

Penny: A digital health approach supporting symptom management and medication adherence in oncology

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- ♦ **I have no relevant financial relationships to disclose**
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Changing cancer care delivery landscape

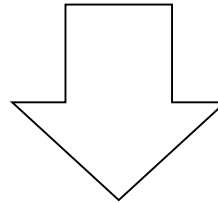
- ◆ Shift of care from hospital to ambulatory and home-based settings
- ◆ Dawn of personalized medicine, with dramatic rise in use of oral targeted therapies
- ◆ System-wide capacity strain, with myriad financial and workforce pressures to improve efficiency



Handley N et al. JCO 2019; Zerillo J et al. JAMA Onc 2018; Takvorian et al. JNCI 2019

Motivating questions

- ♦ How can we leverage digital health to improve care efficiency and patient outcomes in oncology?
- ♦ How can we harness resulting patient-generated data to drive a learning health system that continually improves?
- ♦ How can we empower and/or nudge patients toward higher value evidence-based behaviors?

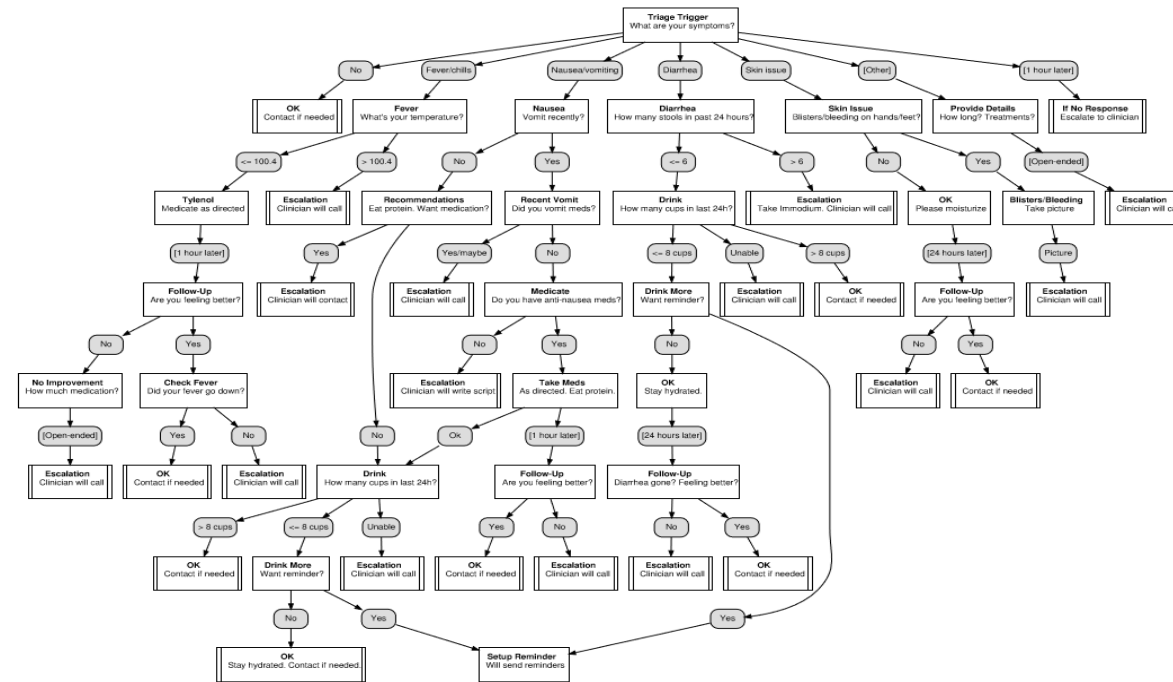


Use case: symptom management and oral anticancer agent adherence

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Contextual inquiry

- ◆ Interviewed patients with solid malignancies admitted for poorly controlled symptoms
 - Patients want to be engaged *outside of office visits*
 - Are accepting of *mobile phone-based* means of engagement
 - Prefer asynchronous *text-messaging* to apps or telephone calls
- ◆ Developed consensus-based symptom management pathways

