Pharmacy-based interventions to reduce primary medication non-adherence

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Background: Non-adherence to essential chronic medications is common and leads to substantial morbidity, mortality, and avoidable healthcare costs. Recent studies have recognized the frequency of primary non-adherence, when patients do not fill their first prescription for a new medication. Little is known about what interventions could reduce rates of primary non-adherence. We evaluated two interventions implemented by a large pharmacy chain attempting to reduce primary non-adherence to cardiovascular medications.

Methods: In 2007 CVS retail pharmacies began making automated reminder phone calls to patients who had not picked up new prescriptions within 3 and 7 days after the prescription was initially processed. In 2009 pharmacists and pharmacy technicians began making personal calls to patients who had not picked up their prescriptions within 8 days after initial processing. For each intervention a 1-2% random sample of patients, selected based on birthdate, did not receive the intervention and served as a control group. We used pharmacy and insurance data from CVS-Caremark to identify the rate at which prescriptions for cardiovascular medications were not filled within 30 days after they had first been processed.

Results: The automated intervention included 852,629 patients and 1.2 million prescriptions, with a control group of 9,282 patients and 13,179 prescriptions. The live intervention included 121,155 patients and 139,502 prescriptions with a control group of 2,976 patients and 3,407 prescriptions. The control and intervention groups were balanced by age, gender, and patterns of prior prescription use.

For the automated intervention, the rate of unfilled prescriptions was 4.2% in the intervention group and 4.5% in the control group (p>0.1). For antihypertensives the unfilled prescription rate was 3.6% in the intervention group and 4.0% in the control group (p>0.1) while for statins the rates were 5.4% in the intervention group and 5.6% in the control group (p>0.1).

The live intervention was used in a group that had not filled prescriptions after 8 days and thus had much higher rates of primary non-adherence. In this setting the rate of unfilled prescriptions was 36.9% in the intervention group and 41.7% in the control group, a difference of 4.8% (p<0.0001). The difference in unfilled prescription rate for antihypertensives was 6.9% (p<0.0001) but for statins was only 0.5% (p>0.1).

Conclusions: Automated reminder calls encouraging patients to fill their prescriptions had no significant effect on rates of primary medication adherence. Personal calls from pharmacists and pharmacy technicians to patients at high risk for primary non-adherence significantly increased primary adherence to prescriptions for cardiovascular medications, although many patients still did not fill their prescriptions. The findings were driven by improved adherence to antihypertensive medications, with no effect on adherence to statins.

Our findings indicate that 20 personal calls from the pharmacy would be needed to yield one additional filled prescription, or 15 calls per prescription filled if the results were limited to antihypertensives. Future analyses of long-term adherence and clinical outcomes will be needed to assess the cost-effectiveness of these interventions for pharmacies or health systems.
Effectiveness of Mailed Fecal Occult Blood Test Cards and or a Detailed Colon Cancer Screening Brochure VS a Reminder Letter for Increasing Colorectal Cancer Screening Rates at a Primary Care Clinic Serving Medically Vulnerable Patients.

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Background: Colon cancer remains the 3rd most common cause of cancer mortality in the US. However, colorectal cancer (CRC) screening rates, particularly for medically vulnerable patients such as low income, uninsured, racial/ethnic minority and immigrant patients are suboptimal. Previous studies have demonstrated the effectiveness of interventions using telephonic reminders at increasing CRC screening rates; however, such interventions are labor intensive and thus costly.

Methods: We sought to identify an intervention that requires low labor intensity and cost but that is effective in increasing colon cancer screening rates among medically disadvantaged patients who previously did not respond to screening outreach attempts via mailed letter. The study setting was a single internal medicine primary care clinic at an urban public hospital in Massachusetts (MA) caring for a diverse and medically vulnerable population. The study sample consisted of 756 adults aged 51-75 who had no record of having had CRC screening (in the electronic medical record) according to current CRC screening guidelines. All patients had been contacted at least once by mail in the last year to encourage CRC screening. We conducted a comparative effectiveness randomized trial of 4 mail-based interventions using a 2X2 factorial design. Each intervention group received a letter encouraging CRC screening by fecal occult blood testing (FOBT) or colonoscopy. Group 1 received this letter only, Group 2 received 3 FOBT cards and pre-paid return envelope, Group 3 received a detailed 12 page CRC screening brochure with graphic depictions of a patient receiving colonoscopy and a description of FOBT that was produced by the MA state department of public health and Group 4 received the 3 FOBT cards and the brochure. At 6 months we assessed whether or not screening by FOBT or screening by colonoscopy had occurred.

