

Integrating Patient-Reported Outcomes into Electronic Health Record Systems in Oncology

Ethan Basch, MD, MSc

Professor and Chief of Oncology, University of North Carolina

Physician-in-Chief, North Carolina Cancer Hospital

February, 2022

Disclosures

Employer: University of North Carolina

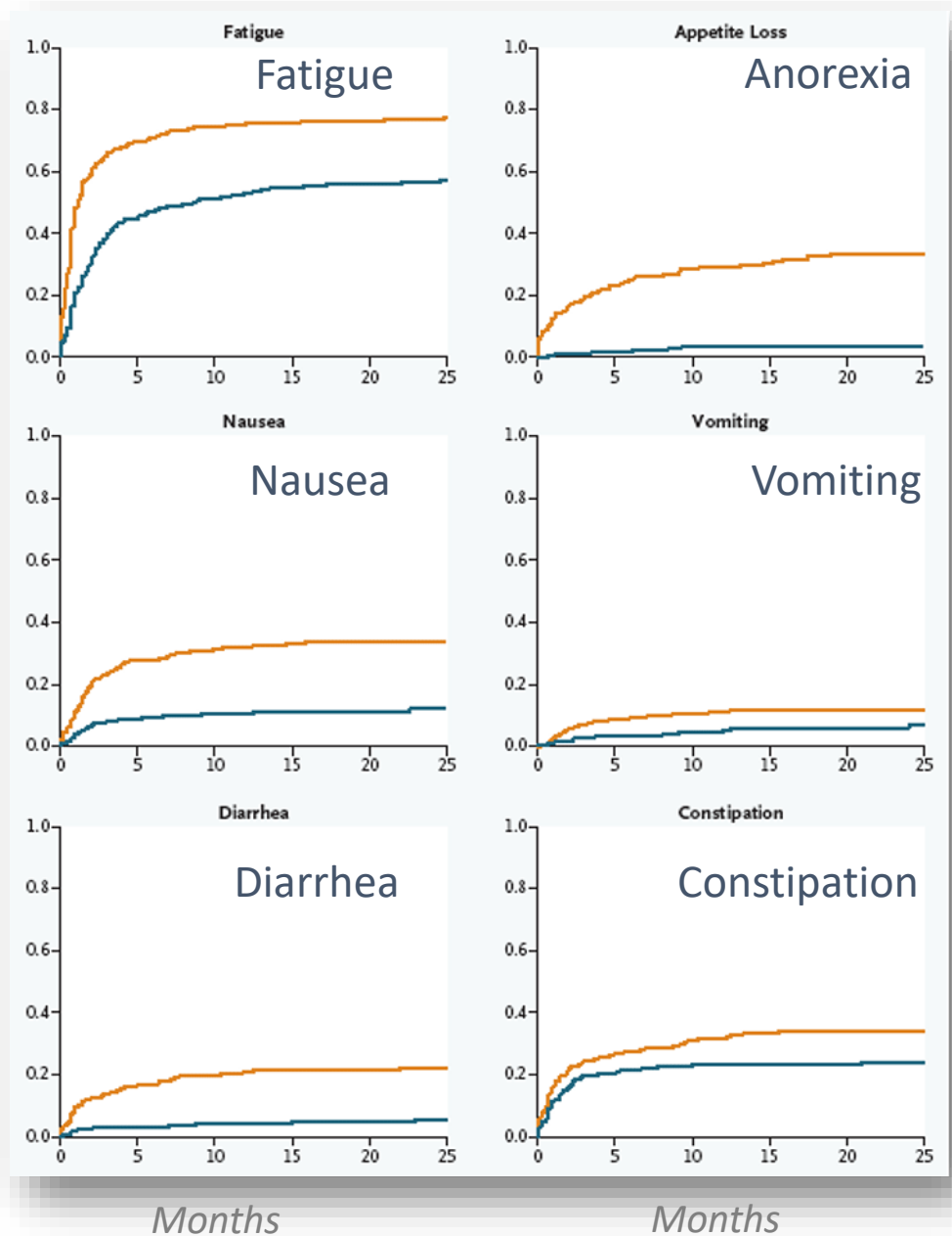
Research Funding: National Cancer Institute; Patient-Centered Outcomes Research Institute

Editorial Boards: *JAMA, Clinical Trials*

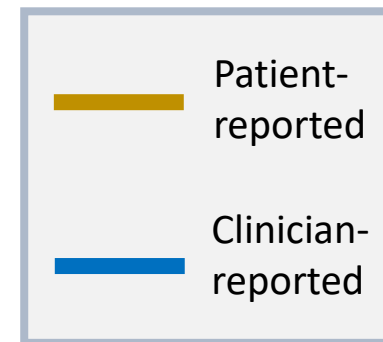
Advising/Consulting: Sivan; Navigating Cancer; CareVive; AstraZeneca; Resilience, N-Power Medicine

