PCAT STATISTICAL ANALYSIS PLAN (SAP)

Project Title: The impact of eScreening on AUDIT-C questionnaire completion rates

Protocol ID: PCIL-AUDIT-C

Brief Title: eScreening

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Sponsor: VA Puget Sound Health Care System

Collaborator: VHA Office of Primary Care

Conditions or Focus of Study: Virtual Care

Keywords: reminders, audit-c, eScreening, virtual care

Study Type: Interventional

Primary Purpose: Screening

Study Phase: N/A

Interventional Study Model: Parallel

Number of Arms: 2

Masking: Participant, investigator

Allocation: Randomized

Enrollment: 900-1300 Veterans (anticipated)

Plan to Share IDP: No

Abstract/Brief Summary: This is a clustered randomized controlled trial that will evaluate the effectiveness of sending an AUDIT-C survey electronic link to Veterans prior to an upcoming visit at the VA Puget Sound (Seattle and American Lake) among Veterans that are due for AUDIT-C screening.

1. STUDY SUMMARY AND AIMS

Study purpose: To evaluate the effectiveness of sending an eScreening Audit C questionnaire via BHL Touch (i.e., an escreening technology platform) to Veterans prior to an upcoming visit among Veterans who are due for an AUDIT-C screening at the VA Puget Sound.

B. Study design:

This is a prospective, clustered randomized controlled trial that will evaluate the effectiveness of improving AUDIT-C survey completion rates by sending a Veteran an AUDIT-C eScreening (24-48 hours) prior to an upcoming visit.

Primary care providers from Seattle and American Lake will be identified through an audited list of providers pulled from the EHR. Among the active arm, the eScreening will be sent to all Veterans on the provider's panel with an upcoming primary care telephone, video (VVC), or face-to-face visit who are due for an AUDIT-C screening. The control arm (i.e., usual care) primary care providers and associated encounter-specific nursing staff will continue to complete screening reminders as identified for patient care during virtual/telephone or face-to-face visits.

A clustered randomized controlled trial is necessary due to the high likelihood of contamination across teams. BHL Touch pilot sites reported other (non-escreening) teams quickly becoming aware of and initiated use of e-screening once the service was available. To overcome this, the study will have one LPN batch the eScreening messages for randomly selected providers. Executing the trial in this way will prevent teams in the control arm from using BHL Touch to send eScreenings. In doing so, we will learn how effective e-screenings compare to the standard usual care practice in real-world settings.

Providers eligible for enrollment into the trial will be randomized in a 1:1 allocation using permuted block randomization (with random block sizes of 2 and 4) to the following interventions:

1. **Active arm: eScreening**
    a. **Intervention Type:** Other
    b. **Intervention Description:** Text message with AUDIT-C survey link sent via BHL Touch
2. **Control arm: No eScreening**
    a. **Intervention Type:** No intervention

Randomization will be stratified within arms by site (Seattle vs. American Lake). **See Figure 1 for additional details.**

Our primary outcome of interest is the AUDIT-C completion rate within 1 day of visit. Our secondary outcome of interest is the AUDIT-C positivity rate (score >/= 5 on AUDIT-C). Enrollment in the trial will occur between January 29, 2024 and 4/22/24 (estimated, rolling based on enrollment).

C. Primary aims:

Aim 1a: Will test the hypothesis (H_{A1}) that the AUDIT-C survey completion rate among Veterans that have been sent an eScreening differs compared to Veterans that did not receive eScreening (active arm vs. control).

D. Secondary aims:

Aim 2a: Will test the hypothesis (H_{A2}) that the AUDIT-C survey positivity rate among Veterans that have been sent an eScreening differs compared to Veterans that did not receive eScreening (active arm vs. control).

