Interdisciplinary Deprescribing of Aspirin Through Prescriber Education and Provision of Patient-Specific Recommendations

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ABSTRACT

Background: Inappropriate aspirin use can lead to increased frequency of bleeding events and poor patient outcomes.

Objectives: Compare current aspirin prescribing to guideline recommendations and analyze the impact of pharmacist education for clinicians with provision of patient-specific recommendations.

Methods: Internal medicine residents received 1 educational session on appropriate aspirin use. Over a 5-month period post-education, 100 patients on aspirin with a clinic appointment were screened and their charts reviewed. Aspirin use was classified based on guideline recommendations as follows: (1) recommended, (2) weigh the risk and benefits, (3) not recommended, (4) dose change recommended, or (5) outside of guideline recommendation. A recommendation for aspirin deprescribing was then communicated to the clinician prior to the patient's appointment. Prescriber practice following the appointment was collected and analyzed.

Results: Inappropriate aspirin use occurred in 29% (n = 29) of patients prior to their appointment. Of these, aspirin was not recommended in 65.5% (n = 19), and a dose reduction from 325 mg to 81 mg was recommended in 34.5% (n = 10). Of the 81 patients who kept their appointment, pharmacist recommendations to deprescribe aspirin were communicated to the clincian for 20 patients (24.7%) and resulted in a 55% aspirin deprescription.

Conclusions: The majority of patients identified as using aspirin inappropriately fell into 3 groups: (1) patients taking 325 mg aspirin, (2) patients taking aspirin for primary prevention, and (3) patients taking aspirin concomitantly with an anticoagulant. Strategies that may lead to optimization of aspirin use include lectures and patient-specific chart reviews with pharmacist recommendation.

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BACKGROUND

Aspirin is used chronically for numerous indications, including primary prevention of atherosclerotic cardiovascular disease (ASCVD), secondary prevention of ASCVD, and prevention of stent thrombosis after percutaneous coronary intervention (PCI), among many others.[1,2] However, there are a significant number of patients taking aspirin when it is not appropriate or at a dose higher than recommended.[2,3] This can increase the risk of serious adverse events.[4] A meta-analysis by Zheng and Roddick found the number needed to harm in primary prevention was 210 for major bleed, 927 for intracranial hemorrhage, and 334 for major gastrointestinal (GI) bleed when compared to no aspirin.[1] In an evaluation of aspirin prescribing trends, Hira and colleagues reported an 11.6% rate of inappropriate aspirin prescribing in primary prevention.[3] Similarly, analysis of aspirin use in patients on a warfarin regimen revealed inappropriate aspirin use rates ranging from 20% to 37.5%.[2,5]

Inappropriate aspirin dosage is also of concern. The most common dose of aspirin is 81 mg daily and the second most common is 325 mg.[6] However, aspirin at a 325 mg daily dose is associated with an increased risk for GI bleeding when compared to a daily dose of 81mg.[6] For many indications, 81 mg of aspirin daily has been found to be as effective as 325 mg daily and is the recommended dose when compared to 325 mg daily.[6-20] The majority of guideline recommendations pertaining to aspirin use recommend a dose range that includes 81 mg daily and excludes 325 mg daily.[7,12-17]

In 2019, the American College of Cardiology (ACC)/American Heart Association (AHA) updated their guideline on aspirin use in primary prevention. The guideline does not recommend aspirin for patients with high risk for bleeding or for patients age 70 and older.[7] This change in recommendations has created an opportunity to improve aspirin use and enhance patient outcomes.

Preliminary efforts to optimize aspirin use have produced promising results. Deprescribing was found to improve patient mortality in a large meta-analysis of randomized studies.[8] However, mortality was reduced only when the interventions were patient-specific, highlighting the need for patient-specific recommendations when deprescribing. To enhance patient care and reduce inappropriate aspirin prescribing, we developed and implemented a targeted educational program and provided patient-specific recommendations for aspirin use to clinicians in a rural health care system.