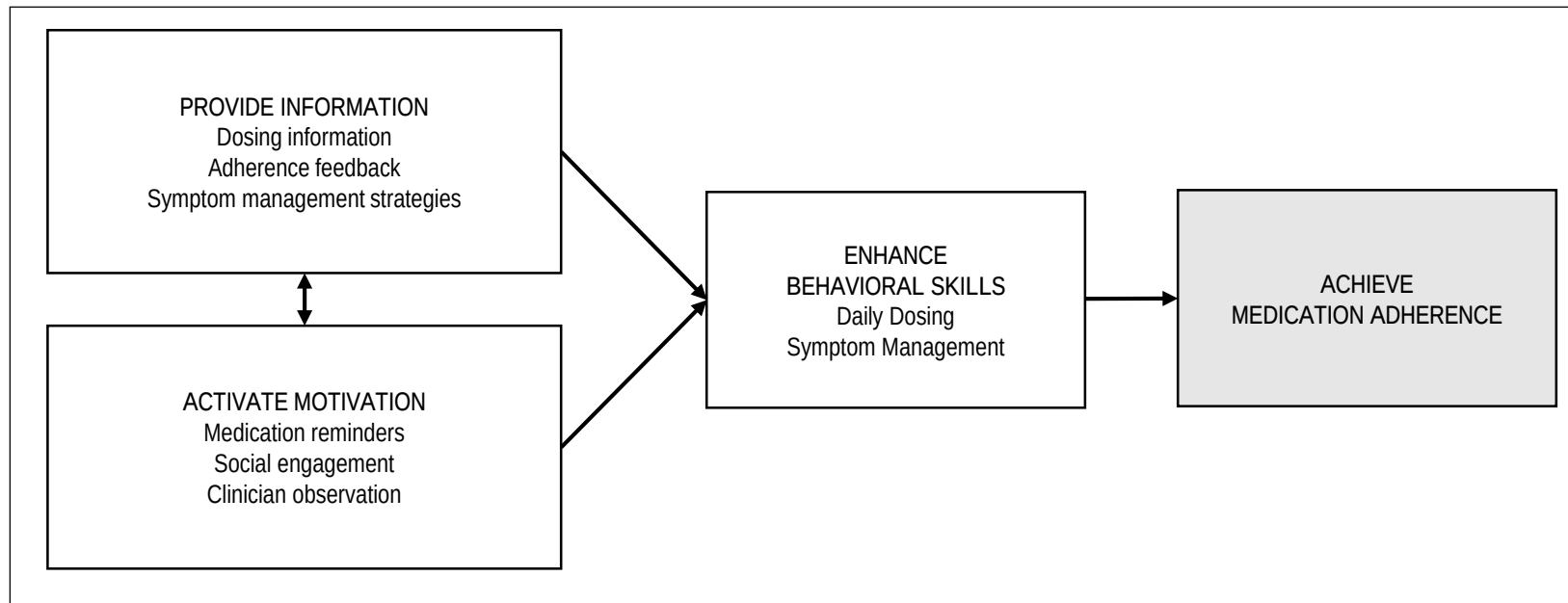


Berges B et al. JCO 37, no.15_suppl (2019);
Takvorian et al. ASCO 2020

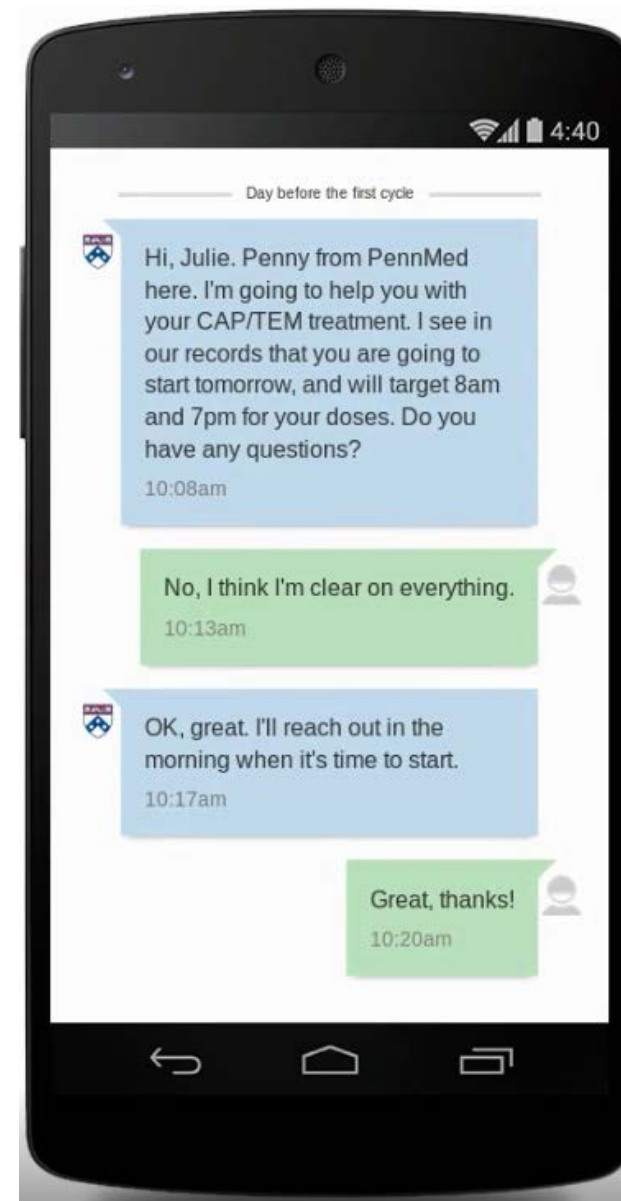
Penny: A new paradigm for remote monitoring

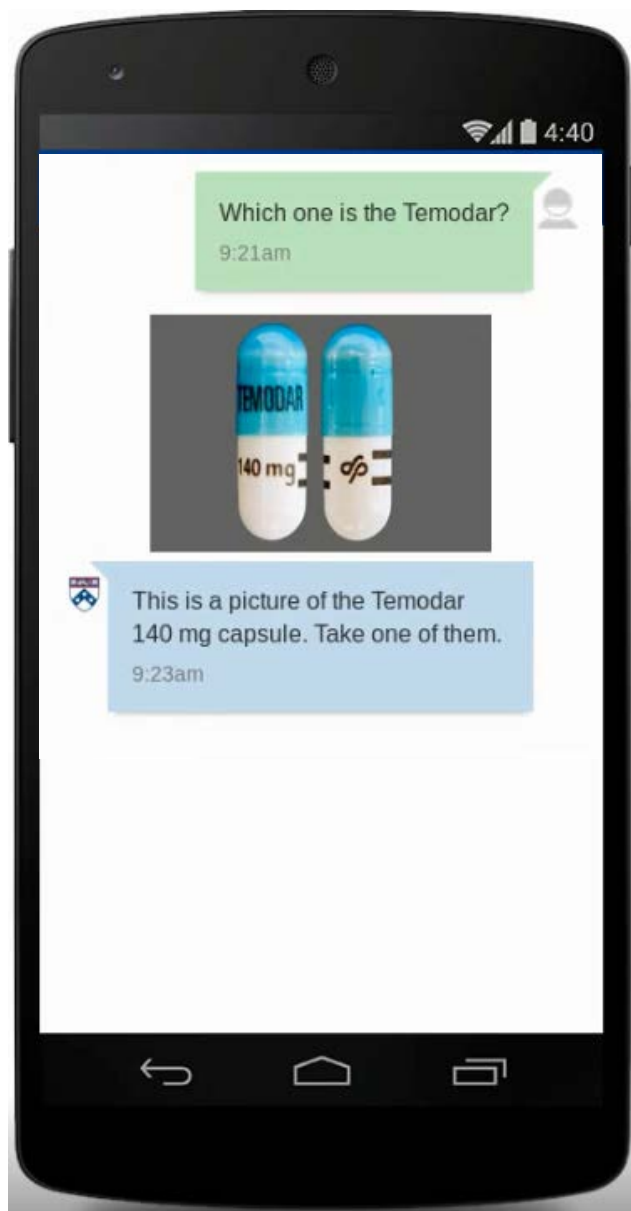
- ♦ **AI-enabled bidirectional conversational agent (“chat bot”)**
 - PRO-based symptom monitoring with self-management support
 - Real-time adherence instructions and motivational reminders/feedback
- ♦ **EHR integration enhances communication and enables longitudinal monitoring**

