

xHealth: Informatics Applications in Disease Management

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xHealth:

TeleHealth
eHealth
mHealth
uHealth

Overview

1. Usability in Critical Care Settings
2. Characterizing Patient-Generated Clinical Data and Associated Implications for EHRs
3. An evaluation of the Telehealth Home-Care Coordinated Disease Management

**ANALYZING ICU USABILITY:
CLINICIAN-CLINICIAN AND CLINICIAN-
COMPUTER INTERACTIONS**

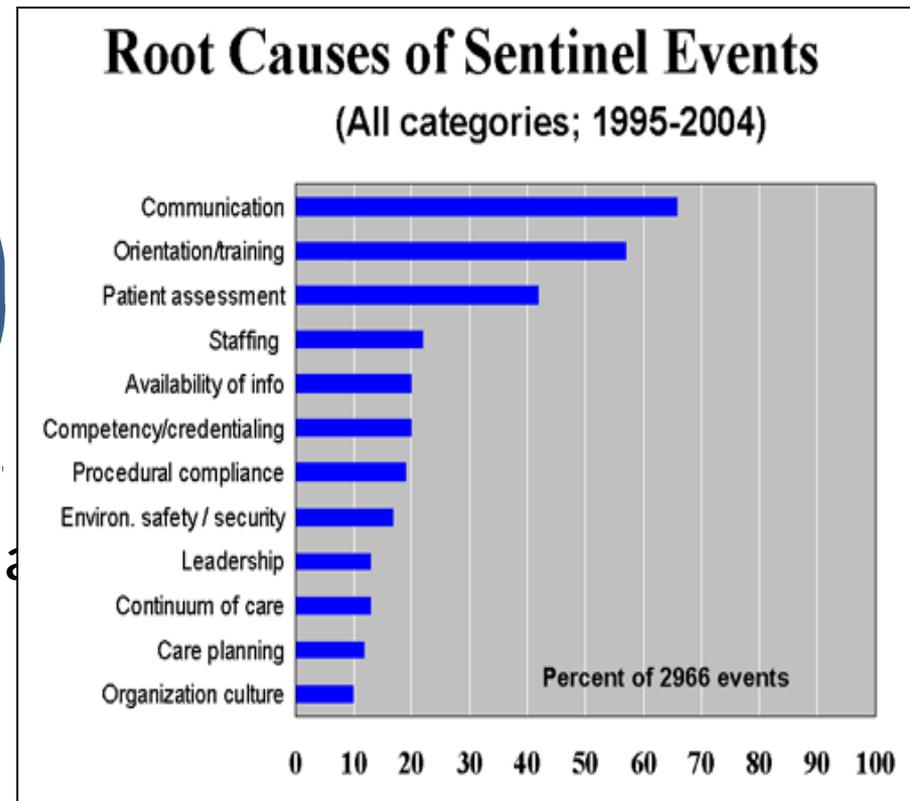
Significance

- Clinical miscommunication:

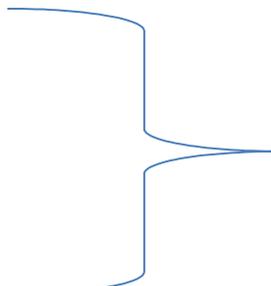
- 75% of medical errors
- 82% of sentinel events