METHODS

This interdisciplinary quality improvement program was designed to reduce the rate of inappropriate aspirin use among patients. Our primary objectives were to compare clinicians' current aspirin prescribing practices to guideline recommendations and evaluate the impact of a pharmacist-led intervention on inappropriate aspirin prescribing by clinicians. The Marshfield Clinic Health System Institutional Review Board (IRB) deemed this project exempt from IRB review.

Prescriber Education

An educational program consisting of a lecture, dissemination of educational materials, and pharmacist-provided, patient-specific recommendations for appropriate aspirin use was developed for clinicians based on the most recent guidelines for each aspirin indication (Box). The lecture provided a summary of aspirin prescribing recommendations based on current guidelines and was presented to all available internal medicine residents (clinicians). Corresponding educational materials were disseminated prior to provision of patient-specific aspirin prescribing recommendations. A summary of the method and timing of communications clinicians would receive from pharmacists also was included with the educational materials. During the program, clinicians were asked to give feedback via email, verbally, and through anonymously answered questions.

Implementation of Patient-Specific Recommendations for Aspirin Use

Patients were included for program evaluation purposes if they were taking aspirin and had an appointment in the internal medicine resident clinic during the project implementation period from February 2020 through June 2020. The appointment had to be scheduled at least 3 days in advance to provide time for pharmacists to conduct a chart review and communicate their recommendations to the clinician.

Box. Guidelines Used to Determine Appropriateness of Aspirin

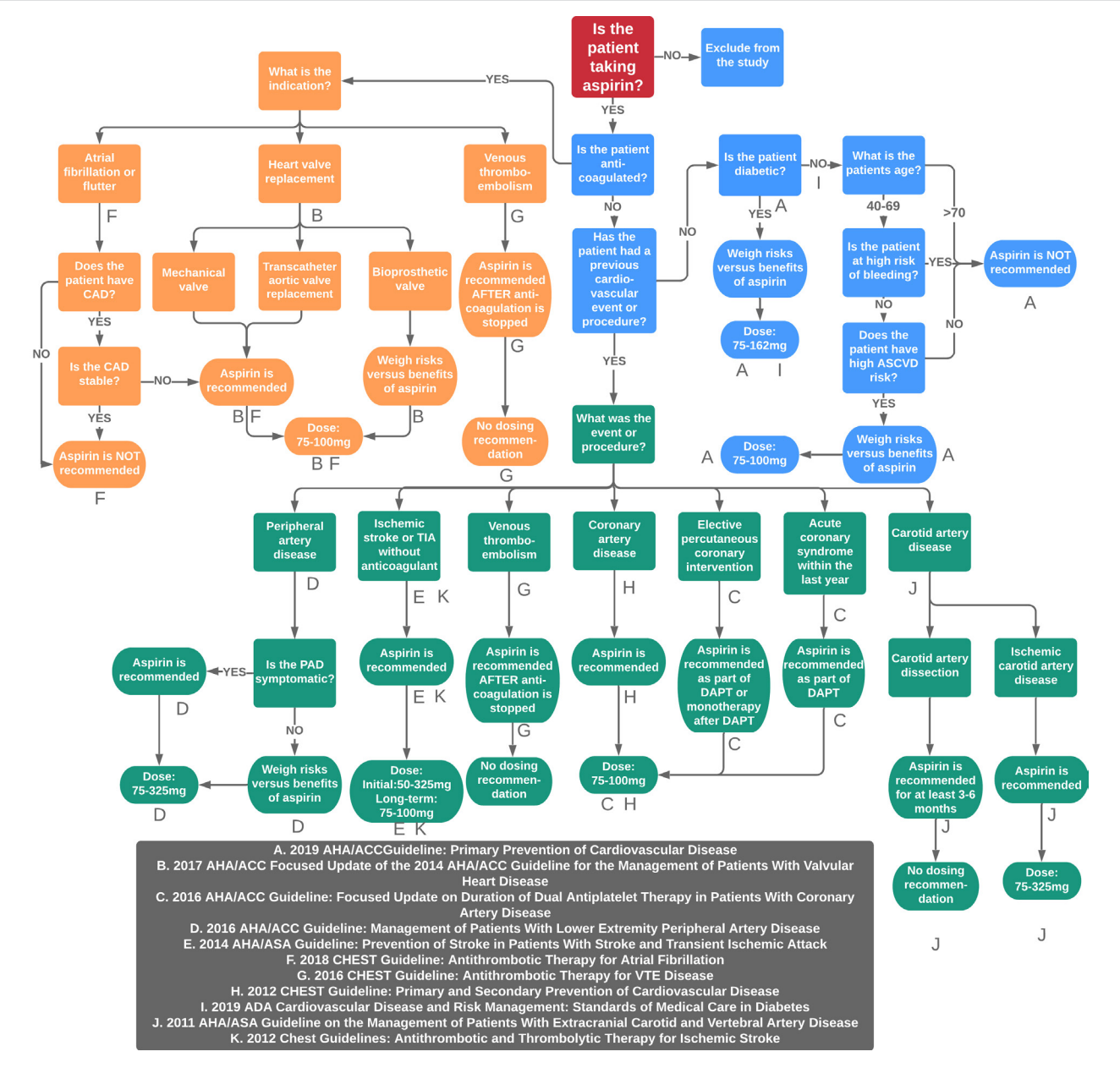
- 2019 AHA/ACC Guideline on the Primary Prevention of Cardiovascular Disease[7]
- 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease[12]
- 2016 AHA/ACC Guideline: Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease[13]
- 2016 AHA/ACC Guideline on the Management of Patients with Lower Extremity Peripheral Artery Disease[18]
- 2014 AHA/ASA Guidelines for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack[19]
- 2011 AHA/ASA Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease[20]
- 2018 CHEST Guidelines: Antithrombotic Therapy for Atrial Fibrillation[14]
- 2016 CHEST Guidelines: Antithrombotic Therapy for Venous Thromboembolism (VTE) Disease[21]
- 2012 CHEST Guidelines: Primary and Secondary Prevention of Cardiovascular Disease: Antithrombotic Therapy and Prevention of Thrombosis[15]
- 2012 CHEST Guidelines: Antithrombotic and Thrombolytic Therapy for Ischemic Stroke[17]
- 2019 ADA: Chapter 10 Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes[16]