E. Exploratory aims:

Will explore overall completion and positivity rates among Veterans that have been sent an eScreening survey versus those Veterans that did not receive an eScreening. Overall includes surveys sent for:

- Alcohol Use Screen: AUDIT-C
- Depression Screening: PHQ-2
- PTSD Screening: PC-PTSD-5
- Tobacco Use Screening

2. DATA SOURCES: *brief description of data sources.*

Table	Time Period	Description	Analytic variables of Interest
cdwwork.RPCMM.CurrentProviderTeamMembership cdwwork.ndim.RPCMMTeam	Screening	Provider/team info	TeamSta6a, StaffSID, STaffName, RPCMMTeam
cdwwork.RPCMM.CurrentRPCMMProviderFTEE	Screening		FTEEValue
[CDWWork].[MH].[SurveyAdministration]	Post randomization	Survey Info	patientsid SurveyName, SurveyLocation, SurveyGivenDateTime, PrimaryStopCode, SecondaryStopCode
[CDWWork].[Outpat].[Visit]			patientsid visitsid Visitdatetime, PrimaryStopCode, SecondaryStopCode
PACT_CC.econ.Outp_PCMM_SSN_Summary PACT_CC.econ.Inp_PCMM_SSN_Summary		Demographics	DOB, age, gender, marital status, DOD (if applicable), service connectedness, copay
SQL13.PACT_CC.[econ].[Outp_PCMM_SSN_Summary]			Age
SQL13.OABI_SHREC.[Demog].[SHREC_v3]			Race/Ethnicity
SQL13.PACT_CC.[SES].[pcmm_sesindex_2010_to_2018]			Neighborhood SES
RB03.VINCI_PSSG.VINC_PSSG			Drive distance
RB03.VINCI_CAN.[DOEx].[can_weekly_report_V2_5_history]			CAN score
SQL13.PACT_CC.[Comorb].[ConditionFlags_Last4Qtr]			SMI
SQL13.PACT_CC.[Comorb].[ConditionFlags_Last4Qtr]			AUD or SUD diagnosis, Charlson, Elixhauser (main), Gagne indices, hospice use/palliative care use
SQL13.PACT_CC.[econ].[Outp_PCMM_SSN_Summary]			Primary care visit count > 2 / < 2 in the past 12 month
SQL13.PACT_CC.[econ].[Outp_PCMM_SSN_Summary]			Gender
RB03.VINCI_PSSG.VINC_PSSG			ZIP code
SQL13.PACT_CC.[Demog].[marital]			Marital Status
SQL13.PACT_CC.[SES].[pcmm18_sesindex]			Education
SQL13.PACT_CC.[econ].[Inp_PCMM_SSN_Summary]			# hospitalization and/or ED visits in the past 12 months

SQL13.PACT_CC.[econ].[Outp_PCMM_SSN_Summary]			# hospitalization and/or ED visits in the past 12 months
SQL13.PACT_CC.[Dim].[VAST]			Primary care at CBOC or medical center
SQL13.[CDWWork].CDWWORK.Outpat.Visit			VVC
SQL13.[CDWWork].CDWWORK.Outpat.Visit			Secure Messaging
RB03.GEC_GECDACA.DOEx.JFI_VA_monthly			JenFrailtyIndex

3. STUDY POPULATION AND ELIGIBILITY

Providers will be identified via an audited list of Primary Care providers from Seattle and American lake. Providers will be excluded if they had a total FTE across all their teams less than 0.3 and are not on a team of type (GERI, *H*, SCI, ,VPACT or HBPC). Providers will be excluded if they participated in a trial test of BHL rollout. Providers will be excluded that had less than 1 patient visit during study timeframe.

All Veterans assigned to a primary care provider at the VA Puget Sound as of November 1, 2023 with an upcoming visit (index trial visit). Upcoming visits must be telephone, VVC, or face-to-face. Eligible Veterans must have an AUDIT-C reminder due (no AUDIT-C completed in 12 months prior to index trial visit).

Sex: All
Gender based: No
Age limits: No
Accepts Healthy Volunteers: Yes

4. STUDY TIME PERIOD

The enrollment period for the study is January 29, 2024 to April 22, 2024 (estimated). Data collection and analysis will continue through at least 3 months post-enrollment for the last Veteran evaluated.

5. STUDY OUTCOMES

Primary outcome measure: % AUDIT-C surveys completed by 24hours post-index visit, among patients with a virtual or telephone visit encounter

Secondary outcome measure: % positive AUDIT-C surveys at 24 hours post-index visit among surveys completed among patients with a virtual or telephone visit encounter

- Positive AUDIT-C survey defined as: score >/=5, aligned with VA clinical reminder, current operational definition.

