Study Design

Introduction. This study in a KPNC pediatric PC setting compares SBIRT delivered by BMSs, SBIRT delivered by PCPs, and Usual Care. We propose to randomly assign pediatric PCPs within the medical center to these 3 conditions, and provide delivery-mode-specific training. We compare study arms on rates of AOD screening, AOD problem identification, brief intervention, referral to AOD treatment, and treatment initiation. We examine patient outcomes, including days of AOD use and typical quantity consumed, using structured electronic instruments at baseline and at the 1-year PC visit, as well as AOD-related legal, school and family problem measures. We examine the implementation costs of each approach, and provider and patient characteristics related to implementation for each approach. We also include provider and administrator interviews to understand SBIRT feasibility and use standard instruments to assess SBIRT fidelity.

Setting. The Oakland Medical Center Pediatrics Department has a racially and socio-economically diverse patient population representative of its catchment area; half of families earn less than $50,000 annually.130 Pediatric PC is delivered by physicians and nurse practitioners certified in Pediatrics or Family Medicine. Fifty-nine percent of the PCPs are female; 49% are non-white (see Provider enrollment grid) and many use languages other than English (e.g., Spanish, Mandarin, Cantonese and Vietnamese).

KP has a system of Best Practices committees, Quality Improvement, and Chiefs’ groups. We have worked with the Chemical Dependency Quality Improvement Committee (CDQIC), the Chiefs of Pediatrics and Adolescent Medicine to develop the study design, intervention and training so they reflect clinical realities, in order to optimize implementation and sustainability following study completion. These collaborative efforts have also resulted in our success in incorporating evidence-based AOD screening and assessment tools into the EMR. The Chiefs of Pediatrics are highly supportive of this study, and Dr. Charles Wibbelsman, the Chair of the Chiefs of Adolescent Medicine will act as a Co-Investigator and Clinical Advisor on the study. We have the support of the Site Chief of Oakland Pediatrics, the Associate Executive Director of The Permanente Medical Group, the Regional Director of Mental Health and CD Services, the Chair of the CDQIC and Chair of Addiction Medicine Chiefs (see letters of support). This support will facilitate successful study completion.

Study Sample. We will randomly assign the 45 pediatric PCPs (15 providers to each arm) in the Oakland, CA Medical Center to one of the three study arms. Preliminary analyses show no differences in screening rates by PCP provider type (e.g., Physicians versus Nurse Practitioners). Therefore we do not need to stratify by provider type prior to matching. We will not match providers on other characteristics (e.g., gender, years of experience) because we can adjust for these statistically in our analyses. Further, matching on these characteristics would prevent us from examining their effects (as we propose in our conceptual model). Oakland has 15,525 adolescent members, 40% of whom have a “well-child” visit in any given year, thus we estimate a sample of approximately 6,210 patients will be seen by the 45 PCPs during the study.

Justification for examining patient AOD outcomes from EMR records rather than recruiting patients. We will examine data collected during outpatient clinical visits. Patients complete a Teen Well Check Questionnaire at each well-child visit which becomes part of their EMR. We have worked with Pediatrics leaders to incorporate evidence-based AOD screening questions, including the CRAFFT, a well-validated 6-item AOD screening instrument for adolescents,131, 132 into the Teen Well Check Questionnaire in the EMR. 30-day and 6-month AOD quantity and frequency questions, and AOD-related problem questions have also been incorporated into the EMR, as a clinical assessment tool, and for baseline and 12-month outcomes measurement for this study (see Appendix 2). No direct research contact with KP patients will be made. This approach, similar to many of the new Comparative Effectiveness Research studies, has several advantages. In addition to large cost savings, many more patients can be studied; it includes the population base of patients. Recruiting patients would also bias the representativeness and naturalistic character of the study and decrease the ability to implement the study and its generalizability; there would be interference with the care flow. Both the EMR and KPNC policy enable this approach; HIPAA privacy policies, as communicated to all members at enrollment and available on the KPNC website, explicitly acknowledge that clinical data may be used for research under Institutional Review Board oversight. (See Human Subjects Section)