- increased patient harm
- length of stay
- caregiver dissatisfaction and

turnover

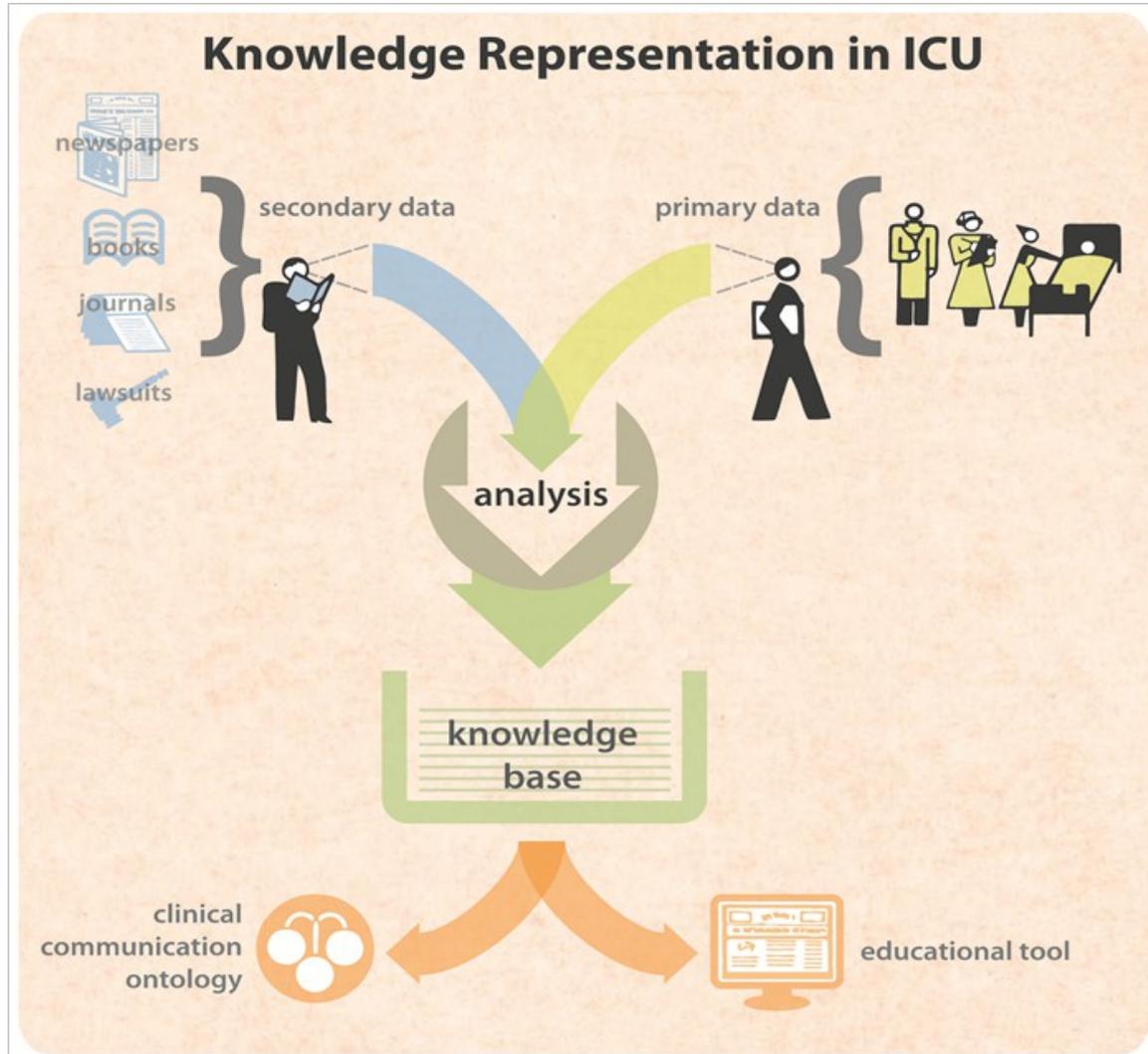


Significance

- Why focus on Intensive Care Units (ICUs)?
 - critically ill patients
 - complex
 - multidisciplinary

Increases the likelihood of miscommunication
- 2 million patients are admitted to urban U.S. ICUs
 - of which approximately 200,000 die each year

Methods



Methods

- Observation Data:
 - ICU Observational Study
 - At a tertiary Hospital
 - 307-bed
- Study design:
 - Observing the ICU clinical team
 - Post-observation survey
 - 2 health informatics researchers
 - Utilized communication checklist



Methods

- Study design:
 - Duration: 2 weeks per Attending physician
 - 3 Attending physicians
 - Activity: Patient rounds
 - 6 observations per Attending physician:
 - First day of the first week
 - Two days during the weekend
 - Two day during week days
 - Last day of the second week

ICU Clinical Communication



Key

- Attending Physician
- Fellow
- Resident
- Medical Student
- Registered Nurse
- Dietician
- Respiratory Therapists
- Pharm. D

- 1 – EKG
- 2 – O2, Misc. outlets, etc.
- 3 – White board
- 4 – Computer
- 5 – TV
- 6 – Supplies Cart
- 7 – Family Member
- 8 – Phone
- 9 – IV Fluids

Results

- Observation study:
 - Approx. 55 hours
 - 279 patient visits
 - 7 communication categories captured
 - 28 observation variables
 - 12 week days & 6 weekend days
- Survey:
 - 147 respondents
 - 22 clinical roles
- Raw data was collected from both researchers
 - mean of records computed and stored

Results

Communication Activity	Average frequency per patient visit (n=279)	
Patient information conveyed to Attending Physician	<u>5.63</u>	Information conveyed to Attending were on average 5 per visit
Feedback given by Attending Physician	7.31	
Communication events done by Attending Physician	<u>13.11</u>	Most communication events done by Attending
Interruptions caused by clinicians	3.03	Interruptions caused by clinicians were 3 times greater than technological interruptions
Interruptions caused by technology-aided devices	1.23	
Attending-Computer interaction	1.14	

Discussion

- Key findings:
 - Interruptions: **3:1** (Clinicians: Technology)
 - Attending physician mostly requests patient information
 - Weekdays Vs. Weekends
 - Feedback given by Attending
 - Teaching
 - Computer interactions
 - Large team size Vs. Small team size
 - Information to Attending
 - **Mistakes made by team**
 - Feedback by Attending

