Integrating Screening and Interventions for Unhealthy Behaviors into Primary Care Practices

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Background: Four unhealthy behaviors (tobacco use, unhealthy diet, physical inactivity, and risky alcohol use) contribute to almost 37% of deaths in the U.S. However, routine screening and interventions targeting these behaviors are not consistently provided in primary care practices.

Methods: This was an implementation study conducted between October 2005 and May 2007 involving nine practices in three geographic clusters. Each cluster of practices received a multicomponent intervention sequentially addressing the four behaviors in three 6-month cycles (unhealthy diet and physical inactivity were combined). The intervention included baseline and monthly audits with feedback; five training modules (addressing each behavior plus stages of change [motivational interviewing]); practice facilitation; and bimonthly quality-circle meetings. Nurses, medical assistants, or both were taught to do screening and very brief interventions such as referrals and handouts. The clinicians were taught to do brief interventions. Outcomes included practice-level rates of adoption, implementation, and maintenance.

Results: Adoption: Of 30 clinicians invited, nine agreed to participate (30%). Implementation: Average screening and brief-intervention rates increased 25 and 10.8 percentage points, respectively, for all behaviors. However, the addition of more than two behaviors was generally unsuccessful. Maintenance: Screening increases were maintained across three of the behaviors for up to 12 months. For both unhealthy diet and risky alcohol use, screening rates continued to increase throughout the study period, even during the periods when the practices focused on the other behaviors. The rate of combined interventions returned to baseline for all behaviors 6 and 12 months after the intervention period.

Conclusions: It appears that the translational strategy resulted in increased screening and interventions. There were limits to the number of interventions that could be added within the time limits of the project. Inflexible electronic medical records, staff turnover, and clinicians' unwillingness to allow greater nurse or medical-assistant involvement in care were common challenges.
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Introduction

In the U.S., a substantial percentage of morbidity and mortality (about 37%) is related to four unhealthy behaviors: tobacco use, unhealthy diet, physical inactivity, and risky alcohol use.[1,2] For example, in 2004, less than one third of adults reported participation in leisure-time physical activity[3]; about 66% of adults are overweight or obese[4]; 29% of people aged 18–24 years, 26% of people aged 25–44 years, 23% of people aged 45–64 years, and 9% of people aged ≥65 years were cigarette smokers[5]; and 19% of adults had consumed five or more alcoholic drinks in a single setting at least once in the past year.[3] Primary care clinicians have many opportunities to assist their patients in modifying unhealthy behaviors; however, they are hampered by inadequate time, training, and delivery systems.

The decision to change unhealthy behaviors is a complex process[6–10]; however, brief interventions delivered in primary care office settings have affected smoking cessation[11–17] and alcohol consumption.[18–22] Although less evidence supports brief interventions for improving diet or increasing exercise, there are reasons for optimism.[23–31] Nevertheless, brief interventions for behavior change are underutilized in primary care settings.[32] Research suggests that only 35% of patients

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Table 1. Project implementation design

Cluster	11/1/05–4/30/06	5/1/06–10/31/06	11/1/06–4/30/07
A	Unhealthy diet, physical inactivity, and motivational interviewing	Risky alcohol use	Tobacco use
B	Tobacco use and motivational interviewing	Unhealthy diet and physical inactivity	Risky alcohol use
C	Risky alcohol use and motivational interviewing	Tobacco use	Unhealthy diet and physical inactivity

have ever been counseled to exercise regularly,[33] only 42% of overweight and obese patients had been counseled to lose weight,[34] and only 37% of smokers have been advised by their physicians to quit.[35] Reasons cited include the lack of time, competing demands, insufficient reimbursement, and low patient interest in prevention, and there is evidence to support these arguments.

Implementing the U.S. Preventive Services Task Force's recommended preventive services would require more than 7 hours of a physician's day.[36] Given the large number of medical problems managed during typical primary care encounters,[37,38] only small amounts of time are available for prevention.[39–43] Other challenges to providing preventive care include the inadequacies of the problem-oriented medical model[44] and the variability and complexity of primary care practices.[45–50] Multicomponent interventions such as chart audits with feedback; physician reminders, patient reminders, or both; nurse involvement through standing orders; and the involvement of behavioral counselors are therefore necessary to effect changes in these complex adaptive systems.[39,40,44,47,50,51] Facilitated rapid-cycle quality-improvement techniques (plan–do–study–act cycles [PDSA]) and learning collaboratives are effective in primary care settings,[52–63] and the two strategies ought to be complementary.