Other prespecified outcome measures:

% AUDIT-C surveys completed among patients with a virtual, telephone, or face-to-face visit encounter

% positive AUDIT-C surveys among surveys completed among patients with a virtual, telephone, or face-to-face visit encounter

Exploratory analyses of above outcomes (survey completion rate, positive rate among surveys completed) for: depression (PHQ-2), PTSD (PC-PTSD-5), and tobacco use.

6. STUDY COVARIATES

Primary analysis:

A. Covariate of interest: intervention group indicator

B. Additional covariates: provider identifier

Secondary analysis:

A. Covariate of interest: intervention group indicator

B. Additional covariates: provider identifier

7. STATISTICAL ANALYSES AND DESCRIPTION OF MAIN TABLES

Sample size and power

Overall baseline (for 90 days period prior to trial) completion of an AUDIT-C survey during a VVC or telephone visit was estimated to be 43% from administrative data. In a pilot test, 20% (6 out of 30) Veterans completed an AUDIT-C eScreening survey sent through BHL Touch.

We find that given an α level of 0.05, 80% power, an expected 43% completion rate in the control arm, and a kappa coefficient of 0.01, the trial would need to have 921 total patients to be able to detect an absolute difference of 0.10. This is assuming the trial was split into 49 clusters with 19 patients each.

We find that given an α level of 0.05, 90% power, an expected 43% completion rate in the control arm, and a kappa coefficient of 0.01, the trial would need to have 1316 total patients to be able to detect an absolute difference of 0.10. This is assuming the trial was split into 49 clusters with 27 patients each.

Descriptive analyses

The baseline comparability between groups will be assessed with regard to the variables as outlined in Table 1. Descriptive patient-level statistics will be presented using the Pearson chi-square test for dichotomous variables and the Student's t test for continuous variables. Missing data will be tabulated.

Primary analyses

The primary intention-to-treat analysis will use multi-level logistic regression (clustered on provider) to test the association between randomization group and AUDIT-C completion rate. (See Table 2) Odds ratios and predicted probabilities from this model will be reported. The secondary intention-to-treat analysis will repeat the same analyses using positive AUDIT-C completion rate (scores >/= 5 on the AUDIT-C) as the outcome endpoint.

For the per-protocol analysis, we will exclude Veterans that "no-showed" to the index visit, had eScreening surveys returned as undeliverable, or providers that began deployment of e-screening prior to conclusion of the trial period, were not found in BHL touch, or for whom e-screening was not correctly deployed, or were ineligible for some other reason post randomization. All analyses used in the intention-to-treat analysis will be repeated for the per-protocol analysis.

All descriptive and main analyses will be performed using R version 4.3.1.

Sensitivity analyses

We will test if the inclusion of face-to-face visits impacts results by rerunning the above specified analyses for the primary and secondary aims for visit types: VVC, Telephone and face-to-face.

Subgroup analyses

The primary aim of the subgroup analysis is to explore any variations in treatment effect on AUDIT-C survey completion based on baseline sociodemographic characteristics of the participants. Specially, we are interested in whether there is consistency of the trial results among different racial and ethnic groups.

Statistical tests for interaction will be used to assess the heterogeneity of treatment effects across racial and ethnic groups. We will test the interaction between assigned treatment group and each racial/ethnicity group. The following subgroups will be used:

Race/Ethnic Subgroup Levels
Non-Hispanic White (referent)
Non-Hispanic Black
Hispanic
Asian/Pac Islander/Native Hawaiian
American Indian/Alaska Native
Multi-race/other

In the case of a low number of Veterans within a category (<10), the categories may be pooled. Given that these subgroup analyses will be considered exploratory, no adjustment for multiplicity will be made.

7Ai. Aim 1a Statistical Analyses

Aim 1a: Will test the hypothesis (H_{A1}) that AUDIT-C completion rates among those who receive eScreening differs compared to those who did not complete eScreening (active arm vs. control).

7Bi. Aim 2a Statistical Analyses

Aim 2a: Will test the hypothesis (H_{A1}) that AUDIT-C positive completion rates among those who receive eScreening differs compared to those who did not complete eScreening (active arm vs. control).