Board of Directors: ASCO

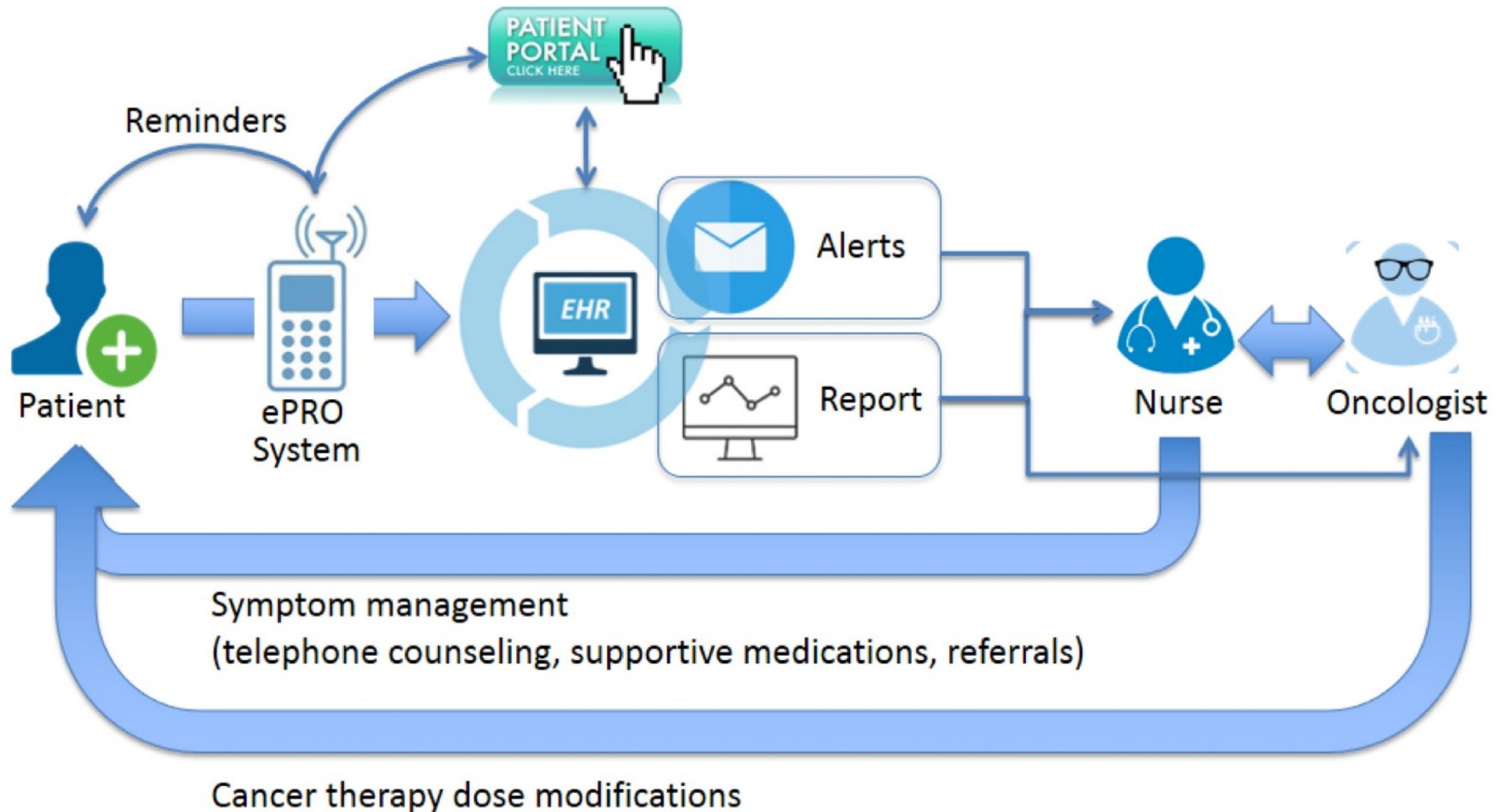




Cumulative incidence of patient vs. clinician reporting of the same symptoms over time, showing under-reporting by clinicians compared to patient self-report



Solution: Integrate Patient Self-Reporting into EHR Workflow



Examples of PRO Interfaces in Use

Example PRO Patient Interface (Free Standing PRO System)

Welcome jaynedoe [Home](#) [Log out](#)

Please think back over the past 7 days: Page: 2 of 5 Progress:

How OFTEN did you have ARM OR LEG SWELLING?

What was the SEVERITY of your ARM OR LEG SWELLING at its WORST?

How much did ARM OR LEG SWELLING INTERFERE with your usual or daily activities?