The purpose of this study was to test an implementation strategy that included audit with feedback, training, practice facilitation, and quality-circle meetings on screening and intervention rates for each of four behaviors: tobacco use, unhealthy diet, physical inactivity, and risky alcohol use. This paper reports the practice-level outcomes (adoption, implementation, and maintenance).

Methods

Study Design

Each of three clusters of practices received training on screening and interventions for the four behaviors and stages of change (motivational interviewing) according to the timetable shown in Table 1. Evidence-based screening methods were recommended, from which practices were encouraged to choose those best suited to their styles of practice and patient populations. They were encouraged to incorporate screening into the vital-signs process. The training emphasized two types of interventions: very brief interventions (1–2 minutes or less) performed by a nurse, medical assistant, or physician to move the patient from pre-contemplation to contemplation or from contemplation to preparation; and brief interventions (5–15 minutes), directed at patients who were ready for the action phase. Practices continued to use the methods learned in prior cycles, so that by the end of the three cycles, screening and intervention methods had been implemented for all four behaviors.

Recruitment of Clinicians

The Oklahoma Physicians Resource/Research Network (OKPRN) is a primary care, practice-based research network that includes 202 primary care physicians, 19 physician assistants, and five nurse practitioners in 95 practices throughout Oklahoma, and serves approximately 232,000 patients. Of these, approximately 6% are Hispanic, 68% are non-Hispanic Caucasian, 13% are non-Hispanic African American, 10% are Native American, and 3% are Asian/Pacific Islander. While most practices are small and community-based, the network also includes ten family medicine residency practices, seven Native American practices, and two community health centers. OKPRN clinicians are equally divided among urban settings, medium-sized towns, and small towns/rural areas.

Clinicians were recruited for participation through a series of e-mails, faxes, and telephone calls from the principal investigator. All full-time, practicing clinician members of OKPRN who were not involved in another OKPRN project were eligible. An invitation letter, which provided a project synopsis, details of the clinician/staff project requirements, and information about the monetary remuneration for participation was e-mailed or faxed to the 25 eligible clinicians most likely to be interested.

Because of the project's design and the initial location of the clinicians who agreed to participate, it became apparent that the required geographic clustering of three clinicians in three regions should include west central Oklahoma and central Oklahoma. The principal investigator then made personal telephone calls to three additional clinicians (one of whom had been on the original invitation list) in a third region, northeast Oklahoma, and all three agreed to participate. A seventh clinician agreed to participate during a personal visit by the principal investigator for other reasons. Finally, the principal investigator sent recruitment letters and then telephoned three OKPRN members from the original invitation list and one non-OKPRN member in the required geographic areas. Two of these agreed to participate, filling the remaining participant slots. Before implementation, one clinician dropped out, and a replacement was recruited, yielding a total of 30 clinicians invited to participate.

Training

Five evidence-based training modules were developed by content experts in the areas of motivational interviewing, weight loss, exercise, smoking cessation, and reduction of risky alcohol use. Each module included five components: (1) a pretest; (2) general information on the topic; (3) screen-

ing methods, and recommended brief and very brief interventions; (4) role-play scenarios; and (5) a posttest. The training was scheduled in a location convenient to all three clinicians within a cluster, usually a hospital or clinician's office, and required about 2 hours for completion. In each geographic cluster, the three clinicians and one to three of their office staff members participated as a team in the workshop for the behavior they were to target next. The motivational-interviewing workshop was conducted at the beginning of the project.