Once a patient on an aspirin regimen was identified, a chart review of the electronic medical record (EMR) was conducted to determine the indication(s) for aspirin and the appropriate guidelines to consult. One pharmacist performed the chart review. Aspirin use was then categorized as (1) recommended, (2) weigh the risk and benefits of aspirin use, (3) not recommended, (4) dose change recommended, and (5) outside of guideline recommendations based on the ACC/AHA, American College of Chest Physicians, and American Diabetes Association guidelines. To assist in determining the aspirin category, a summary flowchart was developed and used to decrease intra-rater variability in scoring (Figure 1). Once the aspirin regimen was categorized, an email was drafted and sent to the clinician for review 1 to 7 days prior to the patient's appointment. This email notified the clinician of the aspirin recommendation made based on the chart review and included relevant sections of guidelines reviewed for that patient. After the visit, a second review of the EMR was conducted to determine if the patient attended the visit and whether aspirin dosing was continued, changed, or stopped.

Statistical Analysis

Data tracked throughout program implementation included patient age and sex, reason for visit, aspirin dose and frequency, other antiplatelet agent use, anticoagulant use, aspirin category as determined by chart review, and appointment result. Informal clinician feedback was reviewed but not analyzed formally. Data were analyzed using descriptive statistics with continuous variables presented as means ± standard deviation and discrete variables presented as value (percent). Data were gathered and analyzed using Microsoft Excel.

Figure 1. Guideline Summary Flowchart



Abbreviations: ACC, American College of Cardiologists; ADA, American Diabetes Association; AHA, American Heart Association; ASA, American Stroke Association; ASCVD, atherosclerotic cardiovascular disease; CAD, coronary artery disease; CHEST, American College of Chest Physicians; DAPT, dual antiplatelet therapy; PAD, peripheral artery disease; TIA, transient ischemic attack; VTE, venous thromboembolism.

RESULTS

Clinician Receipt of Pharmacist-Led Educational Program

The pharmacist-led educational program for aspirin deprescribing was provided 1 month prior to the start of the study period to internal medicine residents in the early phase (years 1 and 2) of their residency. Thirty of the 37 residents, plus 2 attending physicians interested in learning more about the new aspirin recommendations, attended the lecture and received educational materials.