Web

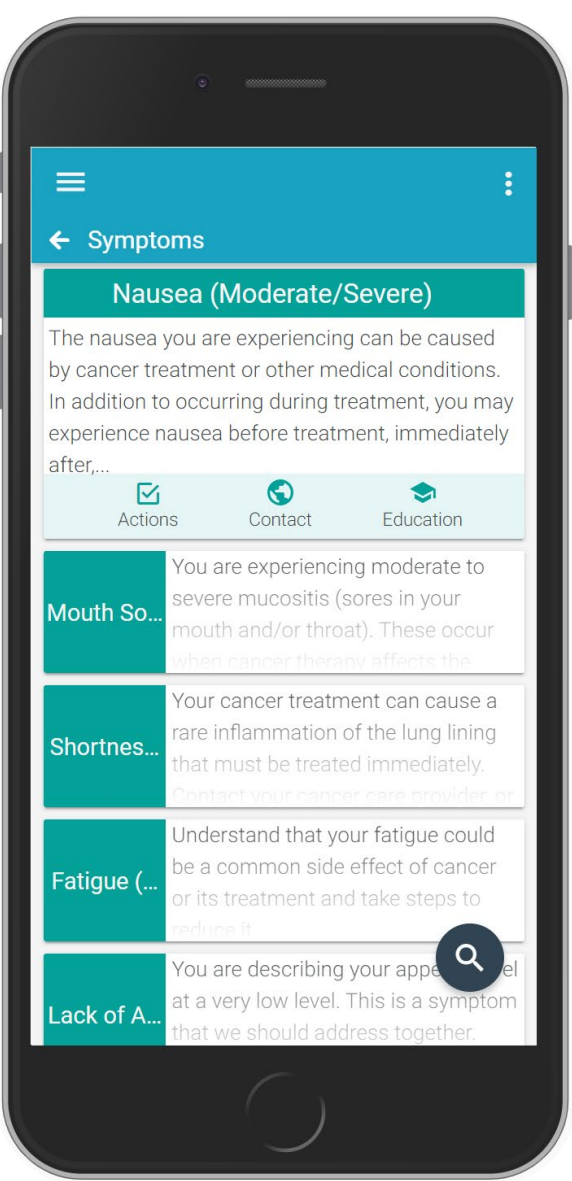
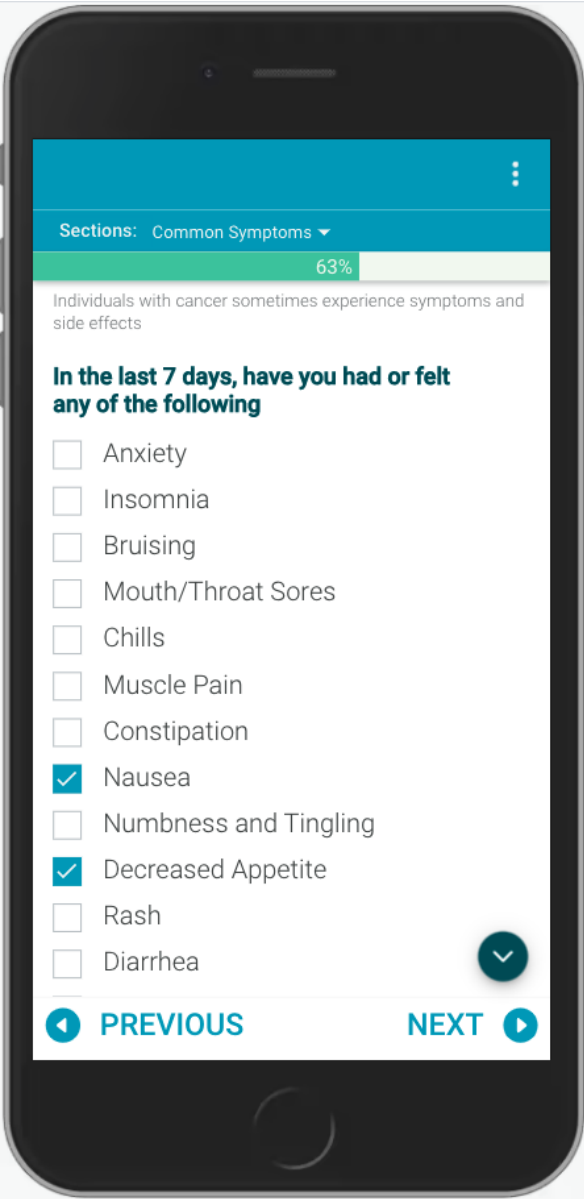
In the past 7 days, what was the severity of your pauses at its worst?

Mobile



Automated Telephone Systems

Example PRO Patient Interface (PRO System Interfaced with EHR)



Example PRO Patient Interface (PRO in Native EHR Functionality)

Expanded Prostate Cancer Index Composite (EPIC-CP)

For an upcoming appointment with **Timothy M Zagar, MD** on 12/17/2019

* Indicates a required field.

* Overall, how much of a problem has your urinary function been for you during the last 4 weeks?

No problem Very small problem Small problem Moderate problem Big problem

* Which of the following best describes your urinary control during the last 4 weeks?

Total Control Occasional dribbling Frequent dribbling No urinary control