Training and Implementation. The trainings will be conducted by Dr. Satre, an expert in Motivational Interviewing (MI), following strategies used successfully to train and implement SBIRT.134, 135 Along with core
MI principles\textsuperscript{136, 137} the trainings will include information on norm setting and providing educational resources and advice about AOD use. In the two intervention arms, all PCPs and BMSs will receive on-site trainings (two 60 minute sessions) for which they will receive lunch and CMEs. This is consistent with how new practice guidelines are implemented in KPNC such as the Depression Care Initiative.\textsuperscript{138-140} A Research Associate will be available to the providers and staff in both intervention arms, providing technical assistance. Drs. Wong and Wibbelsman will be available by phone and email for consultation. Such facilitation has been shown to increase the likelihood of the success of evidence-based implementation efforts.\textsuperscript{5, 139, 141} As is now the case in KPNC for EMR features, providers in all three arms will be reminded via email from their Site Chief about the AOD screening and assessment tools in the EMR and the regional requirement of documenting any activities performed during the course of a patient encounter. This will be equal across arms and consistent with ongoing regional quality improvement efforts to reinforce the importance of documentation in the EMR, and is reinforced by HEDIS performance measures.

### Study Process

<table>
<thead>
<tr>
<th>Step 1: AOD Screening</th>
<th>Teen Well Check Questionnaire AOD questions: During the past 12 months, did you:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1. Drink any alcohol (more than a few sips)?</td>
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<tr>
<td></td>
<td>2. Smoke any marijuana or hashish?</td>
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<tr>
<td></td>
<td>3. Use anything else to get high?</td>
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<tr>
<td></td>
<td>(“Anything else” includes illegal drugs, over the counter and prescription drugs, and things that you sniff or “huff”).</td>
</tr>
<tr>
<td>PCP reviews AOD Use answers and enters them into EMR</td>
<td></td>
</tr>
</tbody>
</table>

#### Step 2: CRAFFT and AOD Frequency Questions

<table>
<thead>
<tr>
<th>PCP ARM</th>
<th>BMS ARM</th>
<th>USUAL CARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of problematic AOD Use?</td>
<td>Evidence of problematic AOD Use?</td>
<td>Evidence of problematic AOD Use?</td>
</tr>
<tr>
<td>NO: No further action.</td>
<td>NO: No further action.</td>
<td>NO: No further action.</td>
</tr>
<tr>
<td>YES: PCP further assesses AOD problems using CRAFFT and AOD frequency questions.</td>
<td>YES: PCP refers patient to BMS for further assessment.</td>
<td>YES: PCP refers patient to BMS for further assessment.</td>
</tr>
</tbody>
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#### Step 3: Brief Intervention or Referral

<table>
<thead>
<tr>
<th>PCP ARM</th>
<th>BMS ARM</th>
<th>USUAL CARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRAFFT score &lt;2 and no severe AOD problems:</td>
<td>CRAFFT score ≥ 2:</td>
<td></td>
</tr>
<tr>
<td>PCP conducts Brief Intervention</td>
<td>Referral to AOD treatment by PCP for additional assessment and treatment.</td>
<td>BMS conducts Brief Intervention</td>
</tr>
<tr>
<td>CRAFFT score &lt;2 and no severe AOD problems:</td>
<td>CRAFFT score ≥ 2:</td>
<td></td>
</tr>
<tr>
<td>BMS further assesses AOD problems using CRAFFT and AOD frequency questions.</td>
<td>Referral to AOD treatment by BMS for additional assessment and treatment.</td>
<td></td>
</tr>
</tbody>
</table>

**PCP Arm:** PCP reviews AOD use answers and enters them into EMR. If patient endorses AOD use, PCP administers CRAFFT\textsuperscript{131} in EMR. If CRAFFT score < 2 and patient has no severe AOD problems, PCP conducts brief intervention. PCP will refer patients with CRAFFT scores ≥ 2) to AOD treatment for further assessment, using an on-line referral mechanism (E-Consult) in the EMR.

**BMS Arm:** PCP reviews AOD use answers and enters them into EMR. If patient endorses AOD use, PCP refers patient to BMS. The BMS will work on-site in the facility. PCPs will call the BMS on a dedicated phone line while the patient is in the exam room. The BMS will immediately come to the exam room to meet the patient, or if busy, will arrange to talk with the patient to set up an appointment. BMS administers CRAFFT.\textsuperscript{131} If CRAFFT score < 2 and patient has no severe AOD problems, BMS conducts brief intervention. BMS will refer patients with CRAFFT scores ≥ 2) to AOD treatment for further assessment, using E-Consult.

