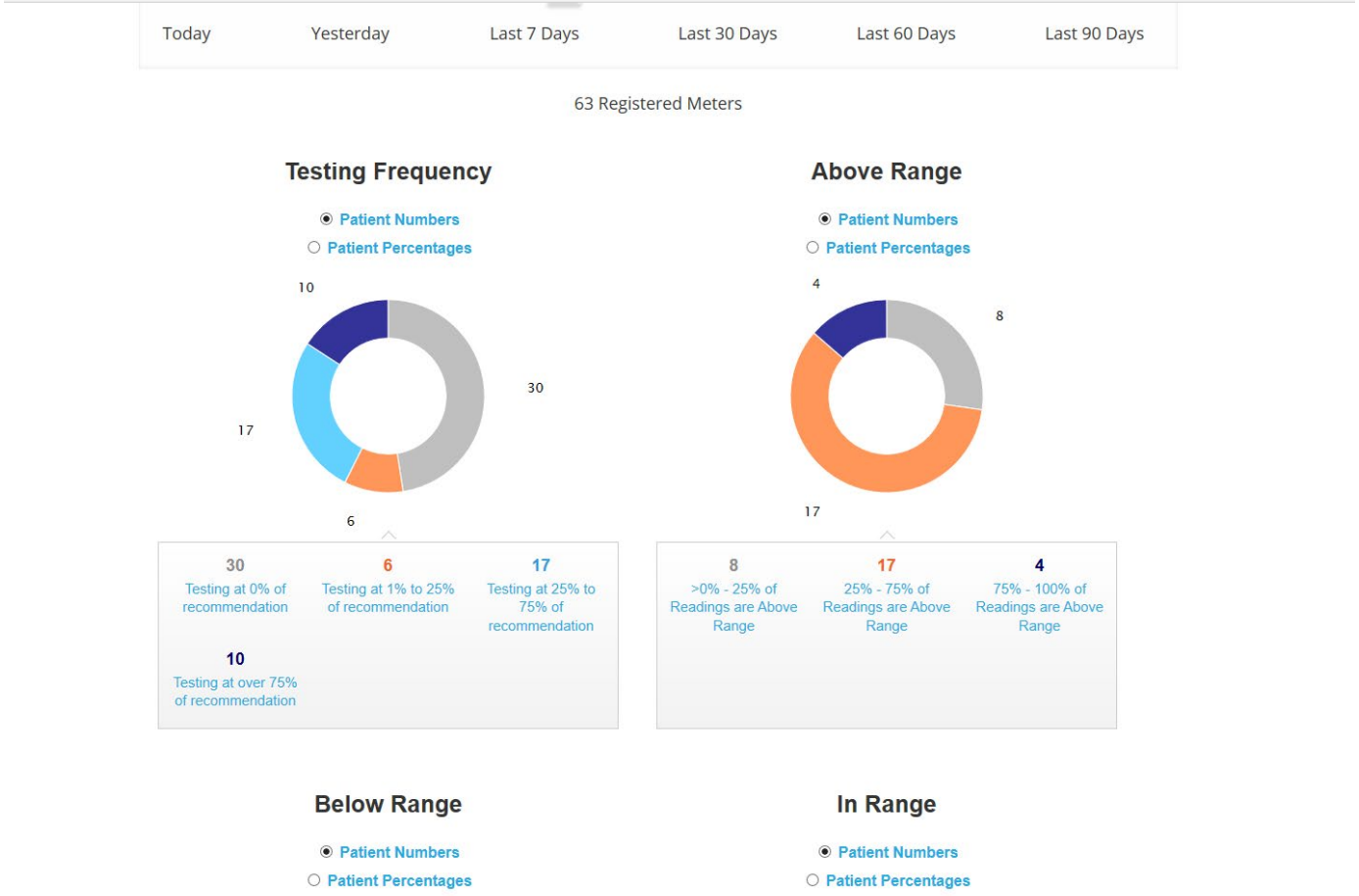
Patient success story

I.S hemoglobin A1C trend

- Enrolled in the pilot study on 7/30/2018
- Completed pilot study on 10/30/2018
- Back on cellular enabled smart meter in April 2019

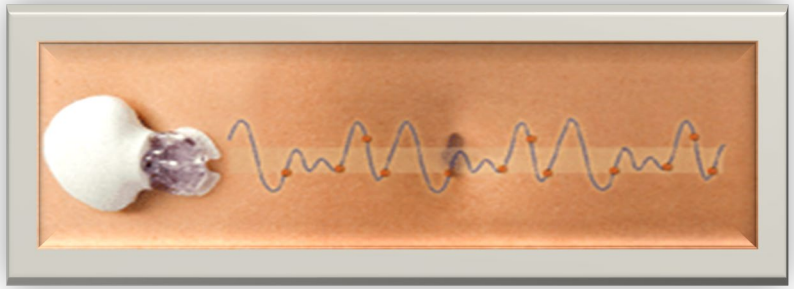
	9/22/09	04/06/10	12/09/10	02/13/18	08/08/18	10/24/18	04/17/19	06/27/19
HbA1c (%)	11.5	12.4	9.4	9.3	11.7	5.9	10.5	7.5