Facilitation

One practice-enhancement assistant was assigned to each geographic cluster of clinicians. Each practice-enhancement assistant worked with three clinician–office staff teams in a single geographic cluster to implement the new screening and intervention methods using PDSA quality-improvement cycles, a skill they had developed in prior projects. The practice-enhancement assistants also performed monthly chart audits to provide feedback to the clinicians on their progress. To ensure data accuracy, all practice-enhancement assistants audited the same set of training charts and discussed any differences until agreement was 100%. The practice-enhancement assistants worked closely with the nurses and medical assistants to modify office routines, forms, and computer templates; they helped each team identify community resources; and they helped the team find or develop patient education materials.

The practice-enhancement assistants kept diaries or field notes on every facilitation session with each clinician–staff team. Training for writing field notes was provided by the Prescription for Health national program office in a Powerpoint presentation. The content of the notes included barriers, facilitators, progress, interventions tried, and outcomes achieved. These notes were reviewed and discussed weekly with the practice-enhancement assistants, and recommendations were made for new approaches. Reading these notes after data analysis provided temporal information that aided the interpretation of study outcomes.

Quality Circles

During each cycle, the three clinician teams in each cluster met three times (at 2, 4, and 6 months) with their practice-enhancement assistant and the principal investigator to review progress and share ideas. Performance data were shared, and specific techniques were described and discussed. The clinician, a nurse or medical assistant, and an office manager from each practice generally participated in these meetings.

Outcome Measures

The outcomes reported in this paper include adoption, implementation, and maintenance from the Reach, Efficacy/Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) model.[64] Adoption was defined as the percentage of clinicians invited to participate who completed training and implemented recommended changes.

Implementation was determined by how well the practices were able, during each 6-month cycle, to fully incorporate screening and very brief and brief interventions for each behavior into their processes of care, based on information obtained from the chart audits. Specifically, in addition to demographic characteristics (i.e., age, insurance type, and gender), other collected data included whether or not, at the most recent visit, a patient was:

- screened for each behavior;
- offered a very brief intervention (e.g., referral to the smoking-cessation quitline or the YMCA water aerobics program; patient education materials; or advice about behavior change [i.e., exercise, eat more vegetables, stop smoking]);
- offered a brief intervention (e.g., behavior-change counseling by the clinician using motivational-interviewing techniques; targeted counseling tied to stage of change; medication prescription and education for smoking cessation; family interventions to facilitate behavior change; more complex referrals such as linking the patient to an Alcoholics Anonymous (AA) counselor while still in the office); or
- offered both a very brief and a brief intervention.
- Chart audits were performed by a research assistant (not otherwise involved in the project) who identified the last 75 patients seen during a predetermined audit period approximately 26 weeks after the training workshop. The sampling method was unknown to the clinician or staff. At each data-collection point, the percentages of patients screened, receiving an intervention, or both at that particular encounter were calculated for clinicians within each cluster (N=75 x 3=225). Six months prior to the end of the study, one clinician closed his practice for reasons unrelated to the project, so data for that clinician were not available for implementation or maintenance for the module on risky alcohol use, and percentages calculated for that cluster were based on 150 patients, not on 225.
- Changes in screening and intervention rates were quantified by comparing the odds—adjusted for the clustering of patients within clinicians' practices—that a practice provided screening or intervention at the end of study to the odds that it did so at baseline. Comparing baseline and end-of-study implementation in terms of odds instead of percentages was chosen because it facilitated the use of generalized estimating equations (GEE) to adjust for clustering. However, cluster adjustment required that the odds that an intervention occurred at baseline be defined for every practice. These odds could not be defined in practices that reported no instances of a particular intervention at baseline. Therefore, to permit the calculation of approximate cluster-adjusted odds in these cases, counts of one (of 75) were assigned to any practice that reported no interventions at baseline.
- Maintenance was determined by the degree to which practices continued to screen for and provide interventions while working on the other behaviors. Because of staggering, maintenance data for each behavior were available at 6 months for six clinicians and at 12 months for three clinicians.