**Follow-up patient data at 12 months.** In the two intervention arms, all patients determined to be at risk for AOD (“yes” to AOD use in past 12 months and “yes” to at least one non-car CRAFFT question) will be scheduled for a follow-up visit at 12 months (by the PCP or BMS). KPNC standard care calls for all patients who endorse AOD or have a medical or psychiatric problem to be asked to return for an annual well-child visit in 12 months and the PCP notes in the patient’s EMR that they need to be seen in 12 months. This generates an automatic appointment postcard to the patient and parent. Using this protocol, we anticipate a return visit rate...
of 80% - this is estimated from other KPNC guideline adherence when this approach is used. To be conservative, however, we will plan for a 60% return rate.

Measures of implementation and effectiveness

AOD Screening Rate. The proportion of patients who are screened with the Teen Well Check Questionnaire AOD use questions among all patients with Teen well-child visits.

AOD Problem Identification Rate. The proportion of patients screened who answer “yes” to AOD use in past 12 months and “yes” to at least one non-car CRAFFT question. (Being in a car with someone using AOD may not be related to child's problem, but to having a parent/other adult who has driven while drinking/using).

Intervention Rate. The proportion of patients who receive an intervention within 14 days, among those who are identified with AOD risk (based on CRAFFT score). This will be documented by clinicians in the EMR.

Treatment Referral Rate. The proportion of patients who receive referrals to AOD treatment within 14 days, among those identified through the CRAFFT as needing such treatment. This is documented in the EMR.

Treatment Initiation Rate. Consistent with the HEDIS measure, this will be defined as the percent referred with at least one AOD-related visit within 14 days among those identified with an AOD problem.

Patient Outcomes. Patients who endorse AOD use on the Teen Well Check Questionnaire will be asked about quantity and frequency of AOD use (Appendix 2) at baseline and at the 1-year return visit to PC:

Alcohol and drug use. The items in the EMR measure past 30-day and 6-month use of alcohol, marijuana and other drugs and tobacco, including days of use, quantity consumed (any, 3+ and 5+ drinks), and days of binge drinking (3+ and 5+).

AOD-related legal, school, and family problems. The EMR questions also include measures from the Comprehensive Adolescent Severity Inventory (CASI), a semi-structured questionnaire which measures adolescent health and functioning across education, legal, and family relations domains.

Data sources

KPNC’s Electronic Medical Record (EMR). This inpatient and outpatient medical record produced by Epic Systems Corporation integrates clinical and diagnostic data with appointments, registration and billing for each encounter. The Teen Well Check Questionnaire is an integral part of every adolescent’s EMR. It documents the results of physical exams and is the official documentation template of every adolescent visit. Diagnoses and procedures are coded according to both ICD-9-CM and CPT4 classification systems. It also includes information from other data sources such as patient questionnaires filled out by clinicians.

The Common Provider Master (CPM) contains extensive information about all KPNC PCPs. It has demographic data, home department and facility, advanced training and time since training, and provider type.

KPNC Membership Files. The medical record number (MRN) is included in all patient-level KPNC databases, making linkage straightforward. Membership data are updated monthly and contain demographic information. With the EMR, race/ethnicity is routinely captured at visits and approaches 100% capture.

EMR’s E-Consult contains data on all referrals, diagnoses and prescriptions.

Costs of Care. Using activity-based costing methods, unit costs of services are calculated and used to obtain costs for each encounter and service and stored in Cost Management Information System (CMIS). Fixed and variable components of cost are broken out, and can be calculated by member over time, or by provider or facility. Data have been used in numerous cost studies.
**Qualitative Interviews.** To more thoroughly explore the relationships examined in Aims 1 and 2, and to measure fidelity, we will use qualitative analysis methods similar to our other studies. We propose using semi-structured interviews conducted in-person with the 45 PCPs, the clinic’s RNs and MAs, BMSs, as well as the Physician-in-Chief, the Chief of Service, and Psychiatry and AOD program directors (N=60). They will explore barriers to and facilitators of SBIRT implementation, and intervention fidelity.

**Analysis Plan**

**Preliminary Analyses.** For dichotomous variables such as AOD problem identification, brief intervention completion, referral and AOD treatment initiation, we will obtain frequency distributions and bivariate contingency tables (e.g., % screened positive by study arm), and use Pearson’s chi square test to examine for significant differences in proportions by study arm. We will also examine by provider characteristics. For continuous measures such as average number of patients identified, completing intervention, referred to and initiating AOD treatment per month, we will use univariate analyses to obtain descriptive statistics to determine the shape of these distributions and check for normality. We will use simple t-tests and analysis of variance (ANOVA) techniques to assess effects of covariates (e.g., gender, age, and medical condition) on continuous outcomes (e.g., days consumed and quantity of alcohol). The results will be used as guidelines in multivariate regression analyses.