Aspirin Use Review

A total of 100 patients on aspirin were seen in the clinic between February 3, 2020, and June 19, 2020 (Table). Sixty-two patients (62.0%) were men with an average age of 67.3 ± 9.8 years, and 38 (38.0%) were women with an average age of 72.2 ± 10.4 years. All patients on aspirin were on 81 mg or 325 mg. The majority of patients (81.0%) had only 1 indication for aspirin use. Primary prevention for future adverse cardiovascular events was the most common indication (37.0%), with coronary artery disease (30.0%) as the most common type of secondary preven-

tion, followed by peripheral artery disease (14.0%). Clopidogrel was the only P2Y12 inhibitor taken by patients included in the analysis (12.0%). Warfarin was the most common oral anticoagulant (8.0%), but apixaban (2.0%) and rivaroxaban (1.0%) also were used by patients.

Of the various categories, aspirin use was "recommended" for 41 patients (41.0%), "weigh the risks and benefits" for 27 (27.0%), "not recommended" for 19 (19.0%), "change in dose recommended" for 10 (10.0%), and "outside guideline recommendations" for 3 patients (3.0%) (Figure 2). The 68 patients (68.0%) on aspirin categorized as "recommended" or "weigh the risks and benefits" were included in the "appropriate" group, while the 29 patients (29.0%) on aspirin categorized as "not recommended" or "change in dose recommended" were included in the "inappropriate" group. Three patients (3.0%) were on aspirin that was considered outside of guideline recommendations and were not included in either group. Of the patients in the "inappropriate" group, 51.7% were on aspirin for primary prevention, 17.2% for atrial fibrillation, 31.0% for coronary artery disease, and 6.9% for venous thromboembolism, with 6.8% on aspirin for multiple indications. In the primary prevention group, patients without diabetes (48.0%) tended to be in the "inappropriate" group versus those with diabetes (25.0%).

Table. Baseline Characteristics of the Patient Population

	Total n (%)	Appropriate[a] n (%)	Inappropriate[b] n (%)
Number of patients	100	68 (68)	29 (29)
Age (years)	69.2 ± 10.3	68.1 ± 10	71.8 ± 10.5
Men	62 (62)	46 (67.6)	13 (44.8)
Aspirin dose			
81 mg	84 (84)	65 (95.6)	16 (55.2)
325 mg	16 (16)	3 (4.4)	13 (44.8)
Indication[c]			
Primary prevention without diabetes	25 (25)	13 (19.1)	12 (41.4)
Primary prevention with diabetes	12 (12)	9 (13.2)	3 (10.3)
Coronary artery disease	30 (30)	21 (30.9)	9 (31.0)
Peripheral artery disease	14 (14)	14 (20.6)	0 (0)
Dual antiplatelet therapy	4 (4)	4 (5.9)	0 (0)
Valvular heart disease	4 (4)	4 (5.9)	0 (0)
Atrial fibrillation	13 (13)	8 (11.8)	5 (17.2)
History of venous thromboembolism	8 (8)	6 (8.8)	2 (6.9)
History of stroke or transient ischemic attack	6 (6)	6 (8.8)	0 (0)
Extracranial carotid and vertebral artery disease	3 (3)	3 (4.4)	0 (0)
Other	3 (3)	0 (0)	0 (0)
Number of indications for aspirin use	1.2. ± 0.5	1.3. ± 0.6	1.1. ± 0.3
1	81 (81)	51 (75)	27 (93.1)
2	14 (14)	12 (17.6)	2 (6.9)
3	5 (5)	5 (7.4)	0 (0)
P2Y12 inhibitors			
Clopidogrel	12 (12)	12 (17.6)	0 (0)
Anticoagulated	11 (11)	5 (7.4)	5 (7.4)
Warfarin	8 (8)	4 (5.9)	3 (10.3)
Apixaban	2 (2)	1 (1.5)	1 (3.4)
Rivaroxaban	1 (1)	0 (0)	1 (3.4)

[a]Patients on aspirin categorized as "recommended" or "weigh the risks and benefits" were included in the "appropriate" group.
[b]Patients on aspirin categorized as "not recommended" or "change in dose recommended" were included in the "inappropriate" group.
[c]Percentages will not sum to 100, as some patients had multiple indications for aspirin.