Results

Adoption was defined as the percentage of clinicians invited to participate who completed training and attempted to implement the recommended changes in their process of care. Of the 30 clinicians invited to participate, ten completed training and nine actually

Table 2. Percentage of patients for whom practices provided screening or intervention at baseline and at end of study, and associated ORs

	Percentage receiving intervention		Cluster-adjusted OR across nine practices[a]			
Clinician behavior	**Baseline**	**End of study**	**OR**	**LCL**	**UCL**	***p***
Unhealthy diet screening offered	25.8	69.0	6.4	2.6	15.8	0.0001
Unhealthy diet screening positive	21.6	48.7	3.5	1.6	7.1	0.0009
Unhealthy diet VBI offered	7.9	3.7	0.45	0.2	1.4	0.1599
Unhealthy diet BI offered	2.9	21.3	8.1	2.3	28.7	0.0013
Physical inactivity screening offered	0.0	23.6	22.8	11.8	43.9	0.0000
Physical inactivity screening positive	0.0	12.7	10.8	4.5	25.8	0.0000
Physical inactivity VBI offered	8.4	12.2	1.5	0.2	10.4	0.6982
Physical inactivity BI offered	2.9	21.0	7.6	2.1	26.7	0.0017
Tobacco use screening offered	54.9	71.1	2.0	0.7	6.2	0.2173
Tobacco use screening positive	14.2	15.4	1.1	0.8	1.59	0.6189
Tobacco use VBI offered	4.7	2.8	0.6	0.2	1.33	0.1837
Tobacco use BI offered	0.0	5.9	4.7	2.7	7.9	0.0000
Risky alcohol-use screening offered	44.3	59.6	1.8	0.6	5.55	0.2783
Risky alcohol-use screening positive	2.8	1.2	0.4	0.2	0.74	0.0058
Risky alcohol-use VBI offered	2.7	0.7	0.2	0.1	1.1	0.0708
Risky alcohol-use BI offered	0.0	0.9	0.7	0.2	1.9	0.4407

[a]Ratios represent the odds that a practice provided screening or intervention at the end of the study compared to the odds that it did so at baseline. The ORs are adjusted for the clustering of patients within practices using GEE. To permit the GEE adjustment when a particular practice reported no instances of an intervention at baseline, a minimum count of one was assigned to those practices (see Outcome Measures).

BI, brief interventions; LCL, lower 95% confidence limit; UCL, upper 95% confidence limit; VBI, very brief interventions

implemented changes in their process of care, resulting in an adoption rate of 30% (9/30). The practices that adopted the process-of-care changes included eight solo practitioners and one nurse practitioner. Practice experience ranged from <5 years to >20 years, and 44% of practitioners were female.

Implementation was defined by the odds, adjusted for the clustering of patients within clinicians' practices, that a practice provided screening or intervention at the end of study compared to the odds that it did so at baseline. Table 2 contains these ORs, CIs, and *p*-values associated with screening rates, rates of positive screens, very brief interventions, and brief interventions.

For unhealthy diet, the rates for observed screening, screening positive, and brief interventions increased significantly across the study. Patients were more than six times as likely to be screened, more than three times as likely to screen positive, and more than eight times as likely to receive a brief intervention at the end of the study compared to baseline. The provision of very brief interventions did not change significantly, but the trend was a decrease, from almost 8% at baseline to almost 4% at the end of the study. The chart auditor observed a reduced rate of very brief interventions by clinicians. The practice-enhancement assistants reported that although medical assistants and nurses delivered very brief interventions, they rarely documented them.

Specific screening questions about physical inactivity were inadvertently not emphasized or measured until the end of the second intervention (12 months into the study). The training and implementation of this module were combined with unhealthy diet, and the practices initially focused on measuring BMI as the vital sign for obesity/overweight but neglected to collect a measure of physical inactivity. None of the clinicians reported routine screening for amount of physical inactivity prior to the intervention. The odds of being screened and receiving a positive screen for physical inactivity at the end of the study were almost 24 and 13 times, respectively, the odds at the beginning of the study. Patients were more than seven times as likely to receive a brief intervention for physical inactivity at the conclusion of the study compared with baseline. The percentage of those receiving a very brief intervention increased insignificantly from baseline to the end of the project.

While observed screening rates increased for tobacco use and risky alcohol use, the increases were not significant, in part because the variance is largest in models of binomial outcomes (yes/no, screened/not screened) when the intervention is offered to approximately 50% of the participants. The rates of positive screens for tobacco use did not change across the study, nor did the rate for very brief interventions. Brief

interventions, however, increased significantly; at the end of the study, patients were more than four times more likely to receive a brief intervention than at baseline.

