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EXTEND

Mobile Monitoring-Enabled Telehealth for Patients with Complex Chronic Illnesses

Ryan J. Shaw

Associate Professor

Duke University, Durham, NC, USA

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Telehealth & Mobile Monitoring

- Telehealth has the potential to improve management of poorly controlled chronic diseases relative to clinic-based care alone.
- Mobile monitoring-enabled technologies could enhance telehealth for chronic illness care.
- Implementation in practice settings would rely on automated integration of data into the electronic health record (EHR).

- We describe the integration and visualization of data from 4 remote monitoring devices into the HER
- Coupled with the evaluation of an evidence-based nurse and pharmacist-telehealth care model for patients with uncontrolled diabetes and hypertension.

Glucose

Weight

Blood pressure

Activity

Electronic Health Record (EHR)

EXTEND Trial

- EXpanding Technology-Enabled, Nurse-Delivered chronic disease care (EXTEND)
- Randomized controlled trial (N=220)
- Recruitment: March 2022 – June 2023
- 5 primary care and endocrinology clinics in Durham, NC, USA
- Grant: US National Institutes of Health (NIH) National Institute for Nursing Research (1R01NR019594; MPI: Shaw & Crowley) .

EXTEND Programs

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Monitor your blood sugar, blood pressure, weight, and activity with 4 devices that connect to your smartphone to improve self-management.

OR

EXTEND Plus

Monitor your blood sugar, blood pressure, weight, and activity with 4 devices that connect to your smartphone and supplement self-management with nurse and pharmacist support.

Engaging Health System IT for Telehealth

- Contracted with 3rd party company to integrate data with clinical and consumer health devices.
- Streaming and REST APIs then deliver standardized data directly into the EHR.
- Prescribe the devices within the EHR similar to a medication.
- Designed SmartSets and SmartPhrases for clinician documentation.
- Designed and refined visualization of data from the devices.

Community Consultation Studio

- Engaged local residents with diabetes in a focus group to refine approach (n=9)
- Results were used to adapt study materials, devices selection, and patient outreach strategies

A)

B)

C)

Device Selection

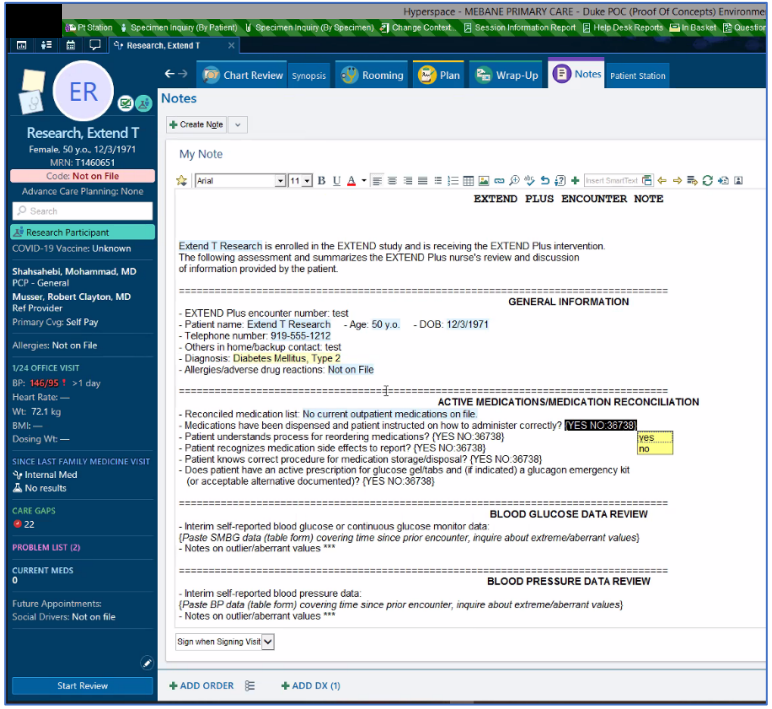
- Health equity lens
- Prioritized devices that met necessary technical specifications while remaining functional for our study population.
- Community consultation studio helped guide selection
- iOS and Android, least number of apps, consumer friendly, easily accessible to racially, ethnically ,and socioeconomic backgrounds

The Data Model

- Step 1: Devices ⟶ Mobile app ⟶ cloud ⟶ Validic API on AWS
- Step 2: Normalize data into a standard data model as streaming API
- Step 3: Patient data deidentified ⟶ random UID associated with tokenized URL ⟶ links to patient's anonymous patient ID
- Step 4: Consumer data from API in .json ⟶ internal data lake as FHIR observations ⟶ Epic API records device data as a flowsheet in EHR
- Step 5: Data lake ⟶ Tableau dashboard that is viewable in EHR
- Step 6: Clinical staff view the patient's data through Tableau dashboard. Option to create a .pdf file or screen shot from the Tableau graphs and copy into the patient's chart.