* How many pads or adult diapers per day have you been using for urinary leakage during the past 4 weeks?

None One pad per day Two pads per day Three or more pads

* How big a problem, if any, has urinary dripping or leakage been for you during the last 4 weeks?

No problem Very small problem Small problem Moderate problem Big problem

How big a problem, if any, has each of the following been for you during the last 4 weeks?
(Select one answer for each problem listed)

* Pain or burning with urination

No problem Very small problem Small problem Moderate problem Big problem

* Weak urine stream/incomplete bladder emptying

No problem Very small problem Small problem Moderate problem Big problem

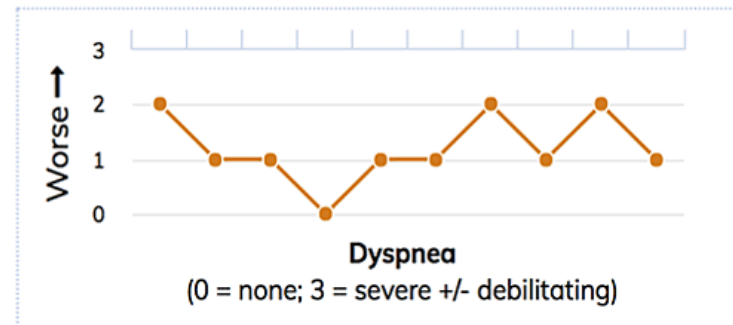
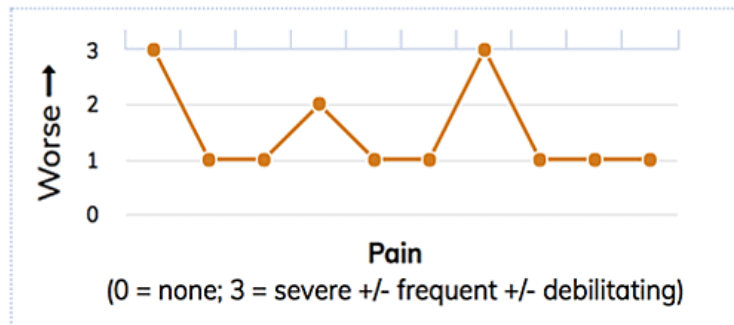
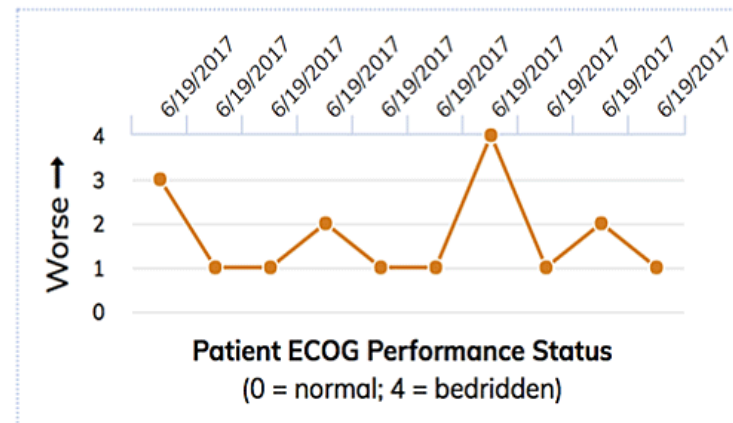
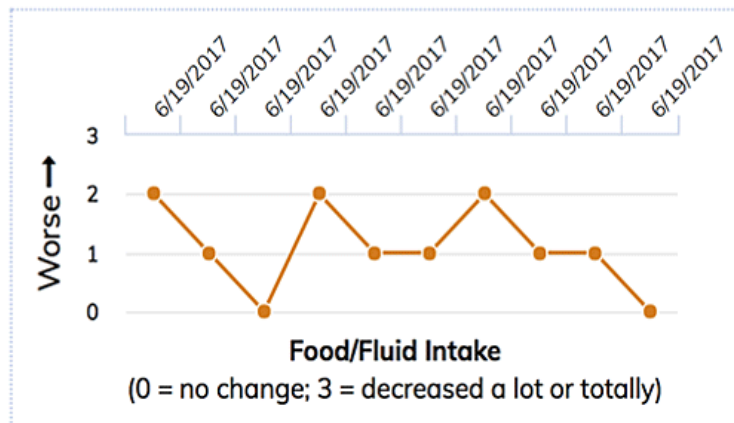
* Need to urinate frequently