Results: The study sample consisted of 49.66% women and 50% >60 years of age. There were no statistically significant differences in patient characteristics among the 4 study groups. Patients receiving FOBT cards and a letter were more likely be screened by FOBT than patients receiving the letter alone (21% vs. 13%; P= 0.038), but not by colonoscopy (6% vs. 7%, p=0.84). Patients receiving the brochure were neither more likely to be screened by FOBT (13% vs. 13%, p=1.0) nor colonoscopy (8% vs. 7%, p=0.69). Patients receiving FOBT and the brochure were neither more likely to be screened by FOBT (20% vs. 19%, p=0.79) nor colonoscopy (7% vs. 7%, p=1).

Conclusions: Although more resource intensive interventions that result in higher screening rates may be preferable, for resource-poor primary care practices mailed FOBT cards may be a feasible and effective option to improve CRC screening among medically disadvantaged patients who did not respond to previous outreach attempts. Detailed printed materials with graphic depictions of CRC screening procedures do no appear to be effective in this setting.
Identifying the Risks of Oral Anticoagulation in Patients with Liver Disease

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Background: Chronic liver disease is thought to present a relative or even an absolute contraindication to warfarin therapy, but some patients with liver disease nevertheless will require long-term anticoagulation. The goal of this study is to identify which patients with liver disease might safely receive warfarin and in which patients it is best avoided.

Methods: Among 102,134 patients who received warfarin from the VA from 2007-08, ICD-9 codes identified 1,763 with chronic liver disease. Laboratory values including lowest serum albumin, mean creatinine, highest AST, and lowest total cholesterol were examined as a means of identifying patients at higher risk among this group. Outcomes included percent time in therapeutic range (TTR), a measure of anticoagulation control, and major hemorrhagic events, as identified by ICD-9 codes. Hazard Ratio for major hemorrhage over the two year study period was compared using Cox proportional hazards, controlling first for age, and then for age and TTR.

Results: Patients with liver disease of any kind had a lower mean TTR (53.1%) compared with patients without such diagnosis (61.7% \(p<0.001\)), as well as more hemorrhagic events (age-adjusted HR 1.93, \(p<0.001\)). Of the variables among patients with liver disease, the serum albumin level and the serum creatinine level were the strongest predictors of TTR and major hemorrhage. We created a 4-point composite score based on these two variables: patients received 1 point each for mildly abnormal albumin (2.5-3.49g/dL) or creatinine (1.01-1.99mg/dL), and 2 points each for severely abnormal albumin (<2.5g/dL) or creatinine (≥2mg/dL). This composite score, which assigned each patient a risk score between 0-4 points, predicted both anticoagulation control and hazard for major hemorrhage (see Table). Compared to patients without liver disease, those with a score of zero had only a modest decline in TTR (59%) and no significant increase in hemorrhagic events (HR 0.73, NS), while those with a score of 4 had very poor control (41.4%) and more hemorrhages (HR 5.41 \(p<0.001\)). The risk of hemorrhage remained significant and was only mildly attenuated after controlling for anticoagulation control.

Conclusions: Overall, patients with liver disease have an elevated risk for major hemorrhage when receiving warfarin, which is only partly explained by poor anticoagulation control. Among patients with liver disease, a simple four-point composite scoring system using both serum albumin and creatinine identifies those at highest risk for poor anticoagulation control and major hemorrhagic events.
The economic consequences of contemporary patterns of antidepressant prescribing

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Background: Serotonin norepinephrine reuptake inhibitors (SNRIs) are frequently prescribed as initial antidepressant therapy, although selective-serotonin reuptake inhibitors (SSRIs) are equally or more effective as well as being less expensive. We sought to evaluate recent patterns of antidepressant prescribing and their economic consequences.