Of patients taking 81 mg of aspirin, the largest category was "recommended," with 38 patients (45.2%). Overall, 65 patients (77.4%) taking 81 mg were in the "appropriate" group, and 16 (19.0%) were in the "inappropriate" group. All 10 patients in the "change in dose" category were taking 325 mg of aspirin, composing 62.5% of patients in the overall sample. All patients taking clopidogrel fell into the "appropriate" group, with 11 (91.2%) in the "recommended" category. On the other hand, 5 patients (45.5%) on anticoagulants were in the "not recommended" aspirin category, and only 1 (9.1%) was in the "recommended" aspirin category.

Evaluation of Aspirin Prescribing Practices Post-Clinician Education and Provision of Patient-Specific Recommendations by Pharmacists

Of the 100 patients included in the program evaluation, 81 (81.0%) attended the scheduled clinician visit and had follow-up data collected. Of the patients who attended their visit, 39 (48.1%) were in the "recommended" category, 20 (24.7%) in "weigh the risks and benefits," 13 (16.0%) in "not recommended," 7 (8.6%) in "change in dose recommended," and 2 (2.5%) in "outside guideline recommendations" categories. No aspirin was discontinued in the "recommended category," and aspirin was discontinued in 4 (20.0%) patients in the "weigh the risks and benefits category." Of the patients who attended the visit, 20 (24.7%) had a change recommended in their aspirin use (Figure 3). Changes were accepted for 11 of the 20 patients (55.0%). Aspirin was stopped for 8 of 13 (61.5%) in the "not recommended" category, and the dose was changed for 3 of 7 (42.9%) in the "dose change recommended category."

The acceptance rate of recommended change was highest for preventive visits and follow-up visits for specific problems (75.0%), then initial visit for a specific problem (28.6%) and, lastly, hospital discharge follow-up (0.0%). From the informal feedback gathered from clinicians, the most commonly mentioned barriers to implementing the recommended changes were

Figure 2. Aspirin Dose vs Aspirin Category

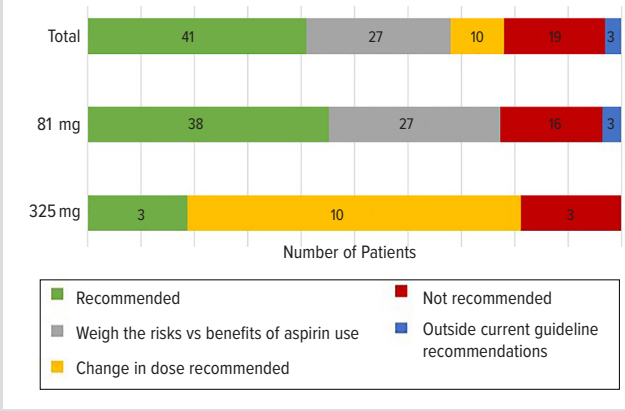
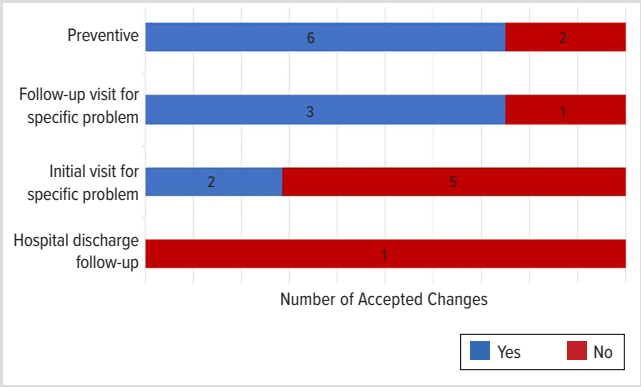


Figure 3. Reason for Visit vs Number of Accepted Changes



lack of time to address the change and the reason for the visit was not appropriate for addressing change. Other barriers included patient reluctance and aspirin use being monitored by another physician or specialist. The average number of recommendations made by the pharmacist to clinicians was 2.8 ± 1.2 per day.