Primary outcome measure: % AUDIT-C surveys completed by 24 hours post-index visit, among patients with a virtual or telephone visit encounter

Secondary outcome measure: % positive AUDIT-C surveys among surveys completed by 24 hours among patients with a virtual or telephone visit encounter

- Positive AUDIT-C survey defined as: score >/=5, aligned with VA clinical reminder, current operational definition

Other prespecified outcome measures:

% AUDIT-C surveys completed among patients with a virtual, telephone, or face-to-face visit encounter

% positive AUDIT-C surveys among surveys completed among patients with a virtual, telephone, or face-to-face visit encounter

Exploratory analyses of above outcomes (survey completion rate, positive rate among surveys completed) for: depression (PHQ-2), PTSD (PC-PTSD-5), and tobacco use.

7Aii. Adjustment of pre-specified variables

For increased precision, we will also complete analyses adjusting a priori for the following covariates:

- Patient level: Age, gender, race, SMI, AUD/SUD diagnosis, and prior primary care utilization count, site
- Provider level: Provider FTE

8. PROPOSED TIMELINE

Activity	*July 2023*	*Aug 2023*	*Sept 2023*	*Oct 2023*	*Nov 2023*	*Dec 2023*	*Jan 2024*	*Feb 2024*	*Mar 2024*	*Apr 2024*	*May 2024*	*Jun 2024*	*Jul 2024*	*Aug 2024*	*Sept 2024*
Obtain letter approval															
Test BHL Touch workflows															
Preparation of trial data processes															
Identify providers and Veterans due for AUDIT-C survey															
Sample size/power analysis															
Complete SAP															
Send AUDIT-C surveys via BHL Touch															
Trial enrollment and randomization															
Data analysis															
Manuscript preparation															

9. PROJECT LINKS *(project document locations to be updated after project initiation)*

1. Project Proposal *<location>*
2. Readme project description *<location>*
3. Data Summary Document *<location>* (Excel document containing work folder location, workplan location, source data description, dataset variables, data dictionary, cohort building script locations, journal/book references for project).

10. APPENDIX A: SHELL TABLES AND FIGURES

Table 1: Baseline sociodemographic characteristics of Veterans by assigned arm

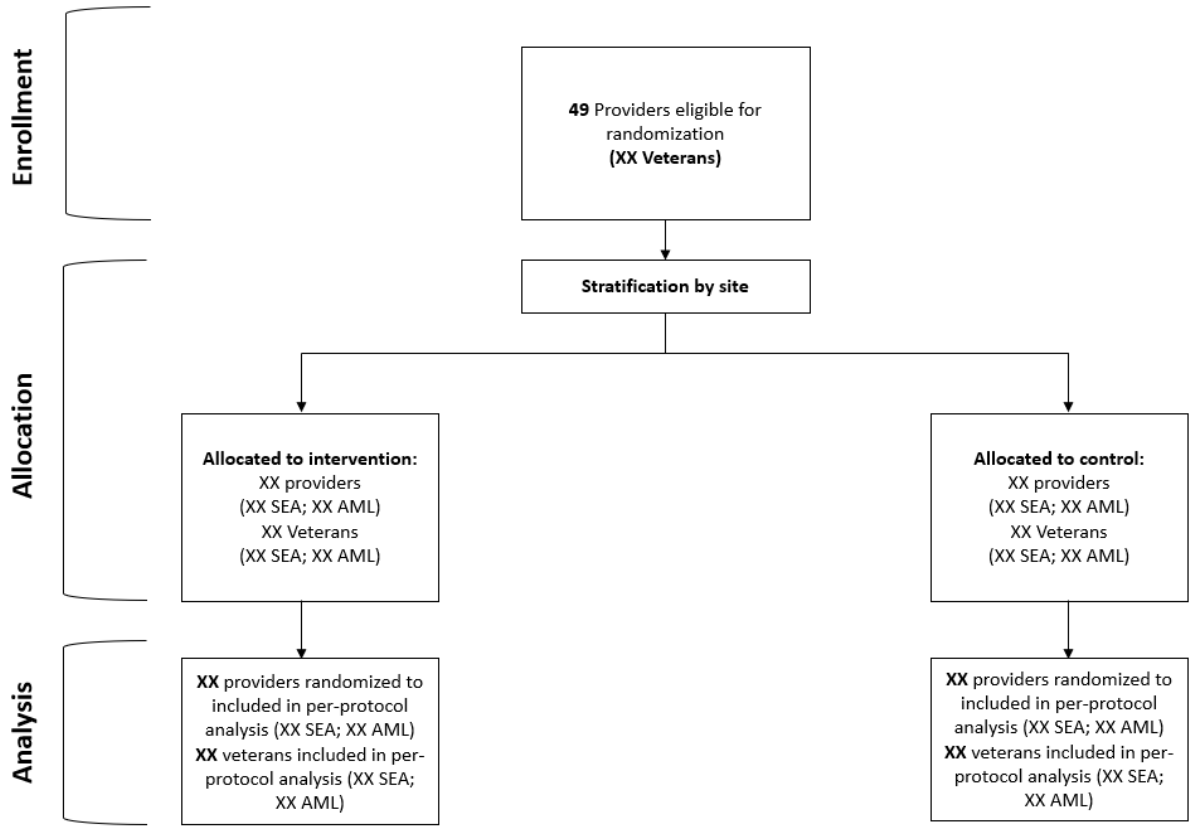
	Overall (N=XXX) % or M (SD)	Control arm (N= XXX) % or M (SD)	Intervention arm (N=XXX) % or M (SD)
Age (years) (SD)			
Gender			
Male			
Female			
Race/Ethnicity			
Non-Hispanic White			
Non-Hispanic Black			
Hispanic			
Asian/Pac Islander/Native Hawaiian			
Multi-race/other			
Marital status			
Married			
Other			
Service Connectedness			
100% SC			
>50% to <100% SC			
>0% to <50%			
NSC			
Copay (Y)			
Gagne comorbidity index			
SES index (decile)			
JEN Frailty Index (SD)			
CAN Score (SD)			
Alcohol Use Disorder (Y)			
Substance Use Disorder (Y)			
Serious Mental Illness (Y)			
PTSD (Y)			
>2 primary care visits in the past 12 months (Y)			
Number of ED visits in the past 12 months (SD)			
% with no HS degree (census block)			
Geography			
Urban			