Discussion

- Important Correlations:

- Mistakes

- Technological Interruptions
- Information conveyed to Attending physician

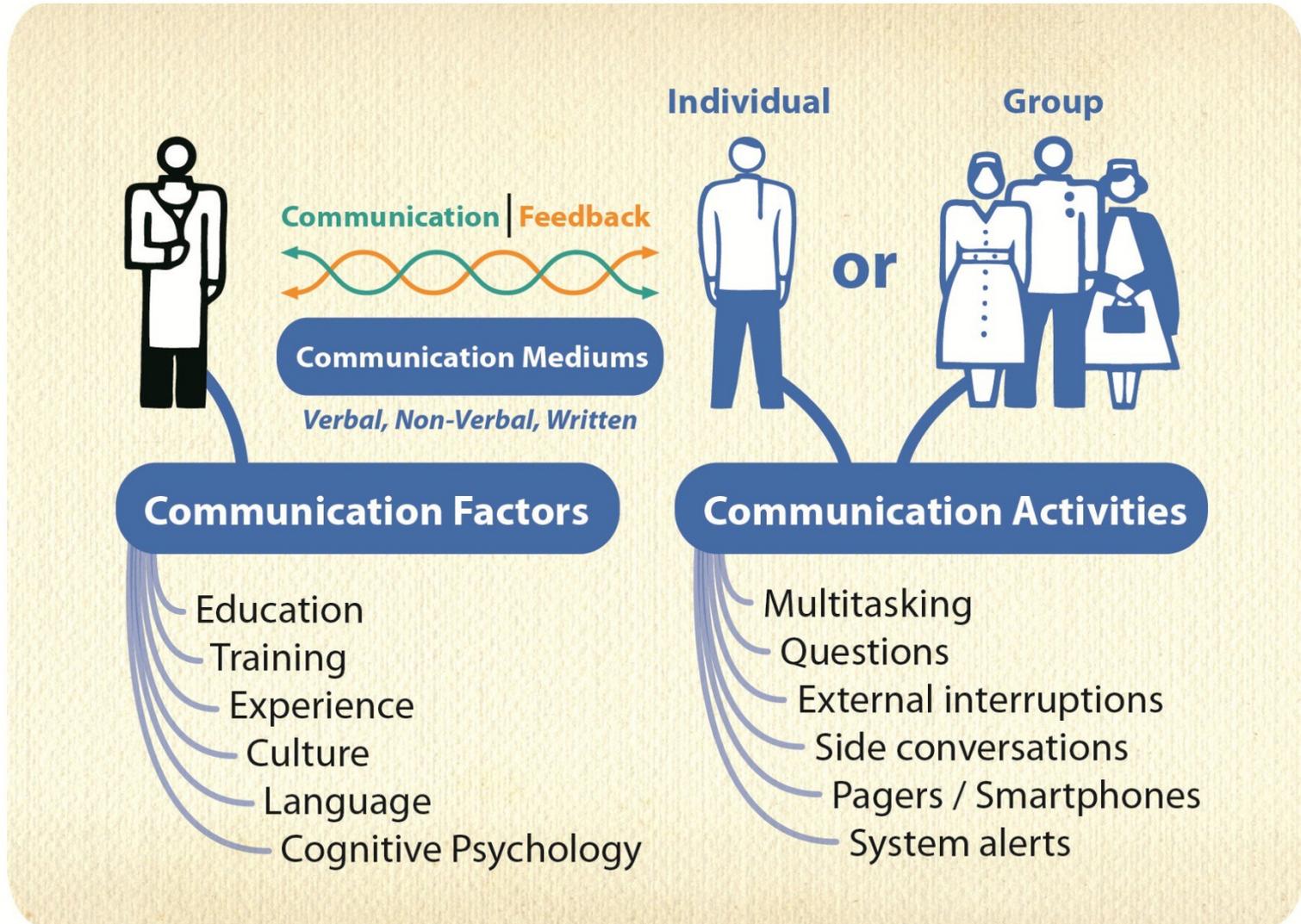
- Computer Interactions

- Technology & Human interruptions

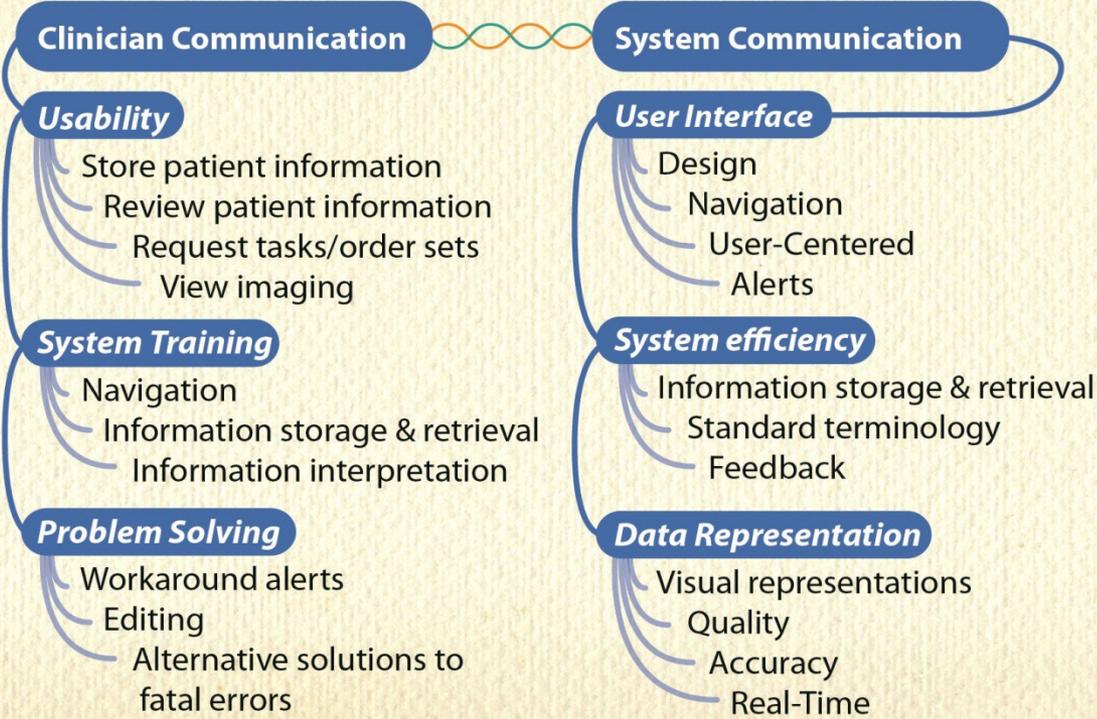
- Strong predictors to (in)effective communication:

- Side conversations
- External interruptions
- Slips by Attending
- Reading electronic patient information (medical records or Imaging)

Clinician-Clinician Interaction



Clinician-Computer Interaction



Characterizing Patient-Generated Clinical Data and Associated Implications for Electronic Health Records

Introduction

- As patient-centeredness is an increasingly important tenet, technologies engaging patients for individual assessment of clinical status, satisfaction, and education are being implemented in larger number.
- A number of studies have shown that patients find the use of a patient portal for direct data entry to be a positive experience.

Introduction

- To date, there are few studies assessing the quality of patient-generated healthcare data.
- Goal: To better understand patient entered data broadly for different aspects of health history through an evaluation of the quality of patient-generated data using a patient-facing health history tool for past medical history (PMH), past surgical history (PSH), and social history (SH).

Methods

- The patient-facing tool evaluated in this study was available September 2014 to patients with appointments at a surgery clinic for the University of Minnesota Physicians.
- The tool was available to patients enrolled in the EHR online patient portal prior to the clinic appointment.

Methods

- Following completion of the tool, results were immediately available to the clinician on the enterprise Epic EHR system.