DISCUSSION

Aspirin Use Review

Aspirin is a medication that presents an area of opportunity for deprescribing. In a 2016 meta-analysis of aspirin use for primary prevention of cardiovascular disease by Whitlock et al, the odds of a serious GI bleeding event occurring were greater in patients on a very low-dose aspirin regimen versus no treatment.[22] Our analysis of aspirin use in 100 patients indicated an appreciable rate of inappropriate aspirin use (29.0%). For 19 patients (19.0%), aspirin was not recommended at all, as bleeding risk outweighed the potential benefits. For 10 patients (10.0%), a reduction in aspirin dose from 325 mg to 81 mg was recommended. Of the patients taking aspirin 325 mg daily, 81.3% were in the inappropriate group compared to only 19.0% of patients taking 81 mg daily. Patients taking aspirin 325 mg are a high-yield area of opportunity and, unless specifically indicated, low-dose aspirin (75–100 mg) is generally a preferred choice for patients using aspirin for primary or secondary prevention, based on our analysis and the recommended dose ranges given by the guidelines used in this program.[7,12-20]

In addition to patients on an aspirin regimen of 325 mg, patients using aspirin for primary prevention could be targeted for reassessment of aspirin use. Almost 41% of the 37 patients on aspirin for primary prevention were categorized in the "inappropriate" category—the highest rate of any indication. The most common reason aspirin was not recommended for primary prevention in the cohort was patients age 70 or greater, but other reasons, including increased risk of bleeding for patients under the age of 70, also contributed to this decision. A higher frequency of patients with a single indication for aspirin use were noted in the inappropriate group (33.3%) than patients with multiple indications (10.5%). Patients taking aspirin for primary prevention represent another high-yield area of opportunity to deprescribe aspirin.

Prescriber Education and Uptake of Patient-Specific Recommendations

Overall, the combination of prescriber education and patient-specific recommendations changed clinician prescribing of aspirin in the patients included in this initial program evaluation. Nearly a quarter (24.7%) of patients seen at a visit had aspirin use that was considered inappropriate, and more than half of those patients (55.0%) had a change in aspirin use. Additionally, the 19.0% of patients in the "weigh the risks and benefits" category who had aspirin stopped implies that clinicians were willing to take the time to reassess aspirin use in situations without a straightforward recommendation.

Previous studies have demonstrated that inappropriate aspirin use is a common problem, but with a large number of indications and guidelines pertaining to the use of aspirin, improving aspirin prescribing can be difficult.[2,3] Results from this study indicate that areas of high yield include patients taking aspirin 325 mg and those taking aspirin for primary prevention. Additionally, the clinician acceptance rate may be increased by focusing on the most appropriate type of visit. Clinicians seeing patients for preventive and specific problem follow-up visits showed a higher acceptance rate of change in aspirin use or dose than those seeing patients at their initial visit for specific problems or hospital discharge follow-ups. Clinician feedback suggests that time and appropriateness were the largest barriers to implementing recommended changes to aspirin prescribing and dose. Furthermore, sending clinicians patient-specific information closer to the visit date also may increase the acceptance rate of aspirin deprescribing recommendations.

Limitations

Our program evaluation has several limitations. The first is a small sample size, which prevents us from drawing strong conclusions

and performing statistically powered analysis of subgroups. Sample size was further diminished by rate of patient attrition, as nearly a fifth of patients included in the initial analysis did not attend their follow-up visit. Lack of a comparator arm, in addition to the single point in time analysis, also limited our ability to evaluate program effectiveness. Since this pilot program was implemented in a rural health care system, our results may not be generalizable to more diverse urban populations. Finally, the program was conducted in an internal medicine resident clinic only; program implementation outside of the resident program may result in different clinician prescribing practices and response to pharmacist education and patient-specific recommendations.

CONCLUSIONS

Inappropriate aspirin use and dosage occurs with appreciable frequency. Pharmacist provision of clinician education and patient-specific recommendations for changes or discontinuation of aspirin may lead to improved prescribing practices.

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