Randomized intervention to promote physical activity of internal medicine residents

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**Background:** Physicians’ long, intense work hours reduce time for healthy behaviors and contribute to burnout. Promoting physical activity of medical residents could help create better role models for patients and improve physician health during and after residency.

**Methods:** We tested 2 strategies using an activity monitor to increase physical activity of internal medicine residents over 12 weeks in 2011 at a hospital in Boston, MA. In Phase 1 (6 weeks), residents were randomly assigned to an activity monitor with visual feedback (intervention) or to a blinded monitor (control). Phase 2 (6 weeks) was a team competition with all monitors unblinded. In both phases, residents were given free access to an on-site fitness center. Primary outcomes were: 1) median steps/day to assess activity levels and 2) proportion of days on which the activity monitor was worn to assess compliance with wearing the monitor. Secondary analyses looked at mean steps/day on days when the monitor was worn (>500 steps), comparing steps in Phase 2 vs. Phase 1, steps during inpatient vs. outpatient rotations, and steps by residency year of training. Baseline weight, BMI, blood pressure, and fasting lipids of residents were compared to measurements at study end.

**Results:** A total of 104 residents were randomized in Phase 1, and 99 continued into Phase 2. The mean age of residents was 29; 54% were female; 66% were white; and the mean BMI was 24.1. During Phase 1, intervention and control groups recorded similar steps/day (6369 vs. 6063, p=0.16) and compliance with wearing the monitor (77% vs. 77% of days, p=0.73). During Phase 2 (team competition), residents assigned to intervention in Phase 1 recorded more steps/day (5382 vs. 3698, p<0.001) and were more compliant (63% vs. 56%, p<0.001) compared to control. Including only days with >500 steps recorded, residents logged more steps/day during Phase 2 (team competition) than Phase 1 (p=0.009) and more steps/day during outpatient than inpatient rotations (p<0.001). During the team competition, senior residents recorded more steps per day than juniors or interns (p=0.02). Compared to baseline, at study end the mean systolic blood pressure decreased (p=0.004), HDL cholesterol increased (p<0.001), and weight did not change.

**Conclusions:** This is the first randomized intervention to our knowledge to promote physical activity among physicians. We found that a relatively simple intervention was feasible, moderately effective for improving activity, and associated with improvement in cardiovascular risk factors of internal medicine residents. Future research will be needed to determine if improving physician lifestyle habits can help prevent burnout and improve health outcomes.
A Mixed-Methods Randomized Controlled Trial of Employer Matching of Deposit Contracts to Promote Weight Loss


Background: Deposit contracts are behavioral economic devices that ask people to put money at risk that they forfeit if they do not meet a goal. While deposit contracts can effectively promote weight loss, a major challenge to wider impact of these programs is getting more people to participate. The goals of this study were to test whether matching of deposits can increase participation in deposit contracts, characterize the corresponding amount of weight loss, and identify factors associated with non-participation in these programs.

Methods: We recruited 132 employees of Horizon BCBS of NJ who wanted to lose weight and had a BMI between 30 and 50. Participants were given a weight loss goal of 1 lb per week for 24 weeks and randomized to a monthly weigh-in control group or monthly opportunities to deposit $1 to $3 per day with daily feedback. Deposits were either not matched, matched 1:1, or matched 2:1 and provided back to participants at the end of the month for every day in that month that participant was at or below the goal weight for that day. After the 24-week intervention period, we conducted semi-structured interviews with intervention arm participants to identify factors that influenced their participation in deposit contracts. The primary outcome was weight loss at 24 weeks. Secondary outcomes included deposit contract participation; changes in eating behaviors, physical activity, and wellness program participation at 24 weeks; and weight loss 12 weeks after the interventions ended.