- If accepted, the entries were then associated with discrete diagnosis terms and diagnosis codes in the PMH and PSH sections, as well as the discrete data fields of the SH section

Methods

- Each diagnosis entered was then reviewed by an independent physician-rater
 - to determine whether the patient-generated diagnosis was previously listed in the PMH and PSH of the patient chart
 - To gauge the level of granularity provided by the patient-generated diagnosis

Results

Demographic	n (%)
Age, range (mean)	18-74 (49.0)
Gender (female)	26 (52.0)
Visit Type	
New	6 (12.0)
Return	44 (88.0)
History Information	
Patient-generated diagnoses	435
Patient-generated procedures	231
Patient-generated social history	188

Past Medical History

Category	n(%)
Duplicate Diagnosis “Hypertension “ = hypertension	117(26.9)
Duplicate Low Granularity Diagnosis ”Kidney problem” = Diabetes nephropathy	112(25.7)
New Low Granularity Diagnosis ”Respiratory problem”	43(9.9)
New False Diagnosis	82(18.9)
New Diagnosis with Utility “Anxiety”	80(18.4)

Past Surgical History

Category	n(%)
Duplicate Diagnosis	53(23.0)
Duplicate Low Granularity Diagnosis	120(51.9)
New Low Granularity Diagnosis	23(10.0)
New False Diagnosis	7(3.0)
New Diagnosis with Utility	26(11.3)
Duplicate Entry	2(0.9)

Discussion

- Over 50% of patient-generated medical diagnoses and nearly 75% of surgical diagnoses were duplicates of those already recorded within the PMH and PSH portions of the EHR.
- Approx. 20% of patient-generated medical diagnoses and 11% of surgical ones were found to provide a **new**, sufficiently **granular** piece of data that was deemed to be likely accurate based on chart review by a content expert.