Methods: We examined a national cohort of privately insured patients with an open formulary and tiered copayments. We identified patients ≥18 years of age with at least two years of prior continuous enrollment who initiated a SSRI, SNRI or atypical antidepressant (bupropion, mirtazapine) between January 2008 and June 2011. Patients were excluded if they previously received any antidepressant or had diabetic neuropathy, chronic pain, fibromyalgia, bipolar disorder, or psychotic disorders. For each month, we calculated the percent of patients receiving each medication class and the percent receiving branded drugs. We assessed the use of each class over time using bivariate linear regression models. We used multivariate linear regression models to identify predictors of being initiated on each class, including age, sex, geographical region, copayment, clinical comorbidities, and month. We next identified patients with at least 6 months of continuous enrollment after filling their original prescription and calculated patient, insurer, and total costs for antidepressants during those 6 months for these patients. Finally, we estimated projected savings if patients prescribed SNRIs had received the generic SSRI sertraline.

Results: Our cohort consisted of 248,550 patients who initiated antidepressants during the study period (62.5% female, average age 42.8). SSRIs accounted for 76.9% of the initial prescriptions, SNRIs for 9.6%, and atypicals for 13.5%. The percent of patients initiating therapy with SSRIs did not significantly change over time (P>0.10). In contrast, SNRI use decreased by an average of 0.12% per month (P<0.001) and atypical use increased by an average of 0.11% per month (P<0.001). Brand drug use decreased from 38.1% to 26.7%, a 0.49% monthly decrease (P<0.001). Characteristics associated with a higher probability of receiving SNRIs, as compared to other antidepressants, were: female sex (odds ratio [OR] 1.25, P<0.001) older age (OR 1.01 per year, P<0.001), and higher Charlson comorbidity score (OR 1.07 per point, P<0.001). Combined patient and insurer spending for patients who initiated therapy with SSRIs was $358.32 (patient costs: $57.55; insurer costs: $300.78) over the subsequent six months. In contrast, SNRI and atypical treated patients had average costs of $673.30 (patient costs: $118.26; insurer costs: $555.03) and $454.92 (patient costs: $53.21; insurer costs: $401.71), respectively. If patients receiving SNRIs had instead been prescribed sertraline, this would result in annual savings of more than $700 per patient.

Conclusions: Despite higher costs and equal or inferior clinical effectiveness, a considerable proportion of privately insured patients received initial antidepressant therapy with SNRIs. Though the proportion of patients receiving SNRIs and branded antidepressants decreased over the study period, savings would be considerable if patients starting SNRIs had instead been prescribed SSRIs.
Eye Images Improve Hand Hygiene Compliance in an Emergency Department

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Background: Hand hygiene is thought to reduce hospital acquired infections, but multiple studies have found poor compliance with hand washing recommendations among health care workers. Interventions aimed at improving compliance, some requiring considerable effort and expense, have shown mixed results. A number of studies in behavioral science have shown that even subtle cues of ‘being watched’ appear to inhibit selfish behaviors and increase altruistic ones (e.g., increasing the amount of money contributed to an honor box: Bateson et.al., 2006, Biol.Lett.) and depiction of eye images has influenced these behaviors in both experimental and real-world settings. We hypothesized that displaying eye images in patient care settings would improve compliance with hand hygiene recommendations among health care workers.

Methods: We placed posters depicting eye images or mountains (as a control), together with a message encouraging providers to wash their hands, next to foam product dispensers at the entrance to patient rooms in the emergency department of a university-affiliated safety net hospital. We employed an interrupted time series design varying the condition every three weeks as follows: baseline (no poster), eye images, washout period, mountains. Covert observation of hand hygiene opportunities was performed remotely via security surveillance cameras that were already in use. These allowed clear vision of the dispensers located outside the rooms but not of those located within all the rooms observed. Data were analyzed by segmented regression analysis.