Rural			
Highly Rural			
Drive time to nearest facility (SD)			
Facility Type			
CBOC			
VAMC			

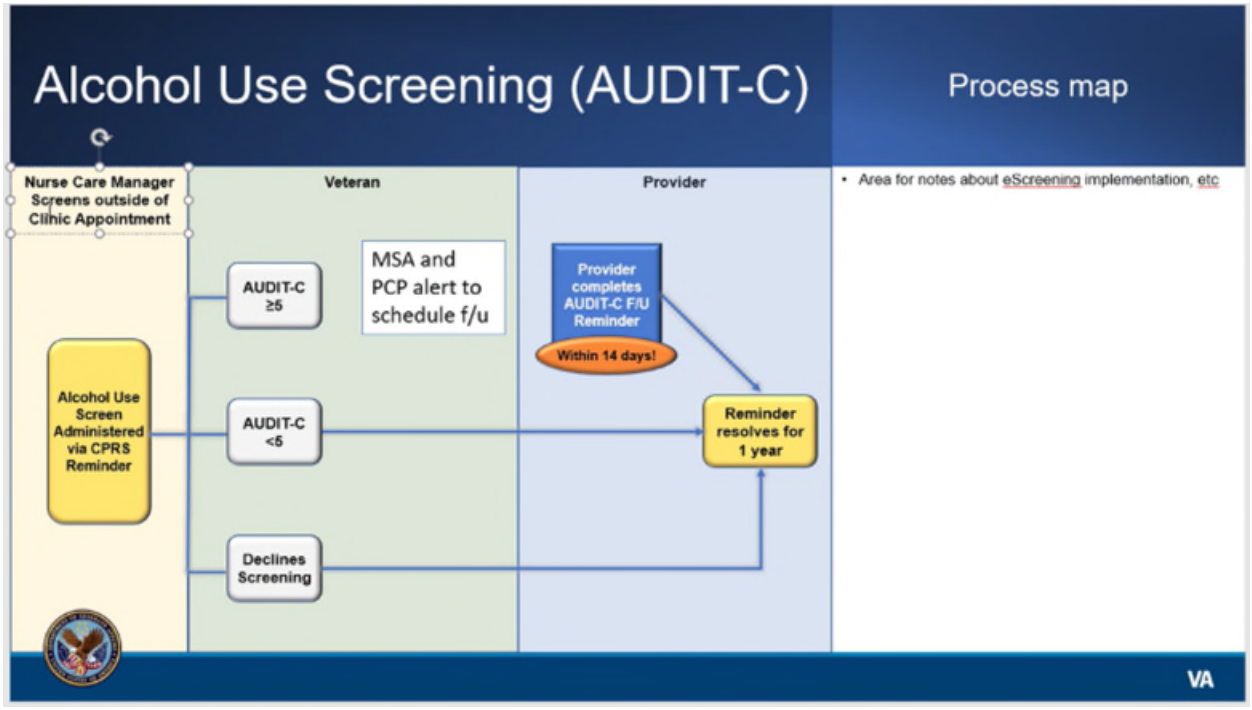
Table 2: Logistic regression and predicted probabilities of AUDIT-C completion by assigned arm (3 month outcome)