Figure 1. How Penny Works to Improve Medication Adherence: Hypothesized Mechanisms



Virtual care team member, available at all times

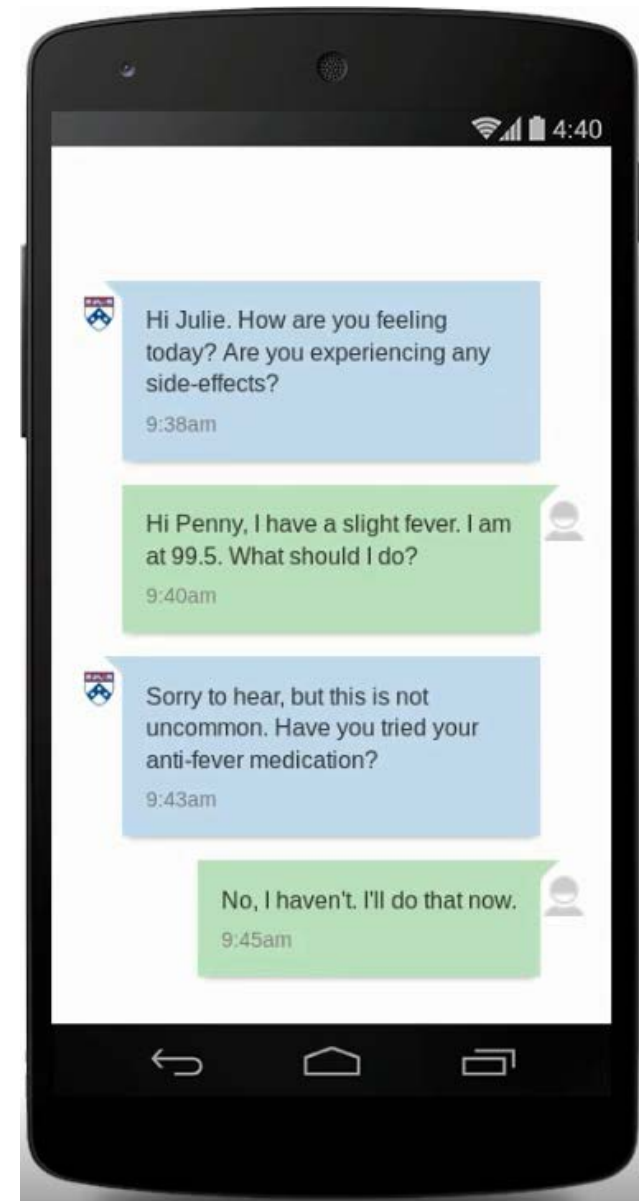




Provides **step-by-step personalized guidance**
to support adherence behavior

Real-time dosing instructions

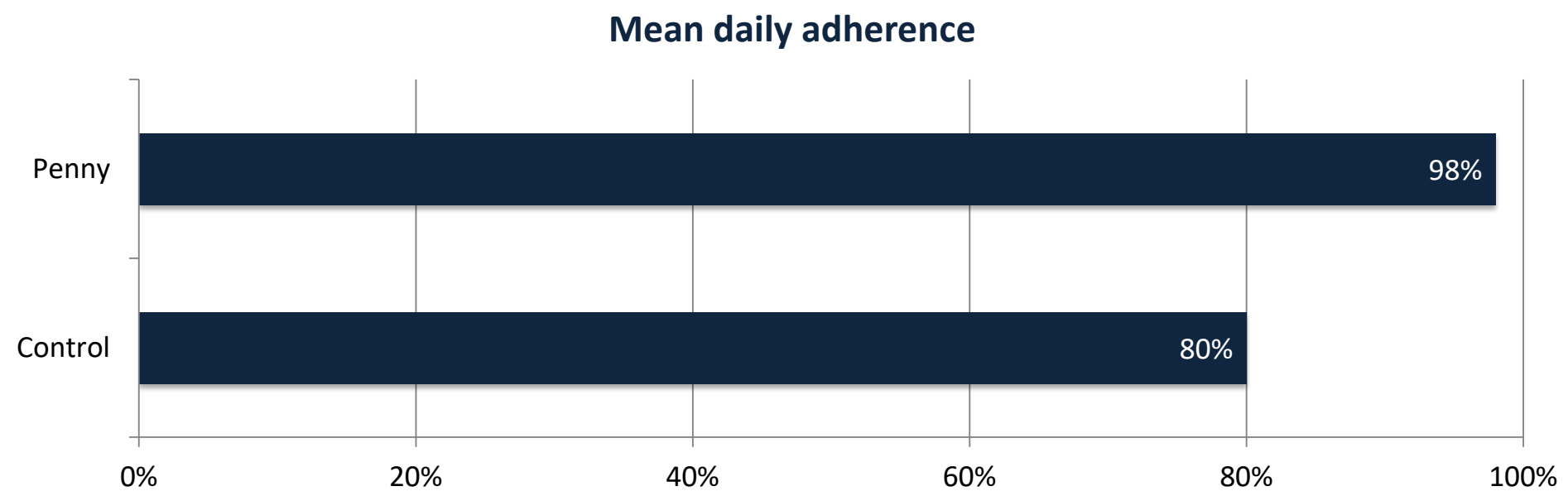
Adaptive rules engine to
monitor & respond to symptoms reported by patients



Pilot study