Discussion

- Perhaps a drop-down menu approach would provide greater ease of use compared to free text entry by patients
 - Empty free text entries
- Differences between:
 - PMH, PSH Vs. SH

Discussion

- It appears that patient-entered health history data has the potential of improving clinical data in the EHR
- Future work will include engaging both patients and clinicians to further optimize the user interface.
- Patient-generated health data is becoming more prevalent in healthcare.

**An evaluation of the Telehealth Home-Care Coordinated Disease Management
by: gpTRAC**

Study Overview

- Who: St. Alexis Medical Center
- Where: Bismarck, North Dakota
- What: To perform an evaluation of the Telehealth Home-Care Coordinated Disease Management Demonstration project
- Why: To improve access and care for patients with chronic conditions who live in rural settings



Methods

- There were a total of 38 patients enrolled from baseline to conclusion of the study;
- The average age of patients was 79;
- All participating patients had one or more chronic conditions;
- Patients were enrolled in the program for an average of 97.4 days.

Methods

- Eligibility: Patients diagnosed with a chronic condition and able to use telemonitoring equipment
- Study consent form and telemonitoring equipment installation form provided
- Baseline Data Form:
 - baseline demographics, chronic condition diagnoses, weight, blood pressure, blood-oxygen saturation levels

Results

Survey Data Summary

Survey Data Received							
Patient Folders	Baseline Forms	Telemedicine Installation Forms	Tabular Trends Forms	Emergency Room Admission Forms	Hospitalization Forms	Monitoring Discharge Forms	Telemedicine Perception Questionnaire
38	38	38	38	15	10	27	27