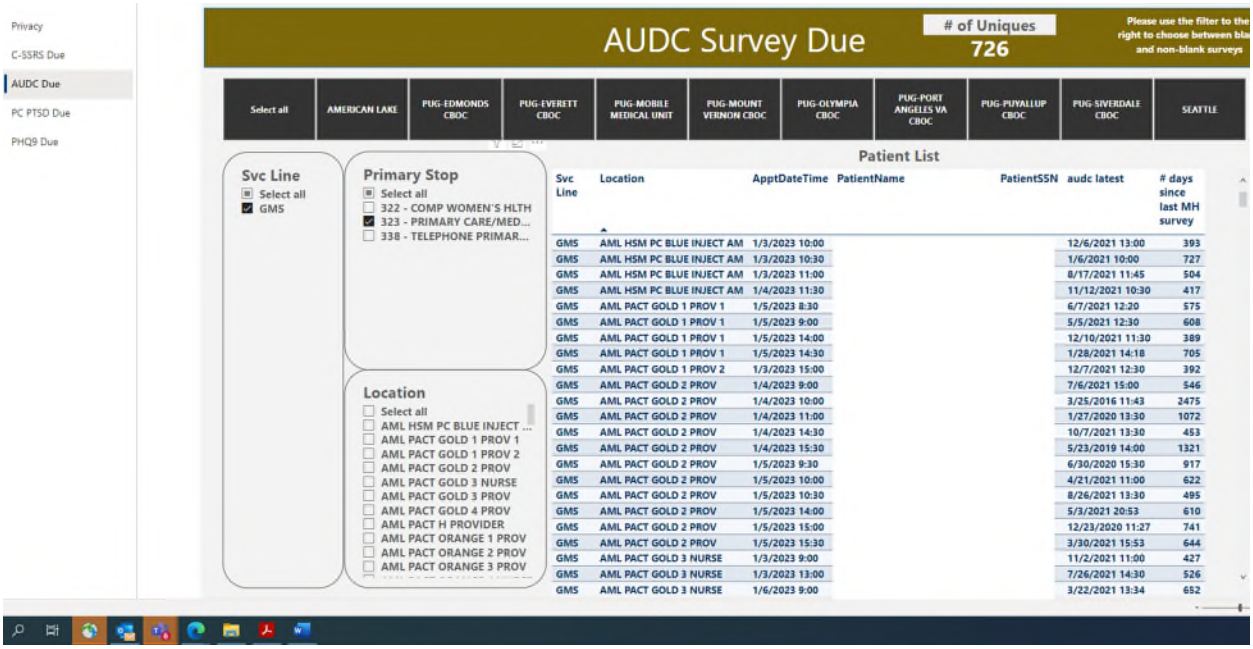
	Overall OR (95% CI)	Control arm OR (95% CI)	Intervention arm OR (95% CI)	Control arm- Predicted probability (95% CI)	Intervention arm- Predicted probability (95% CI)
ITT					
Age (years) (SD)					
Gender					
Male					
Female					
Race/Ethnicity					
Non-Hispanic White					
Non-Hispanic Black					
Hispanic					
Asian/Pac Islander/Native Hawaiian					
Multi-race/other					
Gagne comorbidity index					
Prior AUDIT – C screening (Y)					
PP					
Age (years) (SD)					
Gender					
Male					
Female					
Race/Ethnicity					
Non-Hispanic White					
Non-Hispanic Black					
Hispanic					
Asian/Pac Islander/Native Hawaiian					
Multi-race/other					
Prior AUDIT-C Screening (Y)					
Gagne comorbidity index					