No problem Very small problem Small problem Moderate problem Big problem

CONTINUE CANCEL

Example Clinician Visualization of PRO Data (Free Standing System)

- ❗ **Severe symptoms on 6/19/2017:** Activity Level, Appetite, Nausea, Vomiting, Dyspnea, Diarrhea, Constipation, Pain, Insomnia, Depression.
- ❗ **Worsened symptoms between 6/12/2017 and 6/19/2017:** Activity Level, Appetite, Nausea, Vomiting, Dyspnea, Diarrhea, Constipation, Pain, Insomnia, Depression.
- ❗ **Falls:** 6/12/2017
- ✅ **Improved symptoms between 6/12/2017 and 6/19/2017:** Activity Level, Appetite, Nausea, Vomiting, Dyspnea, Diarrhea, Constipation, Pain, Insomnia, Depression.



Example Clinician Visualization of PRO Data in EHR

Oncology GU Oncology Lab View Adult Onc View » 6 Months 06/21/19 - 12/18/19

Days 12/17/2019 > Most Recent Value
All 6/21/2019 - 12/18/2019

⌵ Patient Spotlight +
No data to display.

⌵ Bladder Cancer Index (BCI)

☐ Urinary Summary	55.66 !!	55.66 !!	12/17/2019
☐ Urinary Function	67 (A)	67 (A)	12/17/2019
☐ Urinary Bother	50 !!	50 !!	12/17/2019
☐ Bowel Summary	56.7 !!	56.7 !!	12/17/2019
☐ Bowel Function	60.5 (A)	60.5 (A)	12/17/2019
☐ Bowel Bother	54.16 !!	54.16 !!	12/17/2019
☐ Sexual Summary	53.5	53.5	12/17/2019
☐ Sexual Function	56	56	12/17/2019
☐ Sexual Bother	50	50	12/17/2019

⌵ Expanded Prostate Cancer Index Composite (EPIC-CP)

☐ Urinary incontinence domain score	6 !!	6 !!	12/17/2019
☐ Urinary irritative/obstructive ...	6 !!	6 !!	12/17/2019
☐ Bowel domain score	4 !!	4 !!	12/17/2019
☐ Sexual domain score	4	4	12/17/2019
☐ Hormonal domain score	6 !!	6 !!	12/17/2019
☐ Overall prostate cancer QOL score	26 (A)	26 (A)	12/17/2019

⌵ Vitals

☐ Weight	75 kg (165 lb 5.5 oz)	75 kg (165 lb 5.5 oz)	12/17/2019
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⌵ Lower Urinary Tract Symptom Medicatinos

☐ Oxybutynin	10 mg Daily ↗
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⌵ Erectile Dysfunction Medications

☐ Tadalafil	10 mg Daily PRN ↗
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Example Clinician Visualization of PRO Data in EHR

KARP, LORI - 00012347 Opened by Smith MD, Carol

Task Edit View Patient Chart Links Notifications Navigation Help

Home Physician Worklist ePA Worklist Dynamic Worklist Referral Management HealthRegistries MyExperience Multi-Patient Task List Invitations eCoach Message Center Patient List Person Search Cerner Direct Referrals UpToDate Links Result: 0 Propo: 0 Messa: 0

Tear Off Exit Calculator AdHoc Temporary Location Communicate Patient Education Patient Pharmacy iAware Discern Reporting Portal Endorse Results [0]

KARP, LORI

DOB: 8/31/1955 Age: 66 years Sex: Female
Allergies: No Known Medication Allergies Dose Weight: 74.700 kg (12/06/2019) Resuscitation Status: FIN: 000303292
Care Team: Smith MD, Paul Loc: BW Med Onc Clin; BW Onc Waiting Room CommonWell: Not Enabled HealthLife: Yes Clinical Trials: Advance Dir:

Menu SMART App SMART App Validator Provider View Demographics PowerOrders + Add Diagnoses and Problems Histories Medication List + Add Notes Activities Documentation + Add Flowsheet

carevive P Cerner Welcome Carol

KARP, LORI 67 y/o, Female Enrolled

Save Changes Create Care Plan Actions

ALERT

Goals and Decision Making

Functional Status

Symptoms

Symptom Management

Emotional and Practical

Unplanned Care

Quality of Life

Cancer Risk

Diagnosis

SYMPTOMS

EDMONTON SYMPTOM ASSESSMENT SCALE (ESAS) Last updated: 10/08/2021

SYMPTOM ASSESSMENT USING COMMON TERMINOLOGY CRITERIA, DERIVED FROM THE PRO-CTCAE Last updated: 10/26/2021

Showing 10 data points More Less

SYMPTOMS	PRESENT	FREQUENCY	SEVERITY	INTERFERENCE
Anxiety	Yes	Occasionally	Mild	A little Bit
Bruising	No			
Chills	No	Never	None	
Constipation	No		None	
Decreased Appetite	No		None	Not at All
Diarrhea				
Fatigue	No		None	Not at All
Fever (100.5 F or higher)	No			
General Pain	No	Never	None	Not at All
Insomnia	No		None	Not at All
Mouth/Throat Sores	Yes		Moderate	Not at All
Muscle Pain	No	Never	None	Not at All

Diarrhea Frequency

Very Severe
Almost Constantly
Severe
Frequently
Moderate
Occasionally
Mild
Rarely
None
Never

Very Much
Quite a Bit
Somewhat
A little Bit
Not at All

10/1/2021 10/6/2021 10/6/2021 10/7/2021 10/8/2021 10/18/2021 10/20/2021 10/23/2021 10/26/2021

S1810 PWCV October 26, 2021 12:41 PM CDT

Example Clinician Importation of PRO Data into EHR Clinic Notes

My Note

Tag Share w/ Patient Details

★ B A abc ↺ ↻ ? + Insert SmartText ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↴ ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↴ ↵ ↶ ↷ ↸ ↹

Actions Taken:
Patient reported urinary symptoms are {concerning/not concerning:45258}.
Patient reported bowel symptoms are {concerning/not concerning:4525}{concerning
Patient reported sexual symptoms are {concerning/not concerning:4525}{not concerning

The following interventions were taken today for positive symptoms:
{bci interventions:45263}

My Note

Tag Share w/ Patient Details

★ B A abc ↺ ↻ ? + Insert SmartText ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↴ ↵ ↶ ↷ ↸ ↹

Actions Taken:
Patient reported urinary symptoms are concerning.
Patient reported bowel symptoms are concerning.
Patient reported sexual symptoms are concerning.

The following interventions were taken today for positive symptoms:
{bci interventions:45263}
{Urinary:45259:::1}
{Bowel:45260:::1}
{Sexual:45261:::1}
All interventions have been tried therefore no new interventions will be initiated today.
Patient declines interventions.

The following interventions were taken today for positive symptoms:
{Urinary:45259:::1}
{Bowel:45260:::1} prescribed ***
{Sexual:45261:::1} increased medication ***
ordered ostomy supplies
clean intermittent catheterization
placed referral to pelvic PT
placed referral for wound ostomy
No interventions taken.

My Note

Tag Share w/ Patient Details

★ B A abc ↺ ↻ ? + Insert SmartText ↵ ↶ ↷ ↸ ↹ ↺ ↻ ↴ ↵ ↶ ↷ ↸ ↹

Bladder Cancer Index (BCI) Last Results
All scores out of 100

Urinary Scoring
Urinary Summary Score: 66
Urinary Function Score: 42
Urinary Bother Score: 78
(12/06/19) (clinically meaningful if < 80)

Bowel Scoring
Bowel Summary Score: 55
Bowel Function Score: 62.5
Bowel Bother Score: 50
(09/05/19) (clinically meaningful if < 80)

Sexual Scoring
Sexual Summary Score: 46.5
Sexual Function Score: 33.29
Sexual Bother Score: 65
(09/05/19) (clinically meaningful if < 50)

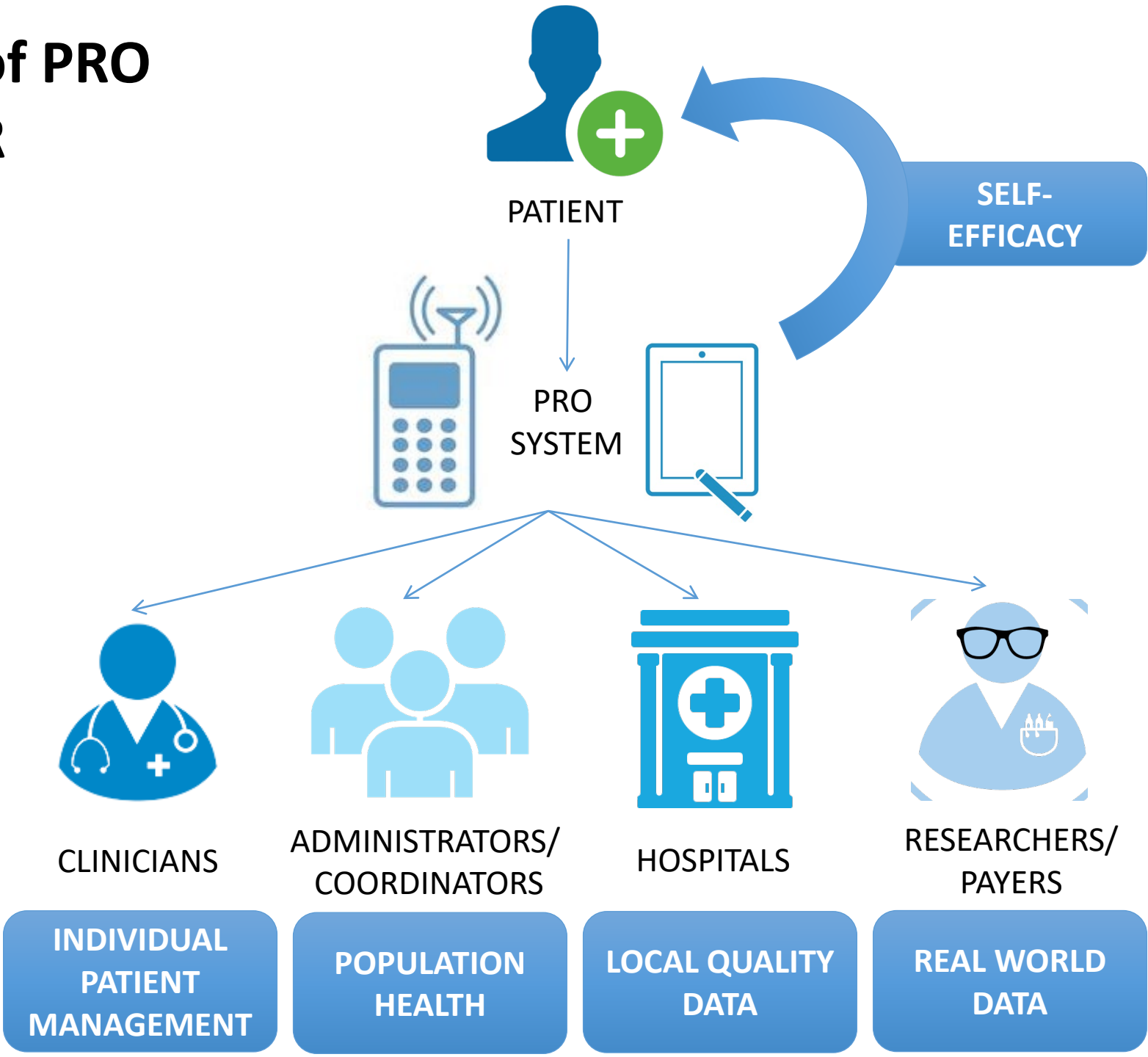
Change in last 2 scores
(Negative change = worsening symptoms)