**Specific Aim 1 – Implementation Outcomes by Study Arm.**

**Hypothesis 1(a):** The PCP and BMS arms will each have higher AOD screening and AOD problem identification rates than the Usual Care arm. The BMS arm will have a higher rate than the PCP arm.

**Hypothesis 1(b):** The PCP and BMS arms will each have higher brief intervention rates than the Usual Care arm, among those with AOD risk. The BMS arm will have a higher rate than the PCP arm.

**Hypothesis 1(c):** The PCP and BMS arms will have higher referral rates to AOD treatment than the Usual Care arm, among those with AOD problems. The BMS arm will have a higher rate than the PCP arm.

**Hypothesis 1(d):** The PCP and BMS arms will have higher AOD treatment initiation rates than the Usual Care arm, among those with AOD problems. The BMS arm will have a higher rate than the PCP arm.

For each outcome, we will first compare each intervention arm to the Usual Care arm to determine whether it is superior to Usual Care. We will then compare the PCP and BMS arms directly to determine which has better outcomes. Patients are nested within providers and therefore observations within these clusters (or levels) maybe correlated. We will use a mixed model (also known as random effects model or hierarchical model) that consists of both fixed and random effects to account for the intra-class correlations (ICC) across patients within providers. The general mixed model is of the form: \( y = X\beta + Z\gamma + \varepsilon \) where \( y \) denotes the outcome, \( X \) denotes observations from fixed covariates (e.g. patient age, gender and other baseline risk factors), \( \beta \) denotes fixed effects, \( Z \) denotes variables for random effects, \( \gamma \) denotes random effects and \( \varepsilon \) denotes variation between patients. Variance components for random effects specified in \( Z \) will provide estimates of the ICC and can be used to determine whether there is a significant clustering effect at the provider level.

We will first conduct pair-wise comparisons of AOD screening in each intervention arm to the Usual Care arm. In the model comparing each intervention arm to the Usual Care arm (which is the reference group), we expect a significant positive coefficient associated with the indicator variable (=1 if screened positive, 0 otherwise) for the intervention arm (PCP or BMS). In the next step, we compare the PCP and BMS arms directly to determine which has better outcomes. Since in the BMS arm PCPs have the benefit of additional resources available in the event of a positive screen, we hypothesize it will have a higher rate of AOD screening. Assuming the PCP arm is the reference group, our hypothesis will be supported by a significant positive coefficient of the indicator variable for intervention type. We will perform similar pair-wise comparisons for AOD problem identification and brief intervention. To compare differences by arm in brief intervention completion, we will use the subset of patients who screen positive. The analyses will use the mixed model framework as above.
To compare study arm on referral to AOD treatment, we will define an indicator variable to denote whether a patient received a referral. As before, in comparing each intervention arm to Usual Care (reference group), we expect a positive coefficient for the intervention group indicator, as we expect both arms to have higher referral rates than Usual Care. (A similar model will be used for treatment initiation). Comparing the BMS to PCP (reference group) arms, we expect a higher referral rate for BMS and thus a significantly positive coefficient for the variable indicating intervention arm. As all the above models are non-linear we will conduct mixed effects logistic regression analyses using the SAS® NLMIXED or similar procedure for analyses.

Specific Aim 2. Patient Outcomes by Study Arm.

**Hypothesis 2(a):** Patients in the PCP and BMS arms will have fewer days of AOD use, binge drinking, and lower quantity of AOD use than Usual Care. We will also examine differences between PCP and BMS arms.

**Hypothesis 2(b):** Patients in the PCP and BMS arms will have larger reductions in AOD-related legal, school and family problems than patients in Usual Care. We will examine differences between PCP and BMS arms.