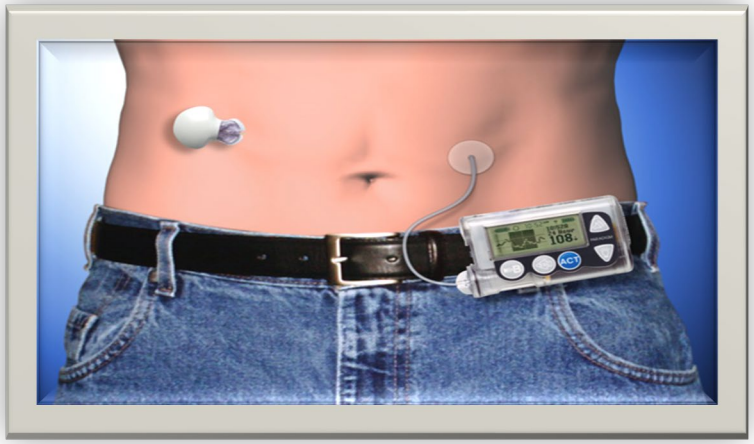
Population Health

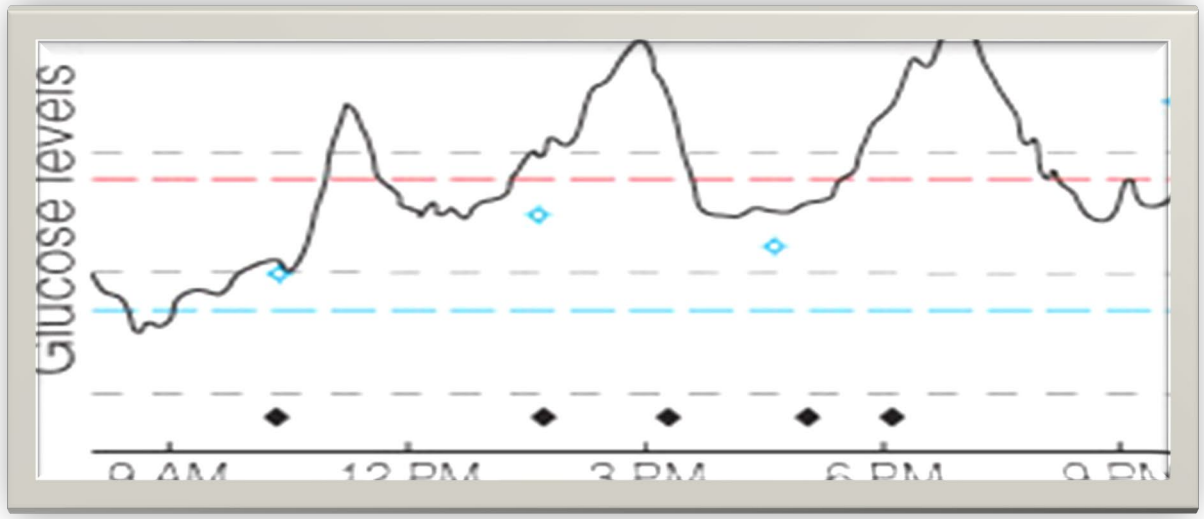


Wearable Devices

Insulin Pumps and Continuous Glucose Sensors







Continuous Glucose Monitors

Key points included in standard AGP report.

AGP Report

Name

MRN

GLUCOSE STATISTICS AND TARGETS

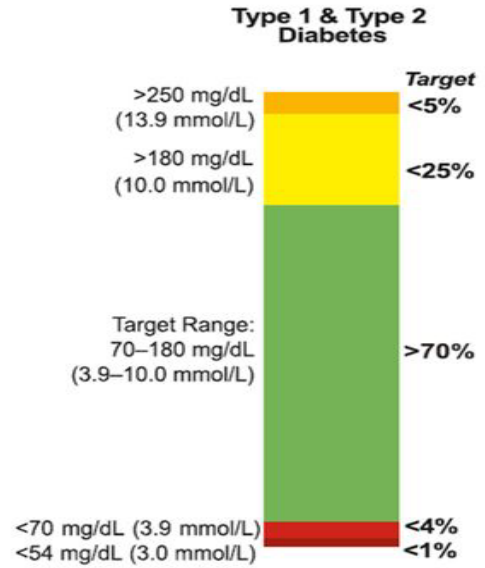
14 days
% Sensor Time

Glucose Ranges	**Targets** [% of Readings (Time/Day)]
Target Range 70–180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70–180 mg/dL) is clinically beneficial.

Average Glucose
Glucose Management Indicator (GMI)
Glucose Variability
Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES



American Diabetes Association Clin Diabetes 2021;39:14-43

American Diabetes Association.

Acknowledgements

- Ernest Carter, MD, PhD
- Clive Callender, MD, FACS
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- National Institute of Minority Health and Health Disparities