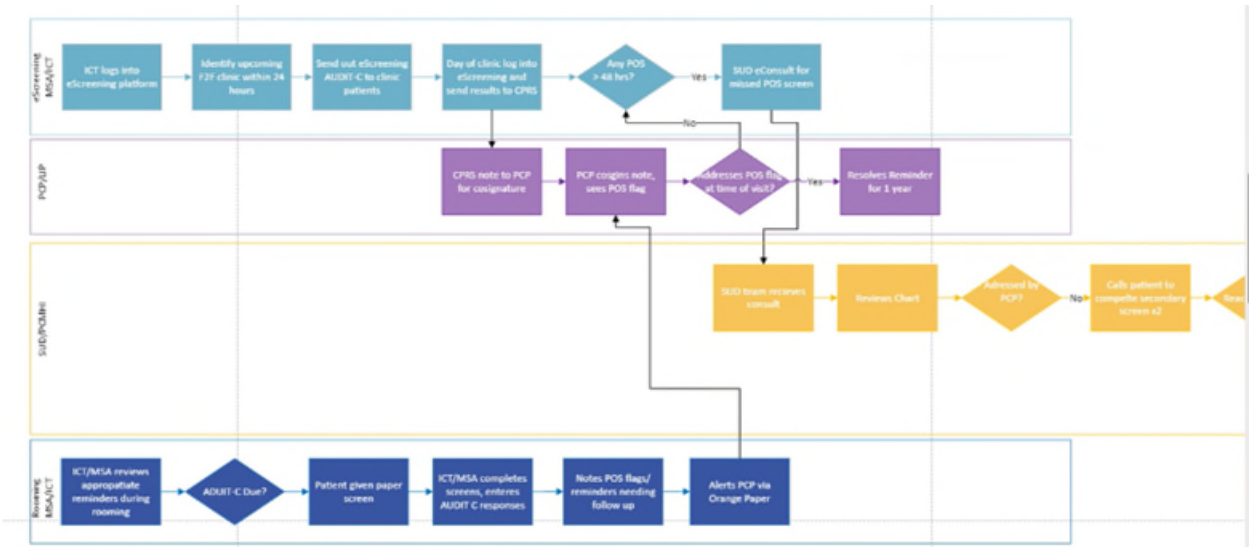
Figure 1: CONSORT diagram



APPENDIX A: SCREENING PROCESS MAP


Alcohol Use Screening (AUDIT-C)
Process map
Nurse Care Manager Screens outside of Clinic Appointment
Veteran
Provider
Area for notes about eScreening implementation, etc
Alcohol Use Screen Administered via CPRS Reminder
AUDIT-C ≥5
AUDIT-C <5
Declines Screening
MSA and PCP alert to schedule f/u
Provider completes AUDIT-C F/U Reminder
Within 14 days!
Reminder resolves for 1 year
VA