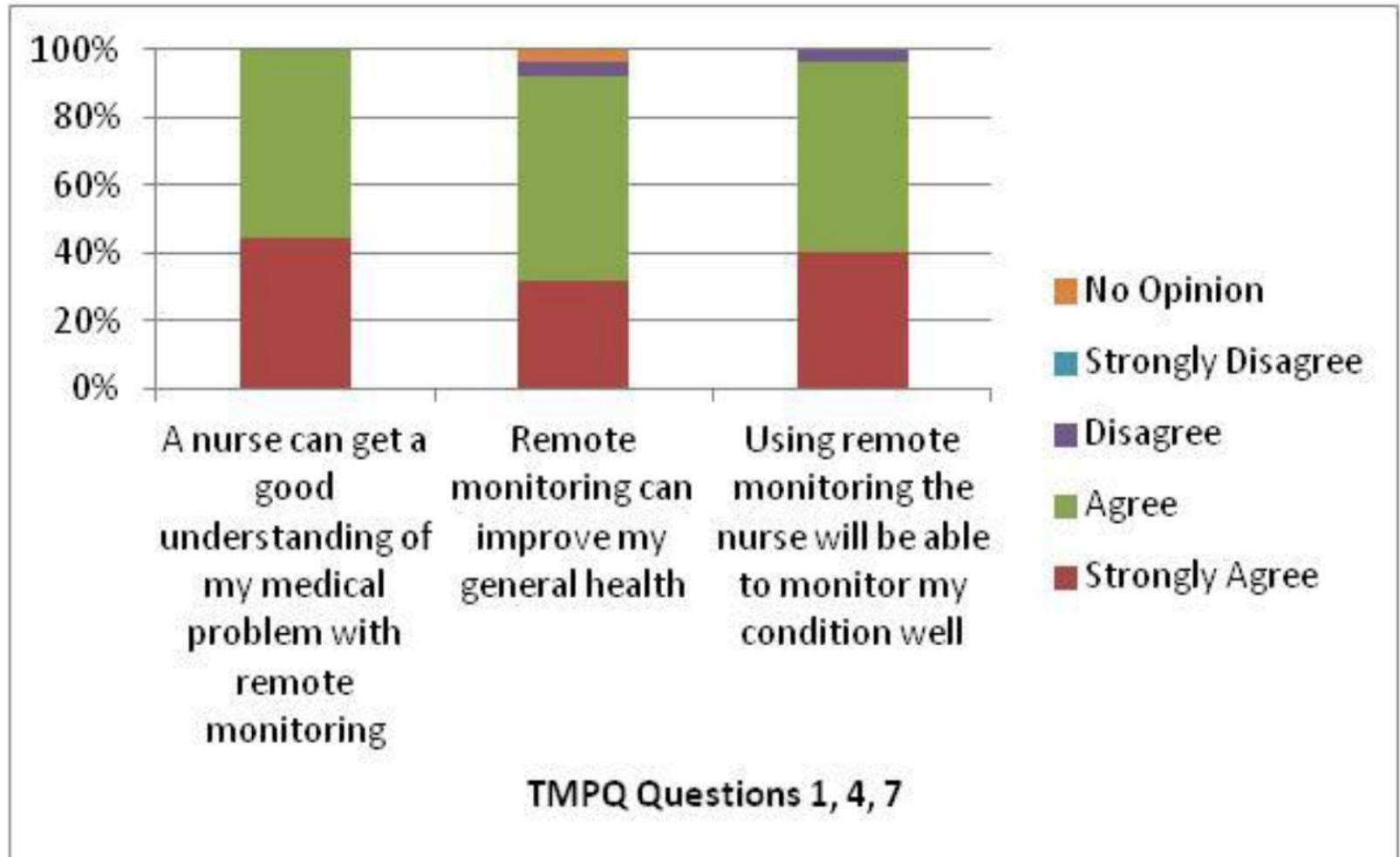
Results

ER Visits and Re-hospitalizations

Gender	Diagnosis	Total Patient Days Enrolled	30 Day Re-Hospitalizations	30-60 Day Re-Hospitalizations	Total Re-Hospitalizations	Total ER Visits
Male	All Diagnoses	2,433	1	2	6	8
Female	All Diagnoses	1,268	0	1	4	7
All Patients	All Diagnoses	3,701	1	3	10	15

