Official Study Title: Project to Improve Communication About Serious Illness--Hospital Study: Pragmatic Trial (Trial 1)

NCT Number: NCT04281784

Document date: 04/25/22

Analysis Plan: Project to Improve Communication About Serious Illness--Hospital Study (PICSI-H)

Principal Investigator: J. Randall Curtis, MD, MPH
Co-Principal Investigator: Ruth A. Engelberg, PhD

Cambia Palliative Care Center of Excellence
University of Washington, Seattle WA

General characteristics of analysis:

- The predictor of interest in all regression models will be the randomization group: 0=control, 1=intervention.
- Regression models will be automatically adjusted for hospital site and ADRD status (as defined at the time of randomization). There will be no other covariates in the models.
- For Cox models, we will use Stata's "exactp" method for correcting for ties unless there are problems with that method, in which case we will use the Efron method. (See page 4.)

Primary outcome: Documentation of goals-of-care discussion in the EHR during the 30 days after randomization

- Linear regression model with robust standard errors: outcome = 0 if no discussion documented during this time period; 1 if discussion was documented
- Additional analysis, in case required by reviewers: logistic regression.

Secondary outcomes:

- Timing of goals-of-care discussion during the 30 days after randomization.
  Cox proportional hazards model:
  Outcome coded as for the primary analysis.
  Time = observation time (elapsed days between randomization and whichever came first: observed discussion, death, 30 days after randomization). Censored if outcome=0.
- Mortality at several time points:
  Outcome = death (0=alive at date of mortality status evaluation, 1=died by date of mortality status evaluation)
  TIME POINT #1: death outcome measured from EHR data for the 30 days after randomization.
  TIME POINT #2: death outcome measured from EHR data at time of index hospitalization discharge. (All patients have been discharged from their index hospitalization.)
  TIME POINT #3: death outcome measured from EHR data pulled for analyses on 2/7/22.
  TIME POINT #4: death outcome measured from death certificates covering the year after randomization.
  (a) Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it).
  (b) Cox proportional hazards model of time to death.
  The time variable will represent the elapsed days between randomization and whichever came first: death or the date on which mortality status is assessed. Censored if death = 0.
- EHR documentation of whether patient received any ICU care in the 30 days (and also in the 90 days) after randomization
  Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it): outcome = 0 if no documentation of ICU care during period of interest; 1 if ICU care occurred during that period
- EHR documentation of whether patient had any ED visits in the 30 days (and also in the 90 days) after randomization
  Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it): outcome = 0 if no documentation of ED visits during period of interest; 1 if ED visits occurred during that period

- EHR documentation of any palliative care consultation in the 30 days (and also in the 90 days) after randomization
  Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it): outcome = 0 if no documentation of palliative care consultation during period of interest; 1 if PC consultation documented during that period
- EHR documentation of any hospital readmission within specified windows (7 days and 30 days) after discharge from the index hospitalization (excluding apparent readmissions that actually represented hospital transfers):
  Linear regression with robust standard errors; (logistic regression as additional analysis in case reviewers request it).: outcome = 0 if no documentation of readmission during period of interest; 1 if readmission occurred during that period.
- Days out of the ICU and alive during specified periods (30 days and also 90 days) after randomization:
  Coding procedure:
  Step 1: Compute the number of days alive during the period
  If patient died before the end of the period: number of days between randomization and death; If patient alive at the end of the period, number of days in period (30 or 90).
  Step 2: Compute the number of days in the ICU during the period.
  Step 3: Outcome measure = days alive minus days in the ICU.

  Days-alive and days in ICU will be computed using only the DATES of randomization, death, and ICU admission and discharge. (Times will be ignored.)
  Primary analysis: Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it)
- Days out of the hospital and alive during specified periods (30 days and also 90 days) after randomization:
  Coding procedure:
  Step 1: Compute the number of days alive during the period
  If patient died before the end of the period: number of days between randomization and death; If patient alive at the end of the period, number of days in period (30 or 90).
  Step 2: Compute the number of days in hospital during the period.
  Step 3: Outcome measure = days alive minus days in hospital.

  Days-alive and days in hospital will be computed using only the DATES of randomization, death, and ICU admission and discharge. (Times will be ignored.)
  Primary analysis: Linear regression with robust standard errors (logistic regression as additional analysis in case reviewers request it)

Additional analyses:

- FOR ALL OUTCOMES: We will repeat the models indicated above, adding an interaction term for RandomGrp * ADRDstatus
- FOR ALL OUTCOMES: Repeat the models above (excluding model with interaction between randomization assignment and ADRD) separately for those with ADRD and those without ADRD.
- Costs of care:
  - Time frames:
    - 1 month following randomization
    - 3 months following randomization
  - Separate analyses for the following outcomes include:
    - Total costs
    - Variable direct costs
    - Fixed direct costs
    - Indirect costs
    - Post-discharge costs

- We will use generalized linear modeling for these analyses. For each analysis we will do preliminary investigation of the family and link that best fit the data (with fit based on AIC and BIC), perhaps restricting these preliminary analyses to investigation of the gamma and inverse Gaussian families, and to log and square root links.

- RE-AIM analysis of intervention group

  For all patients in the intervention group:
  - Tests of the association of Jumpstart format (PDF vs. HTML) with each of the study outcomes

  For all patients whose clinicians received the HTML-formatted Jumpstart form:
  - Tests of the association of clinician use of the form (0=no clinicians opened the Jumpstart form, 1=one or more clinicians opened it) with each of the study outcomes
  - Outcome: 0=no clinicians opened the Jumpstart form, 1=one or more clinicians opened it
    Predictors: hospital site, service

  For all clinicians who received HTML-formatted Jumpstart forms:
  - Outcome: 0=clinician did not open the form; 1=clinician opened the form.
  - Predictors: hospital site, service, clinician's training year (not sure what to do if the clinician was in different training years for different patients).

  Method: binary logistic regression – either a complex model clustered on clinician (which would ignore cross-clustering on patient) or a multi-level model cross-clustered on clinician and patient.