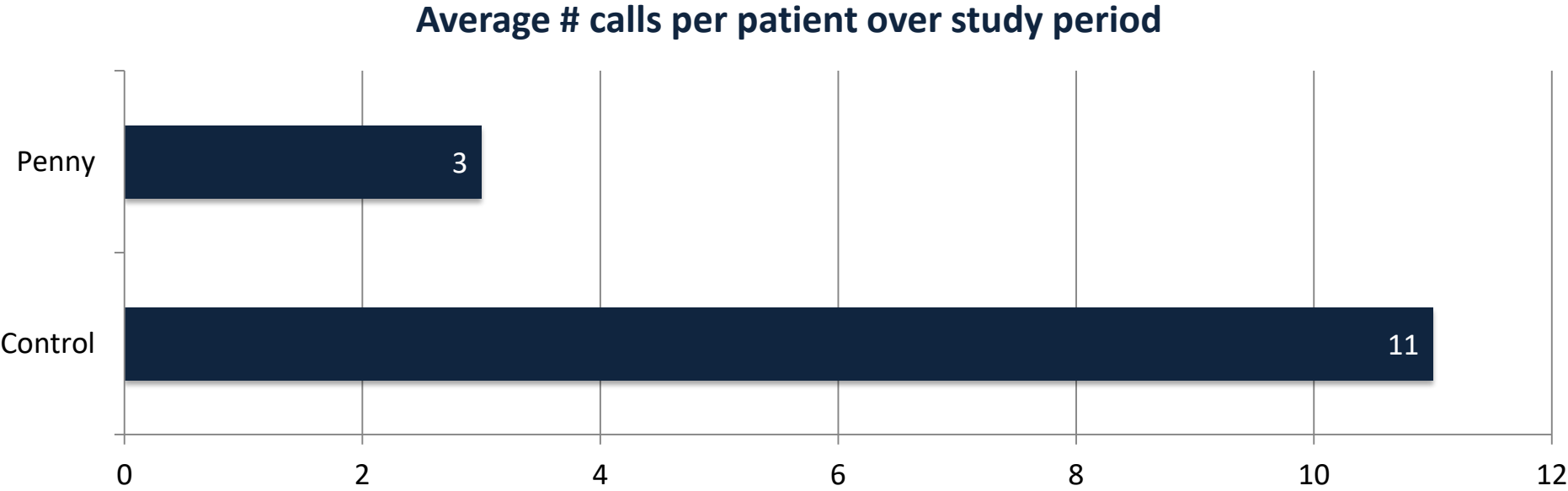
- ◆ 6-month usability study
- ◆ 11 pts on CAP/TEM approached; 10 agreed to participate (ages 45-71)
- ◆ Conducted structured qualitative interviews at monthly intervals to evaluate feasibility and acceptability
- ◆ High participant satisfaction (Net Promotor Score 100)
- ◆ High fidelity and reliability across combined 85 participant-months, with accurate grading and triage of side effects

