Nudging High Emergency Department Utilizers to Consider Non-emergent Healthcare Resources
(NCT)

Study Protocol with Statistical Analysis Plan

January 29, 2025

Study Protocol

Background

The goal of this campaign is to reduce unnecessary emergency department (ED) visits/encourage patients who have visited a Geisinger Emergency Department four (4) or more times within the last 6 months to seek care through alternatives to ED use when appropriate. In this campaign, patients will receive outreach aligned with this goal following ED discharge and will be assigned to outreach via an interactive chatbot message or a live phone call from a Community Health Worker (CHW) or Certified Medical Assistant (CMA).

The study will assess whether ED use differs across patients in different outreach conditions.

Design

This study is a randomized controlled trial with two study arms. Patients will be randomized to receive (1) a call from a CHW or CMA or (2) a message from an interactive Artera chatbot upon ED discharge.

Methods

At the time of an eligible patient's discharge from the ED, that patient will be assigned to one of the following study arms, based on which of several ranges of randomized numbers that patient was originally assigned in their electronic chart:

1. Current standard practice (control arm): Patients in this arm will receive the current standard system outreach (i.e., call from CHW or CMA).
2. Interactive chatbot outreach (treatment arm): Patients in this arm will receive outreach from an interactive chatbot.

Power Analysis

The power calculation has been modified from the original estimation, given less-than-expected eligible patients over time. With 2,279 patients, we would have 80% power to detect a 5.0% absolute decrease in ED visits between the active arm and the control arm, with two-tailed alpha of .15, assuming a 50% baseline rate of subsequent ED visits within 120 days. The target effect size and number of patients are largely informed by practical considerations regarding the acceptable duration of the intervention (maximum of 7 months, regardless of whether the full sample is achieved), with an effect deemed useful if achieved.

Project Status

The intervention has not yet begun.

Statistical Analysis Plan

Planned Analyses

Primary Outcome: ED use [Time Frame: within 120 days following day of discharge]

Question: Does outreach decrease ED visits when including an automated text chatbot instead of live outreach?

Analysis (Confirmatory): We will test the hypothesis that outreach from an interactive chatbot versus a CHW or CMA decreases the likelihood patients will visit the ED in the 120 days following day of discharge. We will run an OLS regression including a categorical predictor variable coding for experimental arm (0 = control arm, 1 = treatment arm).

Other Pre-specified Outcomes

We will run the analysis described above on the following additional outcomes:

1. Contact with patient by monitoring center, CMA, or CHW

   Contact with patient by monitoring center, CMA, or CHW (yes/no)

   [Time Frame: within 3 business days following day of discharge]

2. Contact with patient by monitoring center, CMA, or CHW

   Contact with patient by monitoring center, CMA, or CHW (yes/no)

   [Time Frame: within 5 business days following day of discharge]

3. Time to successful contact by monitoring center, CMA, or CHW

   Number of business days to successful contact by monitoring center, CMA, or CHW

4. Interaction of patient with Artera chatbot

   Interaction of patient with Artera chatbot (yes/no)

   [Time Frame: within 7 calendar days following first Artera outreach]

5. ED use

   ED use (yes/no)

   [Time Frame: within 30 days following day of discharge]

6. ED use

   ED use (yes/no)

   [Time Frame: within 30 days following day of outreach by Artera or CMA/CHW]

Analysis Notes

Recent work suggests that OLS regressions are appropriate in randomized experiments with binary outcome variables such as ours (Gomila, 2021).

Reference

Gomila, R. (2021). Logistic or linear? Estimating causal effects of experimental treatments on binary outcomes using regression analysis. Journal of Experimental Psychology: General, 150(4), 700-709. https://doi.org/10.1037/xge0000920