Results: During the period when no posters were utilized hand washing compliance was only 3.7% and we saw no change in compliance over the three week period of assessment (P = 0.60). After eye images were posted compliance increased to 11.1% (P = 0.02) and again, no change in compliance was observed over the three week observation period (P = 0.10). At the beginning of the wash-out period compliance was 7.3% which we did not find different from the 11.1% measured when eye images were used (P = 0.31), but compliance increased to a small extent during this period of observation (7.3% to 9.2%, P = 0.03). Finally, we found no increase in hand hygiene from that measured at the beginning of the washout period and that measured after displaying the control images (7.3 % versus 7.4%, P = 0.48) and no change in compliance over the final period of measurement was observed (P = 0.88). Surveillance cameras revealed multiple instances of misuse of latex gloves through all periods of observation.

Conclusions: Compliance with hand hygiene recommendations was very low in all periods of study but displaying eye images improved compliance (although still leaving compliance lower than expectations). Although not specifically tabulated, widespread misuse of latex gloves was observed, presumably in lieu of hand hygiene.
Race, Weight Loss, and Change in Patients’ Utility After Weight Loss Surgery

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Background: While weight loss surgery (WLS) is one of few treatments that produce substantial and sustained weight loss, it is neither universally effective nor risk free and WLS outcomes often fall short of patients’ (pts’) initial expectations. Moreover, few data are available on WLS’ effectiveness in racially diverse populations in the U.S. and the “value” pts derive from undergoing WLS.

Methods: We interviewed 538 consecutive pts who sought and underwent WLS at 2 centers (70% response rate) to examine outcomes of WLS and the value pts place on these outcomes. We determined the “value” pts derived from WLS by prospectively assessing pts’ health value or health utility (preference-based quality of life measure) via a series of standard gamble scenarios assessing pts’ willingness to risk death to lose various amounts of weight or to achieve perfect health; calculated utilities ranged from 0 to 1 where 0=death and 1=most valued health/weight state before and after WLS. Weight loss was abstracted via chart review. We conducted preliminary multivariable analyses to examine the influence of sex and race on weight loss and change in utility 1-year post-WLS on the first 372 pts who completed our 1-year post-op interview (72% retention).

Results: The mean pre-WLS BMI was 46.6, the mean age was 45.1 years, 76% were women, 69% were Caucasian, 17% were African American (AA) and 9% were Hispanic; 55% underwent Gastric Bypass and 45% underwent Gastric Banding. The mean patient utility was 0.88 prior to WLS, representing patients’ willingness to assume a 12% average risk of dying to achieve their most valued weight/health state. One year post-WLS, pts lost a mean of 26% of initial weight. After adjustment for age, sex, baseline BMI, education, recruitment site, and surgery type, AA [21.5% (95% CI 19.3, 23.7) of initial weight] and Hispanic [22.2% (19.2, 25.1)] pts lost significantly less weight than Caucasian pts [26.4% (25.1, 27.7)]. After adjustment, pts’ utility on average improved among Caucasian pts [+0.056 (0.023, 0.090)], remained unchanged among Hispanic pts [+0.0004 (-0.076, 0.075)] and deteriorated among AAs [-0.057 (-0.114, -0.001)]. Men and women had comparable weight loss [22.9% (20.9, 25.0) vs. 24.3 (22.8, 25.8)] and change in utility [0.0003 (-0.052, 0.053) vs. 0.019 (-0.019, 0.058)] 1 year after WLS. We did not detect significant interactions between sex and race nor between surgery type and sex or race.

Conclusions: Caucasian patients lost more weight than AA or Hispanic pts 1 year after WLS; nonetheless, AA and Hispanic pts still achieved fairly substantial weight loss. The utility change among Caucasian pts post WLS is comparable to a transition from mild clinical depression to perfect health reported elsewhere. However, despite sustaining fairly substantial weight loss, health utility deteriorated among AA patients and did not change among Hispanic patients after WLS. Future studies should evaluate longer-term clinical and utility outcomes after WLS and the factors that drive health value derived by patients.