A significant decrease in screen-positive rates was noted for risky alcohol use, in that patients were about one half as likely to screen positive at the end of the study compared to baseline. A similar but nonsignificant decrease was noted for very brief interventions. The rate of brief interventions increased, but not significantly.

Implementation and maintenance screening rates for the four behaviors are plotted for each of the three geographic clusters in Figure 1. In both Figure 1 and Figure 2, maintenance was evidenced if a practice cluster demonstrated consistent or stable rates after the 6-month cycle when it introduced an intervention. The screening rates for both unhealthy diet and risky alcohol use continued to increase throughout the study period, even during periods when the practices were focused on the other behaviors. For tobacco use, the screening rate dropped slightly 6 months after the end of the smoking module and then leveled off. Maintenance for exercise was not evaluated, given that measurement was not begun until the beginning of the final 6-month period. Practices began to increase their rates of screening for unhealthy diet and tobacco use even prior to the training module for these behaviors. In all clusters, the rates of screening for the third added behavior did not increase with training and facilitation.

Figure 2 contains the brief-intervention rates for baseline, 6 months, 12 months, and 18 months by geographic cluster. For all behaviors other than physical inactivity, the rates of delivery of brief interventions for the third added behavior did not increase with training and facilitation. The rate of brief interventions returned to baseline for all behaviors at 6 and 12 months during periods when the clinicians were focusing on other behaviors.

Discussion

This project attempted to facilitate change using a multicomponent intervention strategy that included audit with feedback, the training of clinicians and key staff members, practice facilitation, and participation in