Improved medication adherence



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Reduced call volume



Penny handled 78% of calls placed by patients

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Avoidance of ED Visits

3

ED visits avoided

N = 10 patients

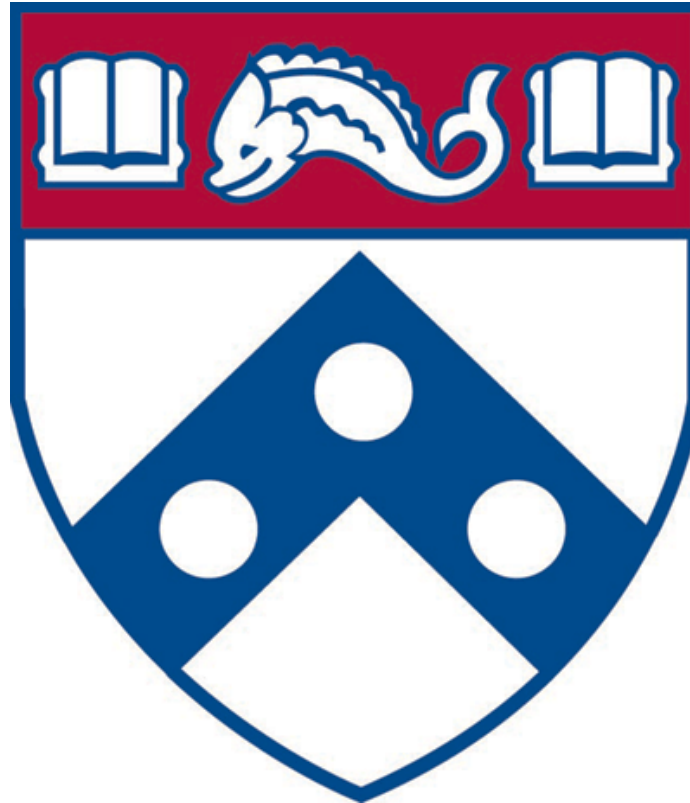
“When you are in the moment feeling sick you aren’t thinking straight... Penny is that straight-thinker we needed at those times.”

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Conclusions and next steps

- ♦ In preliminary testing, Penny was a feasible and acceptable means of supporting symptom management and medication adherence
- ♦ Reduced call volume and improved provider triage demonstrate potential efficiency gains
- ♦ Phase I study to assess safety and reliability across expanded cohorts (ongoing)
- ♦ Phase II randomized controlled efficacy trial and mixed-methods evaluation (to begin enrolling Fall 2020)

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