Designing the Patient Encounter in the EHR

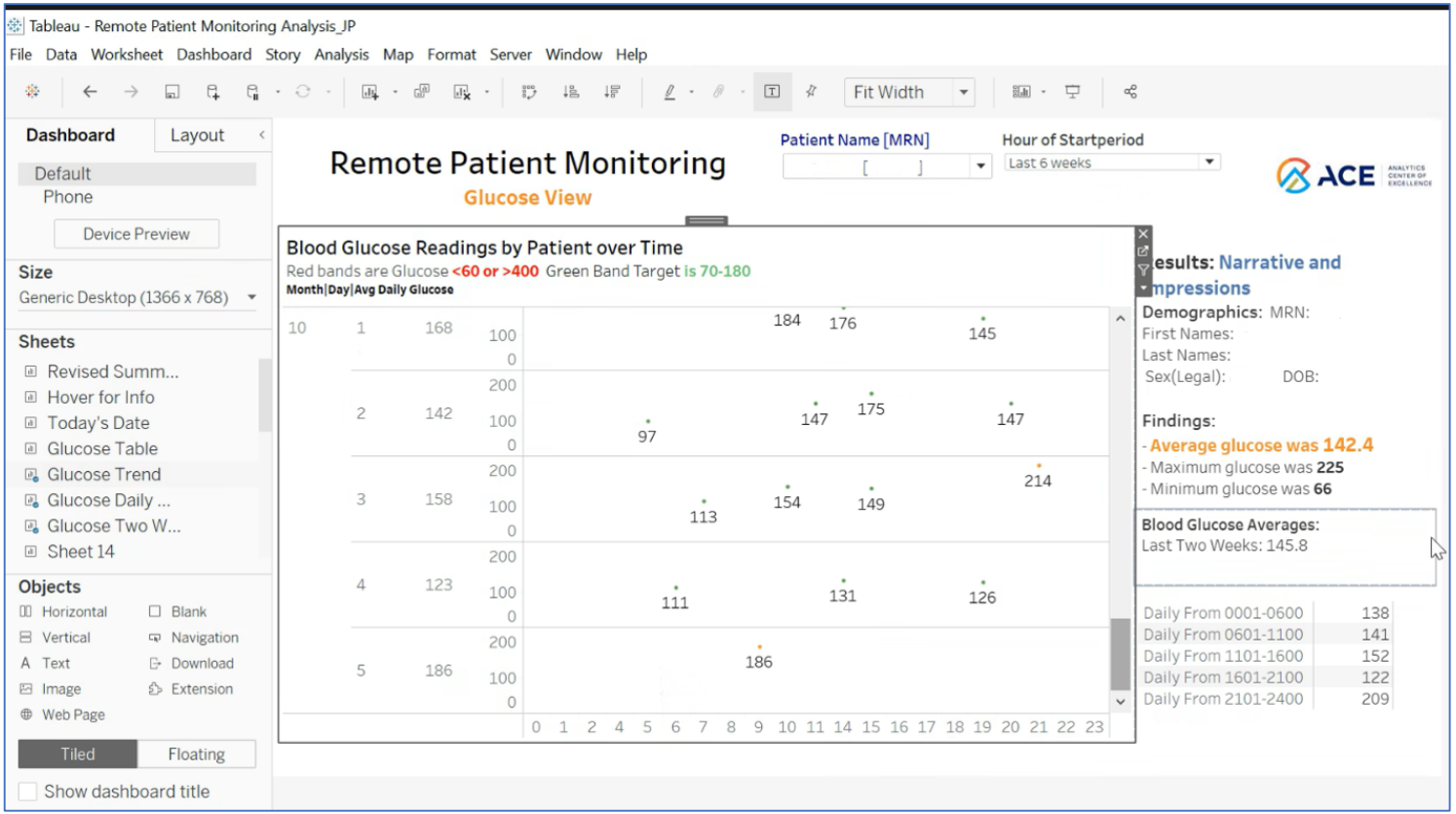
- SmartSets enable prescribing of the four devices, enables the data model, and then associates patients pool ID.
- Nurse can monitor incoming based on set thresholds.
- SmartPhrases are templated notes for documentation during the telehealth encounters.



Data Visualizations

Glucose:

- Daily average
- Day of month
- Time of day
- Color coded



Discussion

- Using this pragmatic infrastructure, clinicians use the EHR to prescribe for patients a suite of devices.
- Alerts are placed upon the data that notify a clinician when values go above or below set thresholds.
- Data are visualized in the clinical record and clinicians use the EHR as a tool for efficiently delivering and documenting patient telehealth encounters and make medication changes.

Team Members

- Matthew Crowley, MD (Co-PI)
- Ranee Chatterjee, MD
- Jashalynn German, MD
- Tammi Deal, RN
- Benjamin Smiht, PharmD
- Sarah Kokosa, PhamD
- Patrick Gregory, PharmD
- Cindy Roberson, PharmD

Gina Pennington

Stacy Crabtree, RN

Holly Canupp, PharmD

Sherry Huber, RN

Kay Doukellis, RN

Qing Yang, PhD

Allison Lewinski, PhD, RN

Doreen Matters

Hayden Bosworth, PhD

Brystana Kaufman, PhD

Daniel Hatch, PhD

Donghwan Lee, RN, MSN

Norma Garcia-Ortiz

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Thank you!

ryan.shaw@duke.edu

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