Results: After 24 weeks, control arm participants gained an average of 1.0 lb (SD 7.6), compared to mean weight losses of 4.3 lbs (SD 8.9; P = .03) in the no match arm, 5.3 lbs (SD 10.1; P = .005) in the 1:1 match arm, and 2.3 lbs (SD 9.8; P = .29) in the 2:1 match arm. Overall, 29.3% of participants in a deposit contract arm made at least one deposit, and there were no significant differences in participation rates across the 3 deposit contract arms. There were also no significant differences in changes in eating behaviors, physical activity, and participation in wellness programs after 24 weeks. In semi-structured interviews, the main factors that limited participation in deposit contracts were a lack of confidence in meeting weight loss goals and fear of losing money. 12 weeks after the interventions ended, control arm participants gained an average of 2.1 lbs from baseline (SD 7.9), compared to mean weight losses of 5.1 lbs (SD 11.1; P = .008) in the no match arm, 3.6 lbs (SD 9.6; P = .02) in the 1:1 match arm, and 2.8 lbs (SD 10.1; P = .12) in the 2:1 match arm.

Conclusions: Relatively few study participants assigned to deposit contract conditions took up opportunities to enter into deposit contracts designed to promote weight loss, and employer matching of deposits did not increase participation. Approaches to promote confidence in losing weight or seed deposit contract accounts might be alternative ways to increase participation in these programs. Greater weight loss in deposit contract arms at 24 and 36 weeks may have been mediated by the automated daily feedback these participants received, and this approach could be another promising tool to promote behavior change in workplace settings.
Breast Cancer Screening before and after the 2009 USPSTF Guideline Changes

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Background: Major controversy surrounds the issue of appropriate breast cancer screening intervals for women over 40. Some authorities believe that overuse of mammography creates unacceptably high rates of false positive detection, anxiety, and morbidity. Prior to 2010, the United States Preventive Services Task Force (USPSTF) recommended screening every 1-2 years for women 40 and older. New USPSTF guidelines published in December 2009 recommended no screening in women 40-49 and screening every 2 years among women 50-75. The impact of these recommendations in unknown

Methods: We examined annual mammography rates from 2005-11 among women age 40-64. Our data source was administrative and claims data from a large US health plan with a total sample of 56 million members. We included women continuously enrolled for at least 11 months and our outcome was receipt of a yearly mammogram. For women whose enrollment spanned calendar years, we used their person time in a given calendar year to generate the denominator. We used a time-series display to examine annual breast cancer screening rates from 2005-11. We assigned 2005-9 as the baseline period and 2010-2011 as the policy change period. We used stepwise autoregressive forecasting to calculate the baseline trend and determine the expected rates in 2010-2011. We stratified results by age 40-49 and 50-64 and compared the 2011 predicted results to the observed values.

Results: Subjects were from all 50 states and the mean annual denominator was 1.2 million women during 2005-11. In 2005, women from the West, Midwest, Northeast, and South represented 13.7, 28.9, 9.9, and 47.5% of the sample, respectively; 78.2% were white and 5.8% were black. Women age 40-49 and 50-64 experienced upward trends in mammography rates from 2005-9 but a flattened trend and relative decline in 2010-2011 (Figure). Observed rates in 2011 for women age 40-49 and 50-64 were 48.5% and 53.0%, respectively, while projected rates were 51.6% and 56.8%. Women age 40-49 and 50-64 had 2011 screening rates 6.2% and 6.8% below expected, respectively.

Conclusions: Mammography rates climbed from 2005-2009 but flattened during 2010-2011 after publication of new UPSTF guidelines in late 2009. This resulted in 6-7% relative reductions in breast cancer screening by 2011 among women age 40-49 and 50-64. Advocates of the USPSTF guidelines would consider the reductions in women age 40-49 appropriate or even too small, but longer-term studies should assess impacts on quality of life, mortality, and costs. Among women age 50-64, subsequent analyses should determine if the reductions we observed in 2010-2011 decrease recommended biennial screening rates.
The Role of the PCP in Preventive Cancer Screening Using a Novel Population Management System

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Background: Preventive cancer testing rates remain suboptimal despite known benefits of screening and use of visit-based reminders. Advances in health information technology (HIT) now permit population-based screening, but the best methods remain uncertain. We implemented a novel visit-independent, population management system within a large primary care (PC) network and compared two versions: one that involved PC providers (PCPs) in patient screening and one that did not. We hypothesized that involving PCPs would lead to more effective and efficient cancer screening.