We will examine effectiveness on patient outcomes of each intervention arm in terms of AOD consumption measures (days of use, of binge drinking, and typical quantity consumed), and other AOD-related legal, school and family problems. These data will be obtained from EMR questions administered at baseline and 1-year follow-up well-child visits. In these analyses, we will assess the potential bias due to missing data (we anticipate a return rate of 60%) using bivariate and multivariate methods to test for differences between those with and without follow-up using baseline measures such as gender and severity. If there is evidence of selective dropout, we will use the two-step Heckman approach to correct estimates of the principal structural model by fitting a first-step probability model to determine the difference between those with and without follow-ups on key observed variables (e.g., age, gender, severity). A correction factor based on the first-step model would be applied in the next step that analyzes outcome variables of interest.149, 150 We do not expect much missing data due to membership loss since this is a 12-month study and our 12-month membership retention rates are very high.113 We will use the mixed linear and non-linear model described earlier as appropriate, e.g., the change in typical quantity consumed (continuous outcome) may be expressed as: \[
\Delta QTY = \alpha + \beta INT + X\gamma + Z\delta + T + \epsilon,\]

where \(\Delta QTY\) denotes change in quantity consumed, \(\alpha\) denotes the average change in consumption, \(INT\) denotes the indicator for intervention arm, \(X\) is the matrix of patient characteristics,(e.g. age and gender), \(Z\) is a matrix of observations on provider-level characteristics, \(T\) is the time between measurements (patients may have different return times) and \(\epsilon\) denotes patient-level random effect. We expect reduced consumption at 12-months, we expect \(\alpha\) and \(\beta\) to be significantly negative, implying that those in the intervention arm have greater reduction in alcohol consumption on average relative to Usual Care.

Specific Aim 3 – Costs and Cost-effectiveness.

**Hypothesis 3(a):** The PCP and BMS arms will be cost-effective with regard to implementation outcomes (AOD screening, AOD problem identification, brief intervention, referral and AOD treatment initiation) than the Usual Care arm. The BMS arm will be cost-effective relative to the PCP arm.

**Hypothesis 3(b):** The PCP and BMS arms will be cost-effective with regard to patient outcomes (days and quantity of AOD use, and legal, school and family problems) than the Usual Care arm. The BMS arm will be cost-effective relative to the PCP arm.

**Costs.** We will estimate costs associated with the SBIRT implementation and intervention for PCP and BMS arms. We consider three principle components of cost: labor, space and other miscellaneous costs. Costs will also be separated into training and implementation costs.

**PCP Training Costs.** Training for the PCP and BMS arms consists of 2 hours of staff time split into two lunch-hour sessions, for each arm, with lunch provided. Costs will be obtained using records compiled by the study team. We will carefully document additional costs such as planning and administrative activities as the implementation is rolled out.
AOD Screening and AOD Problem Identification Costs. The labor cost of AOD problem identification patient are a function of wages (by provider type) and average time spent administering the CRAFFT screener. We will obtain the wages for each provider type from the general ledger database. In both arms, the AOD screening will begin with review of the Teen Well Check questionnaire by the PCP during the office visit. Those who have endorsed any AOD use questions will be administered the CRAFFT by the PCP or BMS. Average screening time will be obtained as part of the qualitative interviews. Space cost will be estimated as “the average cost per unit area x average area occupied (by patient and person AOD screening) x the time taken to perform the AOD screening.” Differences in AOD problem identification cost between the three arms will be primarily due to the difference in the number of patients administered the CRAFFT.

Intervention Costs. Following a positive screen, further assessment is done. Those with CRAFFT scores <2, and whose AOD problems are not severe, are eligible for the brief intervention. These interventions consist of approximately 5-10 minutes of brief feedback, advice, and goal-setting and may differ by provider type. For those with CRAFFT score ≥2, a referral to AOD treatment is warranted. The difference in costs in the two arms is primarily due to different provider types administering the brief interventions, although it is also possible that the average length of intervention may vary between the arms. The average intervention time will be obtained from the provider interviews. We will ask clinicians to estimate the time they spend on SBIRT activities. We will use a form which separates each of the SBIRT activities and ask about time spent on each and for the overall process. We will ask them to estimate this for the last five patients screened, the last five intervened with and last five referred to AOD treatment.

Thus, labor costs will be computed for each of the two staff types (PCP and BMS) and the cost of intervention will be estimated by the average time spent in delivering the intervention x wage per minute of staff performing the intervention.