Privacy
C-SSRS Due
AUDC Due
PC PTSD Due
PHQ9 Due
AUDC Survey Due
# of Uniques
726
Please use the filter to the right to choose between bla and non-blank surveys
Select all
AMERICAN LAKE
PUG-EDMONDS CBOC
PUG-EVERETT CBOC
PUG-MOBILE MEDICAL UNIT
PUG-MOUNT VERNON CBOC
PUG-OLYMPIA CBOC
PUG-PORT ANGELES VA CBOC
PUG-PUYALLUP CBOC
PUG-SIVERDALE CBOC
SEATTLE
Svc Line
Select all
GMS
Primary Stop
Select all
322 - COMP WOMEN'S HLTH
323 - PRIMARY CARE/MED...
338 - TELEPHONE PRIMAR...
Location
Select all
AML HSM PC BLUE INJECT ...
AML PACT GOLD 1 PROV 1
AML PACT GOLD 1 PROV 2
AML PACT GOLD 2 PROV
AML PACT GOLD 3 NURSE
AML PACT GOLD 3 PROV
AML PACT GOLD 4 PROV
AML PACT H PROVIDER
AML PACT ORANGE 1 PROV
AML PACT ORANGE 2 PROV
AML PACT ORANGE 3 PROV
Patient List
Svc Line
Location
ApptDateTime
PatientName
PatientSSN
audc latest
days since last MH survey
GMS AML HSM PC BLUE INJECT AM 1/3/2023 10:00 12/6/2021 13:00 393
GMS AML HSM PC BLUE INJECT AM 1/3/2023 10:30 1/6/2021 10:00 727
GMS AML HSM PC BLUE INJECT AM 1/3/2023 11:00 8/17/2021 11:45 504
GMS AML HSM PC BLUE INJECT AM 1/4/2023 11:30 11/12/2021 10:30 417
GMS AML PACT GOLD 1 PROV 1 1/5/2023 8:30 6/7/2021 12:20 575
GMS AML PACT GOLD 1 PROV 1 1/5/2023 9:00 5/5/2021 12:30 608
GMS AML PACT GOLD 1 PROV 1 1/5/2023 14:00 12/10/2021 11:30 389
GMS AML PACT GOLD 1 PROV 1 1/5/2023 14:30 1/28/2021 14:18 705
GMS AML PACT GOLD 1 PROV 2 1/3/2023 15:00 12/7/2021 12:30 392
GMS AML PACT GOLD 2 PROV 1/4/2023 9:00 7/6/2021 15:00 546
GMS AML PACT GOLD 2 PROV 1/4/2023 10:00 3/25/2016 11:43 2475
GMS AML PACT GOLD 2 PROV 1/4/2023 11:00 1/27/2020 13:30 1072
GMS AML PACT GOLD 2 PROV 1/4/2023 14:30 10/7/2021 13:30 453
GMS AML PACT GOLD 2 PROV 1/4/2023 15:30 5/23/2019 14:00 1321
GMS AML PACT GOLD 2 PROV 1/5/2023 9:30 6/30/2020 15:30 917
GMS AML PACT GOLD 2 PROV 1/5/2023 10:00 4/21/2021 11:00 622
GMS AML PACT GOLD 2 PROV 1/5/2023 10:30 8/26/2021 13:30 495
GMS AML PACT GOLD 2 PROV 1/5/2023 14:00 5/3/2021 20:53 610
GMS AML PACT GOLD 2 PROV 1/5/2023 15:00 12/23/2020 11:27 741
GMS AML PACT GOLD 2 PROV 1/5/2023 15:30 3/30/2021 15:53 644
GMS AML PACT GOLD 3 NURSE 1/3/2023 9:00 11/2/2021 11:00 427
GMS AML PACT GOLD 3 NURSE 1/3/2023 13:00 7/26/2021 14:30 526
GMS AML PACT GOLD 3 NURSE 1/6/2023 9:00 3/22/2021 13:34 652


eScreening MSA/ICT
ICT logs into eScreening platform
Identify upcoming F2F clinic within 24 hours
Send out eScreening AUDIT-C to clinic patients
Day of clinic log into eScreening and send results to CPRS
Any POS >48 hrs?
Yes
SUD eConsult for missed POS screen
No
PCP/AIP
CPRS note to PCP for cosignature
PCP cosigns note, sees POS flag
Addresses POS flag at time of visit?
Yes
Resolves Reminder for 1 year
SUD/PCMHI
SUD team recieves consult
Reviews Chart
Addressed by PCP?
No
Calls patient to complete secondary screen x2
Rooming MSA/ICT
ICT/MSA reviews appropatiate reminders during rooming
ADUIT-C Due?
Patient given paper screen
ICT/MSA completes screens, enteres AUDIT C responses
Notes POS flags/ reminders needing follow up
Alerts PCP via Orange Paper

APPENDIX B: ISRCTN additional information

US FDA regulated drug: No

US FDA regulated device: No

US FDA IND/IDE: No

Human Subjects Review: Board Status: Non-Applicable

Data Monitoring: No

FDA Regulated Intervention: No

APPENDIX C: Study randomization

A list of eligible participants will be generated using a SQL algorithm to extract data from the site's EHR repository. This list will then be randomized using the blockrand package in R version 4.3.1. A final list of eligible participants along with their randomized group assignment will be uploaded into an operational database that will then be shared electronically with operational partners responsible for batching eScreening messages in BHL Touch

References:

Fundamentals of Clinical Trials by Lawrence M. Friedman, Curt D. Furberg and David L. DeMets, 2010; p 158-159