Domain	Change in Score	Change is significant if DECREASE is:
Urinary	14.58	≥ 10
Bowel	30	≥ 8
Sexual	-7	≥ 13

Actions Taken:
Patient reported urinary symptoms are concerning.
Patient reported bowel symptoms are concerning.
Patient reported sexual symptoms are concerning.

The following interventions were taken today for positive symptoms:
Urinary: ordered ostomy supplies and clean intermittent catheterization
Bowel: referral to GI medicine
Sexual: ordered vacuum erection device and referral to intracavernosal injection therapy

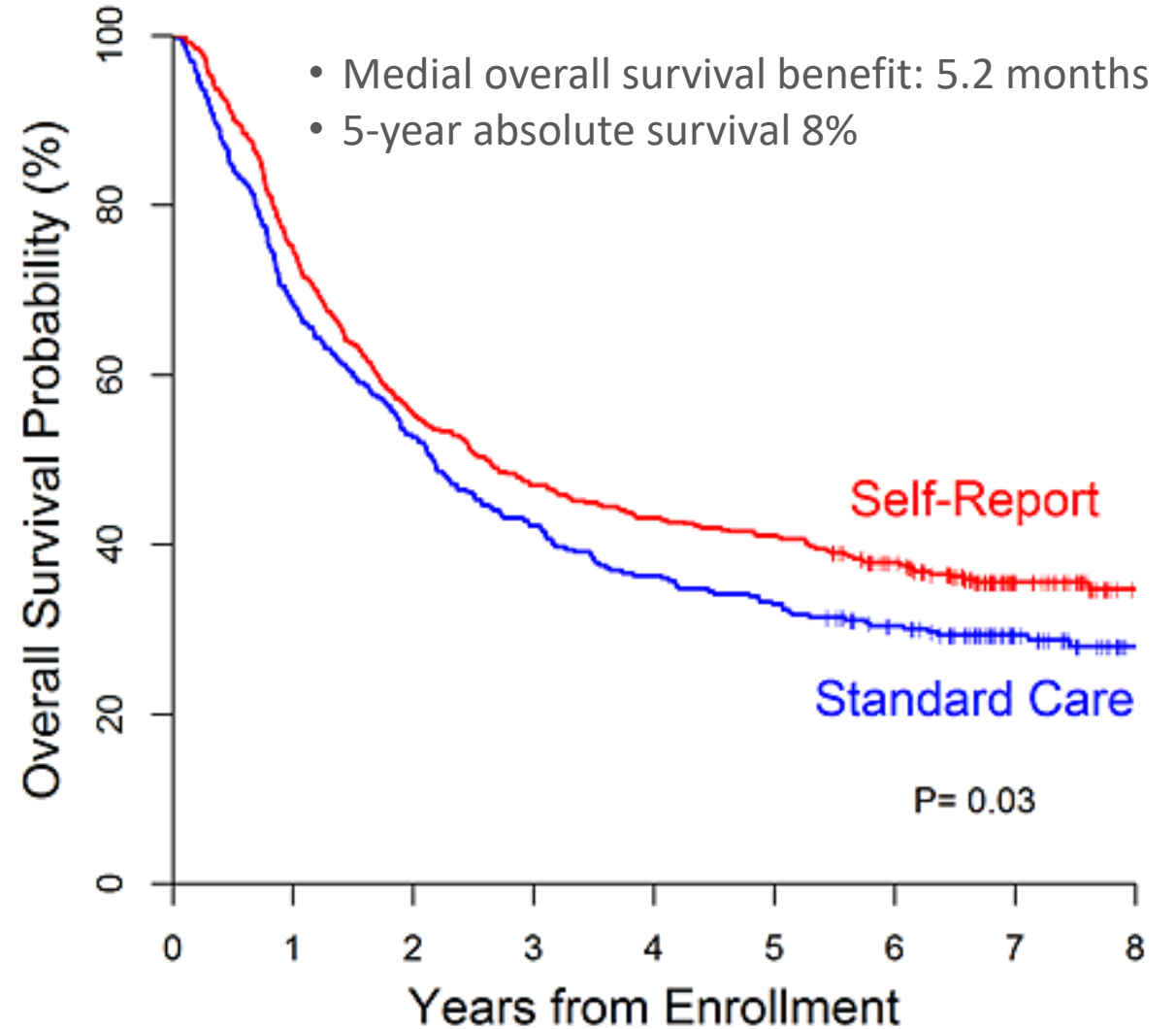
Multiple Uses of PRO Data in the EHR



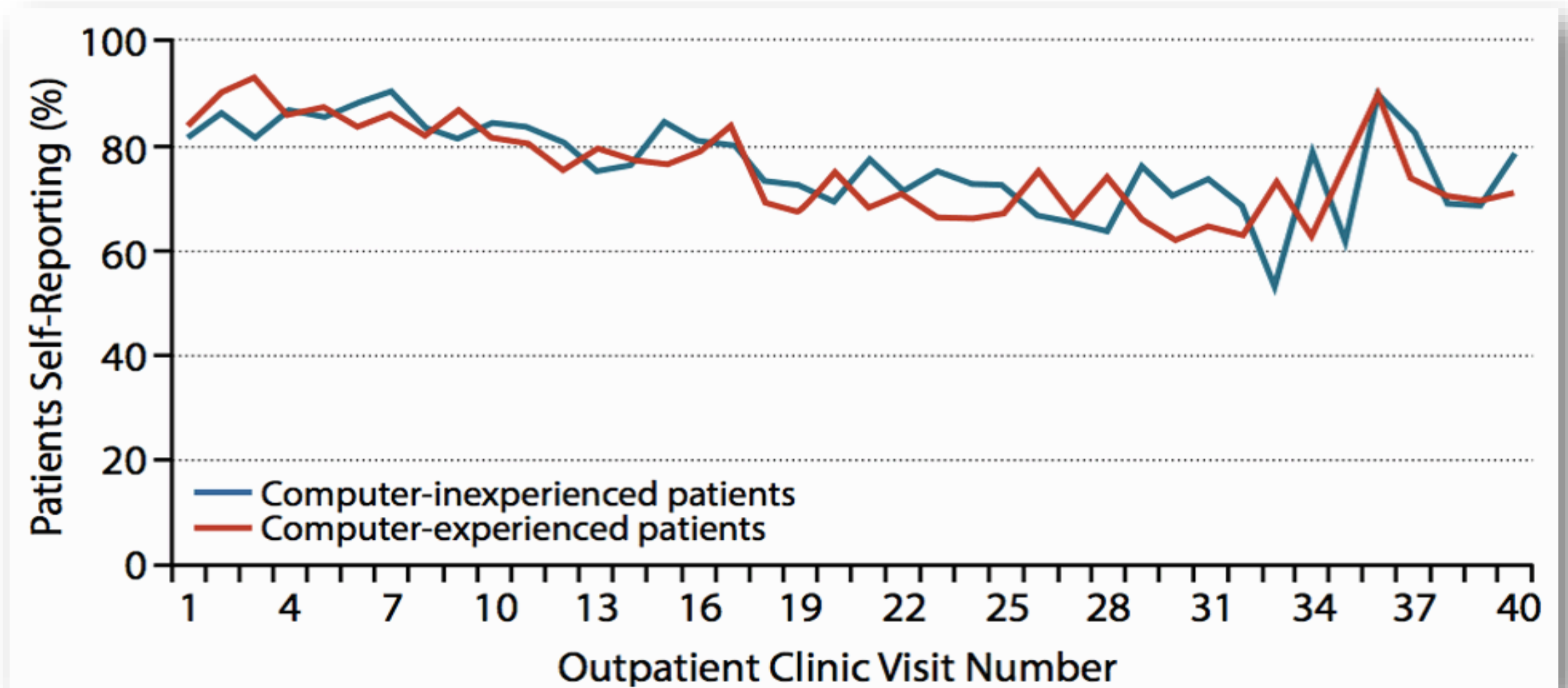
Benefits of PROs in Clinical Practice

Prior RCTs and population research demonstrate statistically significant and clinically meaningful improvements in:

- Symptom control
- Quality of life
- Physical function
- Communication
- ER visits
- Hospitalizations
- Overall survival



Feasibility of Collecting PROs in Clinical Practice



Key Technical Functions for PROs in EHRs

- Administrative interface
 - *Registration form* to enroll patient to initiate PRO reporting
 - *Dashboard* showing patient/panel compliance with PRO reporting
- Clinician interface
 - *Alert notifications*: Inbasket receipt of notifications, with audit trail for clearing alerts
 - *Data visualization*: Ability to view longitudinal data in table and line graph formats
- Patient interface
 - *Automated e-prompts* reminding when to self-report (email, text, phone call)
 - Follow up e-prompt(s) if don't self-report in response to initial e-prompt
 - *PRO surveys* with easy access (this is a major pitfall of native EHR PRO systems)
 - *Alert notifications* triggered to clinicians for severe/worsening symptoms

