Costs and Clinical Outcomes Associated with Use of Ranolazine for Treatment of Angina

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ABSTRACT

Background: There are 10 million patients with angina in the United States (500,000 new diagnoses annually). Although clinical efficacy of angina treatments is understood, total costs of care and clinical outcomes for patients with chronic angina in different treatment protocols are unknown.

Objective: Our objective was to estimate total costs of care and revascularization rates for patients with poorly controlled angina who added either (1) long-acting nitrates, (2) beta blockers or calcium channel blockers, or (3) ranolazine to their therapy.

Study design: We performed retrospective claims analysis using an index event involving change of therapy in which a new antiangina drug was added.

Methods: Using a large commercial insurance claims database, 4545 patients with angina with an index event (ie, change of antiangina therapy) and 6 months of continuous enrollment pre- and postindex event were identified. Using total cost of care and revascularization rates, we first compared preindex disease burden, medical care use, and total cost of care and components of total cost. We then compared unadjusted use and cost of care across treatment groups. Finally, we estimated regression models to predict postindex event total costs of care and revascularization rates.

Results: During the preindex period, the 3 comparison groups had similar health measures, medical care use, and total costs of care. During the postindex period, ranolazine users had lower revascularization rates (9.9%) than comparison patient groups (15.4%–20.4%, both $Ps < 0.001$). Ranolazine users had lower total costs of care ($13,961) than the nitrate group ($18,166, 30.0% higher; $P < 0.001$) and the beta blockers/calcium channel blockers group ($17,612, 26.6% higher; $P = 0.002$).

Conclusions: Adding ranolazine to the treatment regimen of patients with poorly controlled angina was associated with lower rates of revascularization and lower total costs of care than for comparable patients, differences both statistically and clinically relevant. (*Clin Ther*. 2012;34:1395–1407) © 2012 Elsevier HS Journals, Inc. All rights reserved.

Key words: angina, cost of care, multivariate analysis, outcomes, pharmaceutical therapy, revascularization.

INTRODUCTION

Recent data estimate that 10.2 million Americans have angina, with 500,000 new cases diagnosed annually.[1] Both numbers will increase as the US population ages. No known studies analyze the total cost of care for patients with angina on different therapeutic plans, although 1 randomized controlled trial (RCT) studied hospitalization costs.[2] Estimates of total direct health care cost of angina diverge greatly depending on how angina is defined, with estimates ranging from $1.9 to $74.8 billion annually (in 2000) in the United States.[3] These estimates do not include associated indirect costs such as loss of workforce productivity. Adjusting these 2000 data to 2012 using the increase in the Consumer Price Index of 33% would give corresponding figures of approximately $2.5 to $100 billion.

We analyzed total costs of care and important clinical outcomes for patients with coronary artery disease (CAD) with angina under differing pharmacologic treatment protocols.

Per federally published guidelines,[4] angina treatment choices (preceding interventional cardiology or surgery) include various pharmaceutical options, commonly including sublinguinal short-acting nitrates (SANs) to counteract immediate chest pain symptoms, plus combinations of long-acting nitrates and 2 anti-

hypertension drugs: calcium channel blockers (CCBs) and beta blockers (BBs). The most recent therapeutic alternative is ranolazine, a novel compound that acts through inhibition of the late sodium current. RCTs show that ranolazine relieves angina both as a stand-alone therapy[5] and in conjunction with other antiangina agents.[6] Ranolazine costs considerably more than alternative antiangina therapies, all of which are available in generic forms. For example, 1 source estimates that ranolazine's monthly cost (500-mg pill twice daily) exceeds $200.[7] By contrast, prices for generic alternatives are much lower (eg, BBs and CCBs cost as little as $3 per month).[8,9]

Patients with angina typically have very high medical care costs. Previous analysis[10] demonstrates that patients with angina have all-cause total costs of care approximately double that of other patients with CAD but without angina, with a difference of more than $1000 per patient per month. Thus control of angina symptoms represents a significant opportunity for improving patient health status and saving costs concurrently.

However, the total cost of care is presumably of greatest interest to a managed care organization and society more broadly and hence also the efficacy of various therapeutic programs in reducing symptoms and subsequent medical encounters. The central issue should be total costs of care, not the costs of any single component such as pharmaceutical costs. Little is known about the influence of therapeutic choices on total resource use and health care costs among patients with angina. Therefore we analyzed a large managed care administrative claims database to better understand the effect of ranolazine versus alternative antiangina drugs on health care use and total costs of care.

OBJECTIVES

Our objective was to estimate the total cost of care and revascularization rates for patients with angina across various pharmacologic therapeutic alternatives. Costs and medical care use by patients already actively treated for angina were analyzed; in particular, those who alter their therapeutic protocol in an attempt to improve symptom control and/or reduce side effects.

Specifically, revascularization rates and cost outcomes (total and component costs) were estimated for patients with angina newly receiving 1 of 3 categories of antiangina therapy: ranolazine, long-acting nitrates,

or BBs/CCBs. The following hypotheses were tested: (1) treatment groups do not differ significantly in pre-index health, sociodemographic characteristics, health status, medical care use, and cost of care; and (2) treatment groups do not differ significantly in postindex revascularization rates or total costs of care, controlling for individual patient characteristics.

METHODS
Data

Our analysis employed a retrospective, administrative claims-based analysis using eligibility information, pharmacy claims, and medical claims data from a large, geographically diverse US health insurance plan with 11.2 million commercial enrollees. All patients were covered for approved physician and hospital use and prescription drugs. Data used for this study were de-identified and met requirements for the use of protected health information in compliance with the standards of the Health Insurance Portability and Accountability Act. The Figure shows these patient selection flows.

Inclusion Criteria
Evidence of Angina Pectoris

The patient-selection plan first identified patients who had a diagnosis of angina, chest pain, or CAD and use of antiangina drugs during the period between July 2005 and February 2008. Three definitions were used to identify angina patients, based on combinations of *International Classification of Diseases, Ninth Revision* (ICD-9) diagnostic codes and antiangina drug use (See Supplemental Appendix I in the online version at http://dx.doi.org/10.1016/j.clinthera.2012.04.025).

Index Event

An index event wherein the patient was prescribed a new antiangina drug (not used within previous 6 months), either by a change in or the addition of a new antiangina medication was identified. This step identifies those whose angina was presumably under such insufficient control or had such side effects that their physician altered their medication plan. Thus, during the 6 months preceding their inclusion in this study, patients had been receiving ≥1 antiangina drug from the BB/CCB class or nitrates. A change in their prescription—the index event—separates the 6 months of preindex data from the 6 months of postindex follow-up. Each patient has a unique index date, and hence a distinctive 12-month