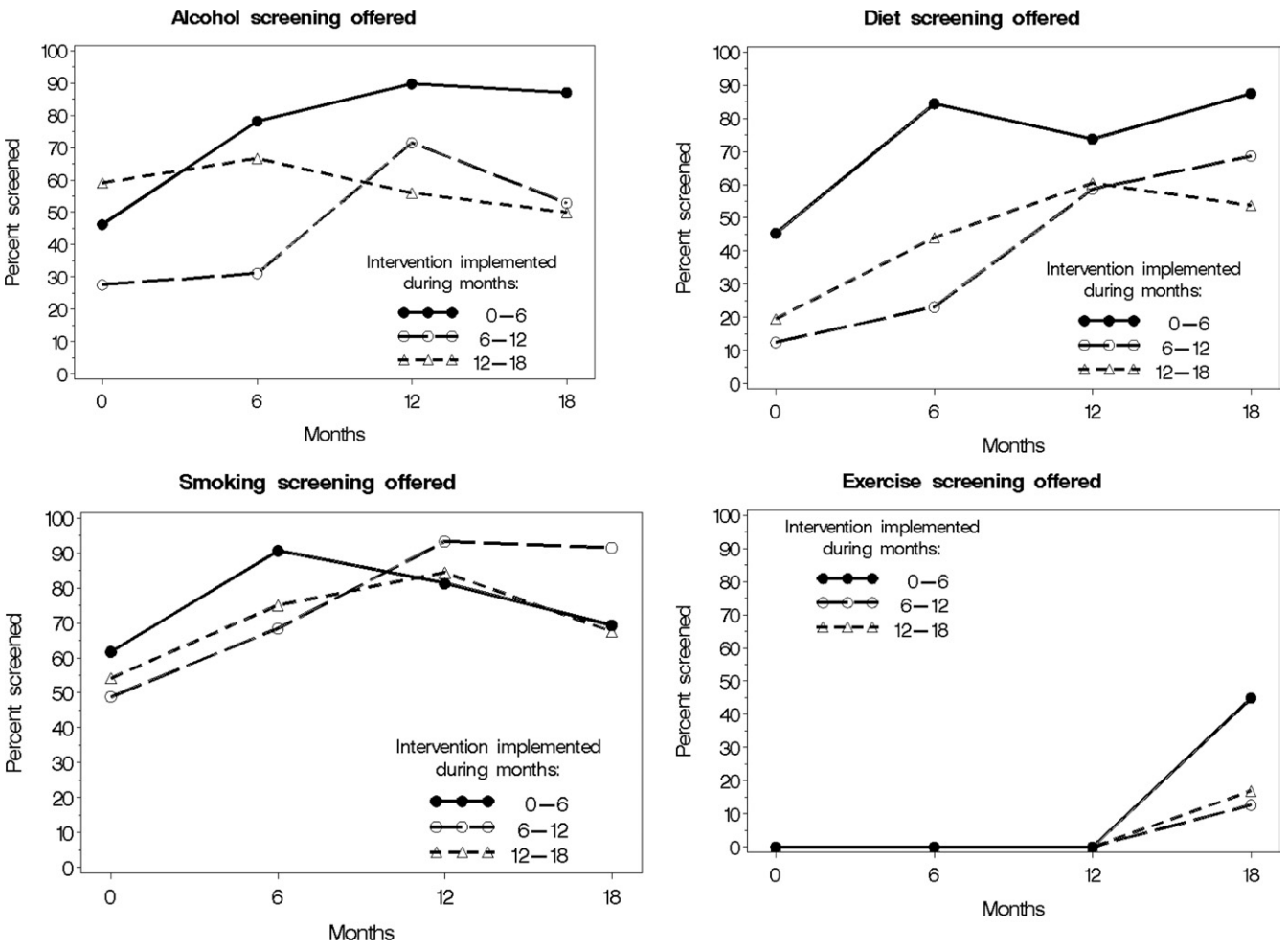

Figure 1. Screening and maintenance rates for each behavior by geographic cluster and implementation period