Cost-effectiveness. We expect both the BMS and PCP arms to have higher costs than the Usual Care arm. Therefore, when comparing each intervention arm to the Usual Care arm, we will assess the incremental cost-effectiveness ratio (ICER) as the added cost per additional patient screened, identified or receiving brief intervention or referred to treatment. For example, if the PCP arm costs $1,000 more per patient receiving brief intervention than the Usual Care arm, and increases the likelihood of receiving brief intervention from 0.2 to 0.4 then the PCP arm costs $5,000 per additional person receiving brief intervention. Similarly, when comparing patient outcomes, if the PCP arm results in a 25% reduction in drinking days on average relative to the Usual Care arm, the ICER will be $4,000 per additional non-drinking day. A distribution of the ICER will be constructed using the bootstrap method based on the variances of our estimates of costs and effectiveness. The cost-effectiveness acceptability curve that will be obtained can be used by health systems and policy-makers to determine potential gain in effectiveness for acceptable thresholds of costs. In comparisons involving BMS and PCP arms, we will determine whether the BMS arms is costlier than the PCP arm (although unit costs for labor are lower for the BMS arms, the brief intervention may be longer and therefore the cost may be higher). If so, we will compute the ICER as before. If the BMS arm costs less per patient than the PCP arm, then the ICER is not applicable since the BMS intervention will be dominant. Similar methods will be used for patient outcomes.


Hypothesis 4(a): After controlling for other covariates, boys will be more likely to be screened and referred to treatment than girls, but girls will have higher AOD treatment initiation rates than boys. Older adolescents will be more likely to be screened than younger adolescents.

Hypothesis 4(b): After controlling for other covariates, more experienced providers will have higher AOD screening, brief intervention and referral rates than less experienced providers.

For both intervention arms, we will examine the factors that predict AOD problem identification rates and, among those identified with AOD problems, the factors that predict brief intervention, referral, and treatment initiation for each of the intervention arms. We will use the mixed model described earlier for these analyses. Drawing from preliminary analyses, we will include all patient-level predictors (e.g., demographics such as age and gender and other individual characteristics such as presence of medical conditions) that are significant. In
addition, we will include provider characteristics (e.g., age, gender, experience (length of time since training)) to assess whether the inclusion of these factors may also explain the variations in outcomes across providers. We will conduct similar analyses including patient characteristics to understand factors that predict AOD use and other patient outcomes such as legal, school and family problems.

**Specific Aim 5. Qualitative Analysis of Semi-Structured Provider Interviews.**

Audiotapes of the providers interviews will be transcribed and organized using NUD*ist software, which assists in identifying and tracking patterns in responses. The interviews will be compared for similarities and differences, and coded for emergent themes. A preliminary codebook will be generated based on the first few interviews. It will define broad topic categories, which will be attached to relevant passages for a subsequent analysis. A second analyst will also examine the data for themes and code the same interviews. Results will be compared and differences discussed. Each interview will be coded within no more than one week of completion, so that later interviews may be adjusted to reflect emerging understanding of the issues. The creation of the semi-structured interview tool and the coding and analysis of results will take place under the supervision of Dr. Weisner and Ms. Sterling.

**Power Analysis.** Power simulation for random effects models require several assumptions about the population parameters including the within- and between-class variances and intra-class correlations. We use an alternate way of calculating power that takes into account the correlations between observations by calculating the effective sample size. In our models, we need to account for provider-level intra-class correlation (ICC) as even a small level of ICC can lead to bias in estimates of standard errors and resulting test statistics. Although estimates of ICC are difficult to obtain at the planning stages of a study, several studies suggest that provider ICCs are in the range of 1% - 5% depending on the outcome of interest. We use a conservative estimate of 5% ICC in all calculations (smaller ICCs will increase the effective sample size and power) and assume a significance level of .05 for all hypotheses tests. For hypotheses related to implementation outcomes, we will have a sample of 138 patients per provider who will have a well-child visit in a given year. Although everyone should be screened according to the regional workflow, we will use a conservative estimate of 90% AOD screening rate. We assume a conservative AOD problem identification rate of 40% yielding an average of 750 patients/arm that are eligible for brief intervention or referral to AOD treatment. For this sample, we will have a power of .93 to detect a small-medium effect size of 15% (=.15 standard deviation) in brief intervention rate between the PCP and the BMS arms. Comparisons involving the Usual Care arm will have higher power due to anticipated larger effect sizes.

For examining effectiveness in patient outcomes, we are limited to those who have a follow-up visit within 1 year of initial AOD problem identification. Based on the KPNC PC data, we conservatively anticipate that 60% of those who screen positive (n=403/arm) will have a return visit within one year. Holding the overall AOD problem identification rate and ICC constant, we will have a power of .87 to detect a difference of 15% standard deviation in drinking days between the PCP and BMS arms. As before, comparisons involving the Usual Care arm will have higher power due to anticipated larger effect sizes.