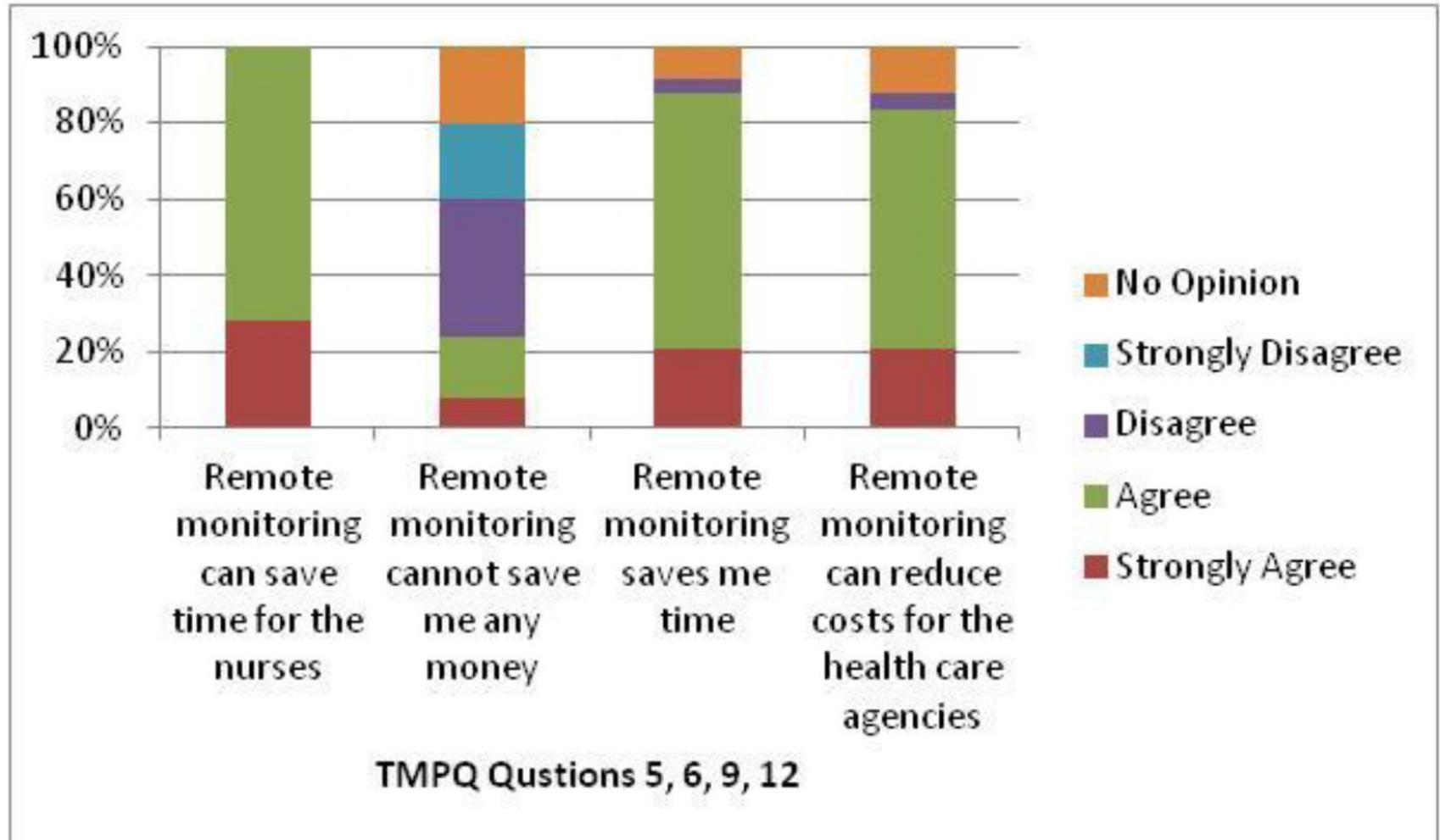
Results

TMPQ Questions 1, 4, 7



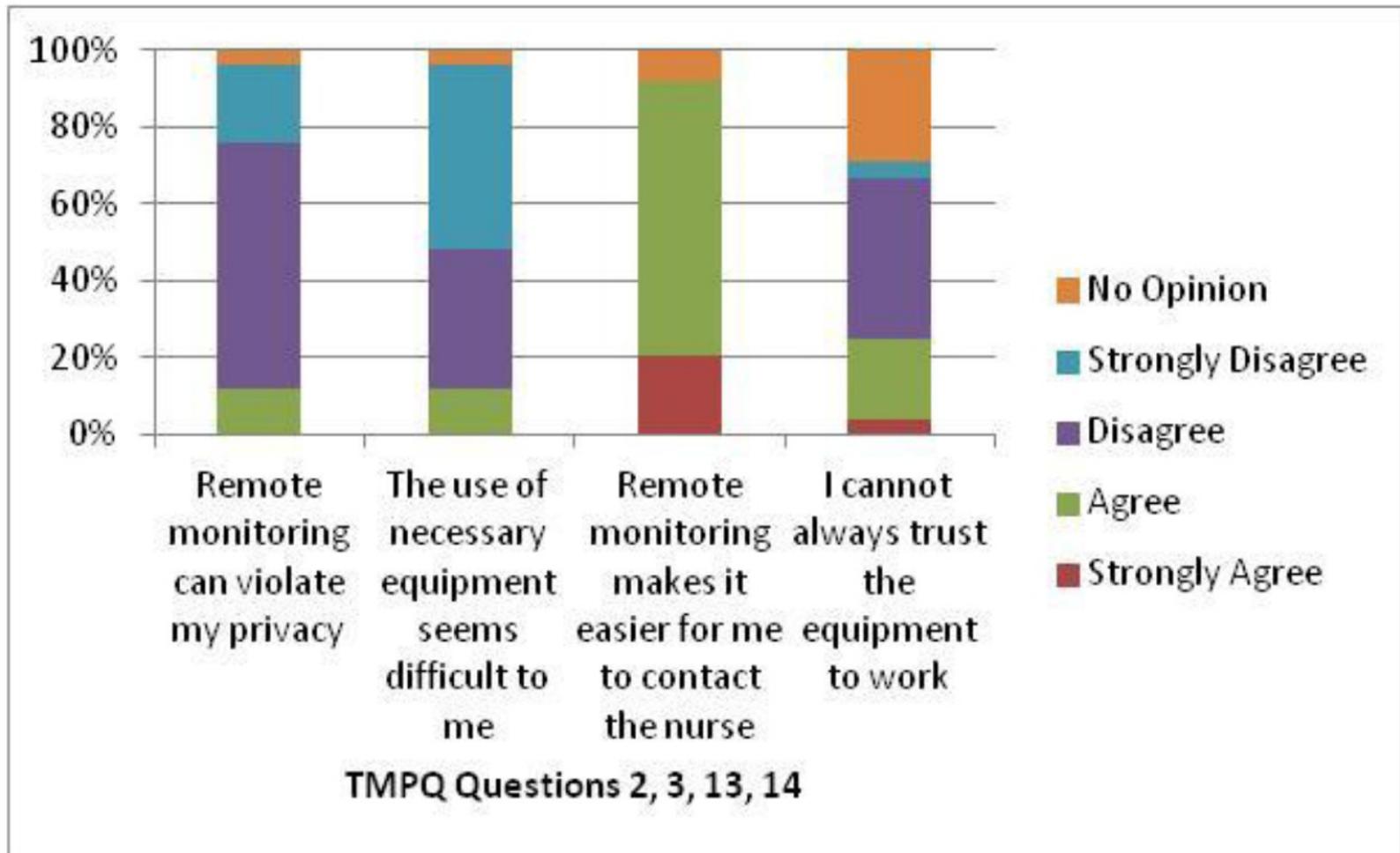
Results

. TMPQ Questions 5, 6, 9, 12



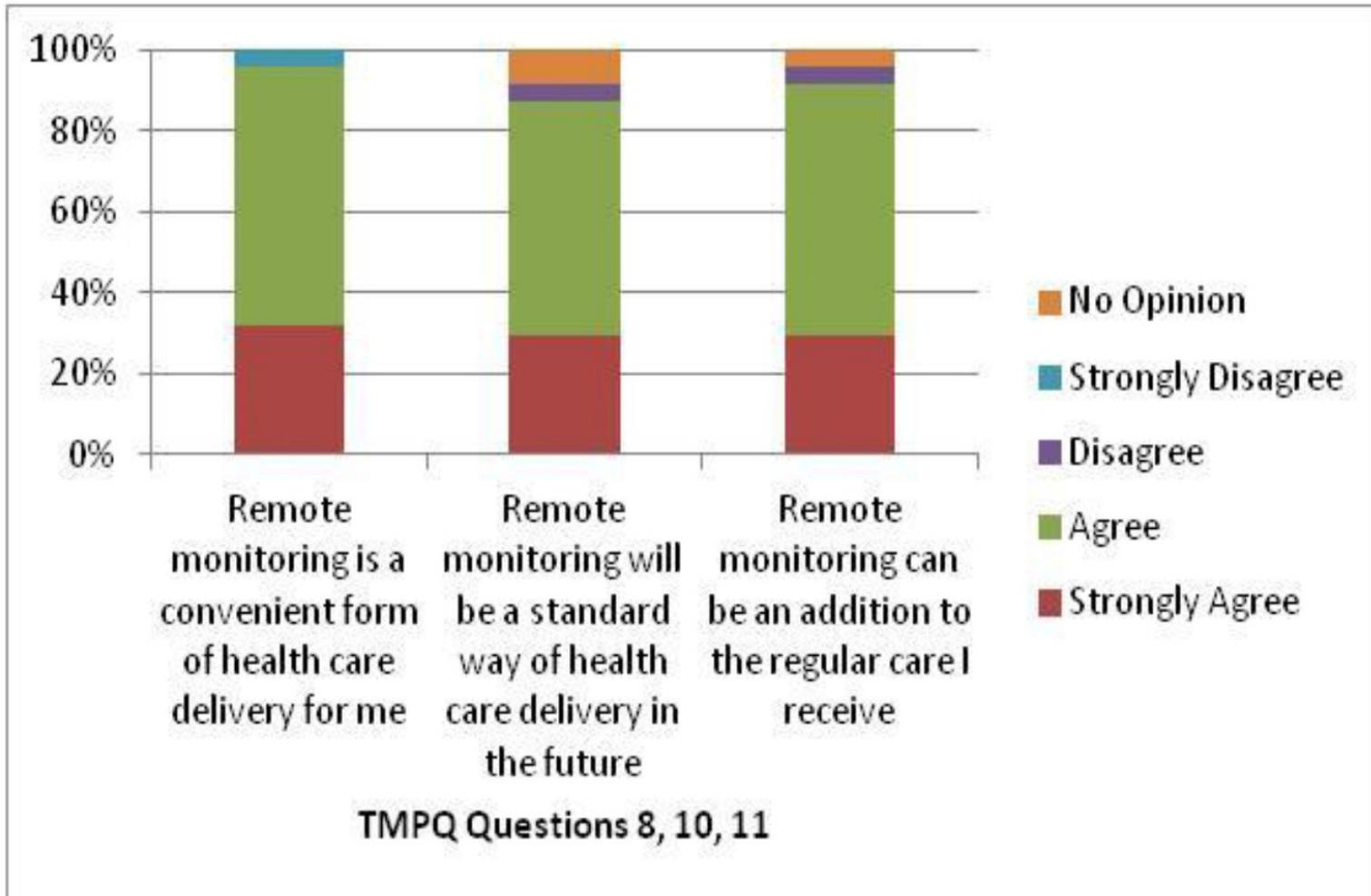
Results

TMPQ Questions 2, 3, 13, 14



Results

TMPQ Questions 8, 10, 11



Findings

- High levels of patient satisfaction with the telehealth program were identified:
 - 92% of patients agreed that telehealth (TH) can improve their health;
 - 83% agreed TH can reduce healthcare costs;
 - 84% felt the equipment was easy to use;
 - 96% agreed that TH was a convenient form of healthcare delivery.

Findings

- Overall effectiveness of the Telehealth program was best demonstrated in terms of:
 1. stabilization of clinical indicators,
 2. the relatively low numbers of emergency room visits and re-hospitalizations among enrollees,
 - A. out of 3,701 patient/days of enrollment, a total of 10 re-hospitalizations, with only one within 30 days of initial enrollment
 3. and high levels of satisfaction with the program demonstrated by the results of the TMPQ.

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 - Mary Devany
 - Zoi hills

Thank you



New Social History Data Elements

Category	n(%)
Tobacco	1(5.9)
Alcohol	1(5.9)
Illicit Substance	3(17.6)
Sexual History	11(64.7)
Total	17