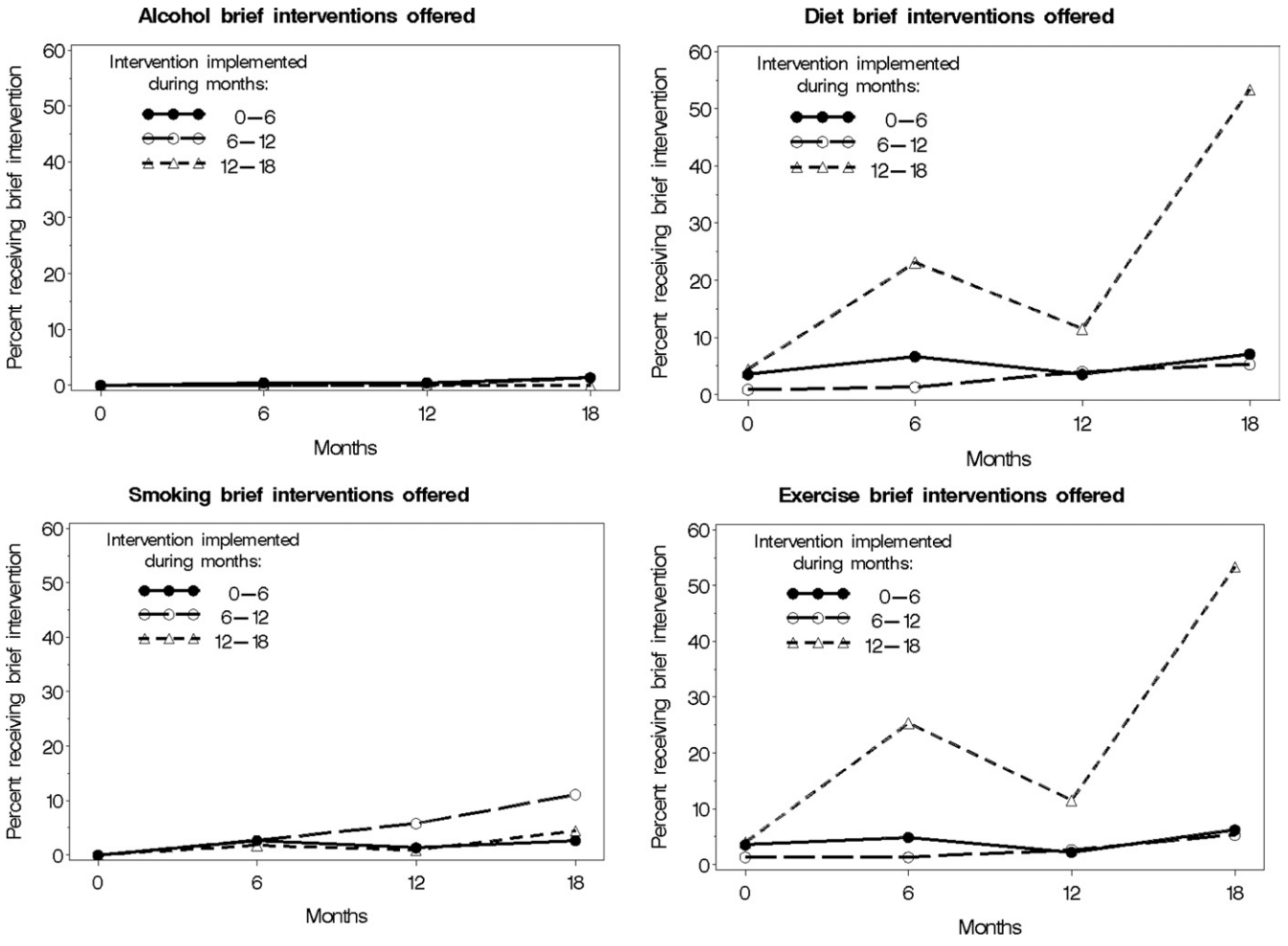

Figure 2. Brief intervention rates per encounter for each behavior by geographic cluster and implementation period

quality-circle meetings with other clinicians working on making similar changes. The results presented here show that the multicomponent intervention resulted in overall increases in screening for unhealthy diet and physical inactivity and in brief interventions for tobacco use, unhealthy diet, and physical inactivity. It should be noted that the reported rates of screening of very brief interventions and brief interventions are from a single encounter. Assuming that many patients with unhealthy behaviors visit their primary care physician more than once per year, the probability of their being screened or receiving an intervention would be substantially greater than reported here.

A phenomenon illustrated by three of the graphs in Figure 1 suggests that practices may not be able to add more than two screening behaviors and continue to increase screening for the first two behaviors. Six months may be an insufficient time period to completely institutionalize a screening-behavior change before adding another, ultimately resulting in declining effectiveness at the introduction of the third set of changes. Another possibility is that, as screenings for unhealthy behaviors are added to vital signs (which are largely collected by nurses or medical assistants), there may be a point at which time constraints preclude adding any more screenings. Practitioners are more likely to drop the newly added screening items rather than drop the traditional physical measures.

Another interesting finding was the decline in positive screens for risky alcohol use. This appeared to be associated with the increased screening of patients for whom risky alcohol use was not suspected. Before the study, clinicians screened only patients for whom alcohol was a suspected problem, increasing the percentage of positive screens (7%). The extremely low screen-positive rate (1.8%) when more patients were screened suggests that this form of screening, at least as it was carried out in these practices, may not be cost effective. Feedback from the participants suggests that it was the least comfortable of the screens to do as a vital sign at every visit.

The field notes recorded by the practice-enhancement assistants confirmed the high staff turnover and the competing demands associated with other major efforts such as implementing an electronic medical record (EMR). For this particular project, electronic health

records were both a blessing and a curse. Certainly it was helpful to be able to codify the desired behaviors in an EMR template. However, most of the EMRs were so inflexible that it proved difficult to insert the screening questions within the record's vital-signs section.

This study had limitations associated with the small sample size—only nine clinicians participated; however, many findings reached significance even after accounting for the clustering of patients by clinician. This supports the strong effect of the implementation's interventions. The lack of nurse or medical-assistant documentation of very brief interventions limited researchers' ability to accurately judge the rate of change in this area. Given the observations of the practice-enhancement assistants, the chart documentation of these very brief interventions would have resulted in significant increases.

Consistent with the literature, a multicomponent intervention, supported by practice facilitation and the opportunity to confer with colleagues facing similar challenges, is a powerful practice-change model. Future analyses will focus on patient-level outcomes.

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