Methods: We randomized 18 PC sites within an academic network to intervention (n=9) or augmented usual care control (n=9) groups. Patients eligible for breast, cervical and colorectal cancer screening were included. All practices employed a novel HIT system that identified patients overdue for screening, mailed reminder letters, and tracked scheduling and completion of screening; used scheduling delegates to assist patients; and had access to patient navigators for those at high risk for non-adherence. In intervention practices, physicians (for their patients) and population managers (for other practice patients) personally screened real-time rosters of patients overdue for screening, and could choose an individualized method of patient contact (reminder letter, referral to scheduling delegate, referral to patient navigator) or defer screening. In control practices, all overdue patients were initially sent a reminder letter without provider review and then transferred to a delegate list. Intervention patients without provider action within 8 weeks defaulted to the automated control version. We examined average cancer screening test completion over 1-year of follow-up for each eligible patient and all eligible cancers using a mixed effects model accounting for clustering by PCP or practice and adjusting for age, race, insurance, language, and time since last visit.

Results: Among 104,074 eligible patients, baseline screening rates were similar in intervention and control patients for breast (79.4% vs. 79.8%), cervical (80.9% vs. 82.0%), and colorectal (77.6% vs. 76.4%) cancer. Small but statistically significant differences in patient characteristics for age, gender, ethnicity, language spoken, insurance status and time since last visit were seen among intervention (n=51,166) and control (n=52,908) patients (all p<0.001). Most intervention providers used the tool (88 of 98, 90%) and reviewed 8115 patients overdue for at least 1 cancer screening (6017 selected to receive a reminder letter, 407 referred directly to a scheduling delegate, 48 referred to a patient navigator, and 1744 were deferred from screening). An additional 6159 letters were sent to intervention patients not reviewed by a provider (total 12,176 letters). In control practices, 17,237 patient letters were mailed. Adjusted average cancer screening test completion rates did not differ among intervention and control practices for all cancers combined (79.6% vs. 79.6%, p=0.87), or breast (79.7% vs. 79.7%, p=0.98), cervical (80.6% vs. 81.3%, p=0.58), or colorectal cancer (78.0% vs. 77.5%, p=0.78).

Conclusions: Involving providers in a visit-independent, population management HIT system for breast, cervical or colorectal cancer screening did not increase screening rates compared to an automated reminder system. However, similar screening rates were achieved with fewer patient contacts in intervention practices.
Self-audit increases clinician-driven universal HIV screening among internal medicine residents

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Background: Adoption of universal HIV screening by primary care physicians has been suboptimal, despite CDC recommendations. Less than half of Americans have ever been screened. Internal medicine residents represent the next wave of practicing physicians targeted to integrate HIV screening into their practice. We sought to identify the effect of self-audit on HIV screening rates among internal medicine residents in their out-patient clinics.

Methods: We used a pre-post intervention design without a control arm where residents received self-audit feedback on their out-patient HIV screening rates. Residents were from a single training program where they participated in a 3-year primary care continuity clinic. In 2010, the intervention was integrated into a longstanding annual chart review where all residents self-audit 20 randomly selected primary care patients on preventive services. Baseline data was collected during the 2010 chart review. 2010 data accurately reflected pre-intervention HIV screening rates because residents were not informed in advance that HIV screening had been added to the chart review form. During the following year, no other intervention occurred, and the formal curriculum was not altered. The annual chart review was repeated in 2011 without modification, providing post-feedback screening rates one year after the intervention.