Key Barrier to Integrating PROs in Cancer Clinical Care: Reimbursement

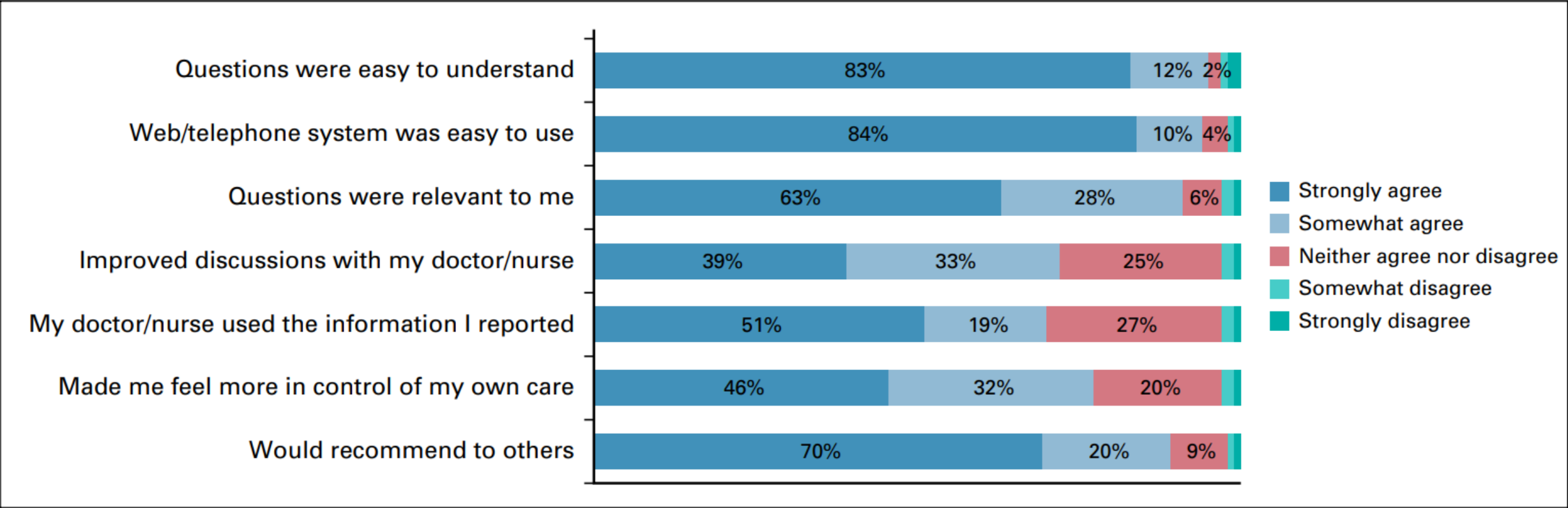
- New CPT codes for Remote Therapeutic Monitoring (98975, 98976, 98977, 98980, 98981)
- Cover use of software or connected devices that collect and transmit data to practices, and monitoring by supervised clinical personnel (e.g., navigators)
- Limitations that currently preclude covering PROs in oncology:
 - Currently restricted to respiratory and musculoskeletal conditions
 - Require at least 16 transmissions of data/month which is more than typical for oncology PRO systems (usually ~4/month)
 - Require direct MD supervision of personnel, which is unrealistic in oncology

Thank You

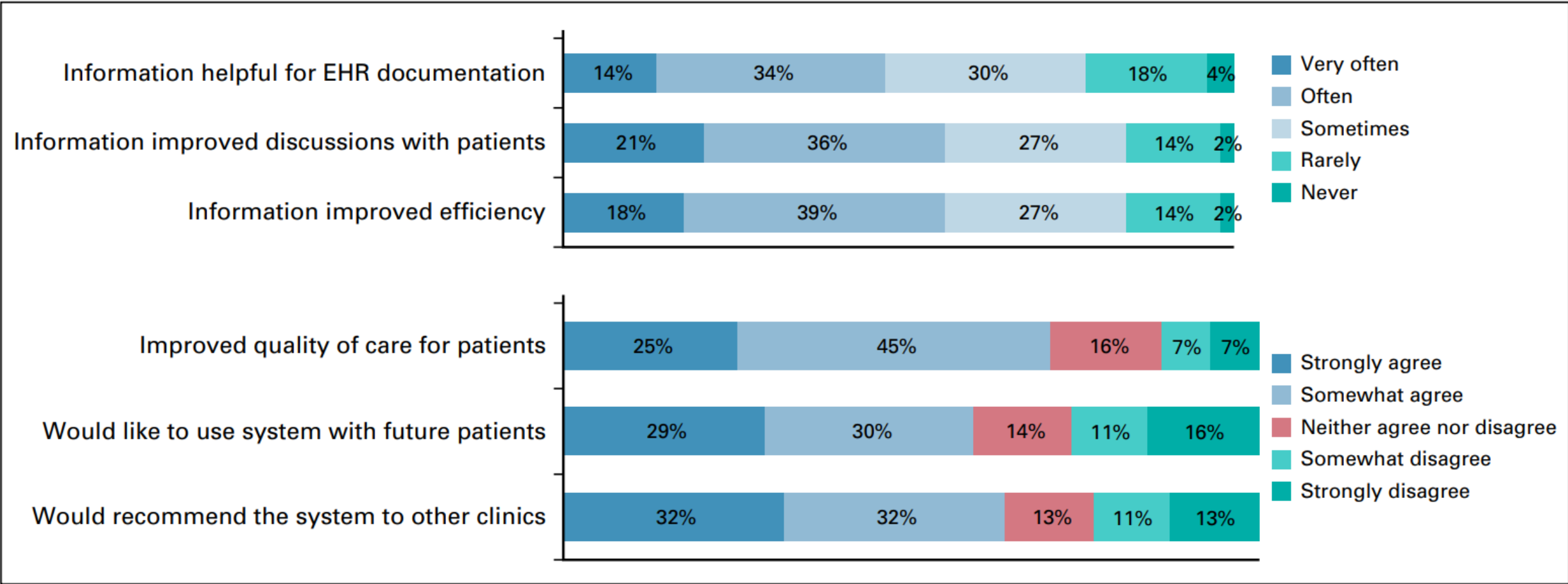


Appendix: Additional Background Slides

Patient Satisfaction with PRO Digital Monitoring



Nurse Impressions of PRO Digital Monitoring



Integration with Consumer PGHD Technologies