A generalized linear mixed approach was used to model the odds ratio of HIV screening between the two years, adjusting for resident year of training and gender, clinic site, patient age and gender, and resident-patient gender concordance. Within a single year patient-level data was clustered according to resident, which was treated as a random effect. Odds ratios were constructed similarly for other preventive services included on the chart review to assess whether change between the two years was HIV screening-specific. The analysis had >80% power to establish equivalence for a screening test performed in 80% of patients with a margin of 5%.

Results: The study analyzed chart reviews on 2097 individual patients over two years. Internal medicine residents increased their out-patient HIV screening rates from 18 to 40% (adjusted OR 3.16, 95% CI 1.93- 4.39, p<0.001) following self-audit feedback. Older patient age was associated with a decreased odds of receiving HIV screening; however no other patient- or resident-level variables were significantly associated with HIV screening. Over the same time period, rates of other preventive services- blood pressure control, diabetes and cholesterol screening, as well as alcohol and tobacco assessment- did not change, suggesting the intervention was HIV screening-specific. Tetanus vaccination increased slightly, however this could be explained by a local pertussis outbreak that likely spurred increased Tdap immunization rates.

Conclusions: Providing feedback to residents on their HIV screening rates was associated with a significant increase in subsequent out-patient HIV screening. This was achieved with minimal intervention, simply including the topic on an annual chart review. HIV screening continues to be included in the residency program’s annual audit, demonstrating its feasibility and sustainability. It should be noted that a screening rate of 40% is still low. However, we have demonstrated a clear improvement within the residency and general HIV screening rates in the Midwest, which hover around 20%.
Prevention of anal condyloma with quadrivalent human papillomavirus vaccination of older men who have sex with men: A nonconcurrent cohort study

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Background: The quadrivalent human papillomavirus vaccine (qHPV) is FDA-approved for use in males 9 to 26 years old to prevent anogenital condyloma. QHPV has been shown to decrease anal and cervical high-grade dysplasia recurrence post treatment. The objective of this study is to determine if qHPV is effective at preventing anal condyloma among MSM 26 years of age and older.

Methods: This nonconcurrent cohort study evaluated HIV-negative MSM patients aged 26 and older seen in a single anorectal surgery practice in New York City during 2007-2010. Patients either had no history of anal condyloma or had previously-treated anal condyloma recurrence-free for at least 12 months prior to vaccination/time zero. We determined the recurrence rate of anal condyloma in vaccinated versus unvaccinated patients.

Results: Of 308 eligible patients, 114 (37 %) patients had received the full 3-dose qHPV vaccine electively; 194 (63%) were unvaccinated. One hundred ten (35.7%) patients had history of anal condyloma. Vaccinated patients were significantly younger than unvaccinated patients (vaccinated mean age 38.5 +/- 7.4 years, unvaccinated mean age 44.2 +/-10.4, p<0.001) and were more likely to test positive for oncogenic HPV within 8 months prior to study entry (vaccinated 43.9%, unvaccinated 33.5%, p=0.03). Groups were comparable in respect to race/ethnicity; insurance type; smoking status; history of anal condyloma; history of high-grade anal intraepithelial neoplasia; and history of gonorrhea, chlamydia, and syphilis. The incidence of anal condyloma among vaccinated patients was 4.6 per 100 person-years; the incidence among unvaccinated patients was 8.7 per 100 person-years. After adjustment for history of anal condyloma and oncogenic HPV status, qHPV was associated with decreased risk of anal condyloma development, though did not reach significance (hazard ratio 0.47; 95% confidence interval 0.22-1.04; p=0.063).

Conclusions: Among MSM 26 years of age and older with and without history of anal condyloma, qHPV appears to reduce the risk of anal condyloma development and the risk of recurrence in those who had been condyloma-free for at least one year prior to vaccination. A randomized controlled trial is needed to confirm these findings in this age group.