Insight on the Issues

Impact of the Medicare Hospital Readmission Reduction Program on Hospital Readmissions Following Joint Replacement Surgery

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BACKGROUND

As evidenced by the proliferation of advertisements filled with people happily touting the benefits of their artificial knees and hips, joint replacements are becoming an increasingly popular medical procedure. Joint replacement was the most common hospital procedure covered by Medicare in 2013, accounting for nearly 450,000 inpatient admissions and a program-high $6.6 billion in spending.[1] Experts believe that the rates of these procedures will grow substantially as the baby boomer population continues to age.[2]

Joint replacements (total hip arthroscopy [THA] and total knee arthroscopy [TKA], or "hip replacement procedures" and "knee replacement procedures" in the context of this paper) are associated with improvement in pain, function, and health-related quality of life among older adults with osteoarthritis.[3] However, such procedures do not come without risk: Implant-related complications are common,[4] and research indicates that the incidence of such events is rising.[5] These complications can lead to hospital readmissions, increasing the costs associated with already expensive procedures.[6]

While many hospital readmissions are unavoidable, experts believe that hospitals can engage in several activities to lower their rate of readmissions and related costs.[7] Accordingly, the Centers for Medicare & Medicaid Services (CMS) launched the Medicare Hospital Readmission Reduction Program (HRRP) in 2012 as part of the new health law (the Affordable Care Act). The program fines certain hospitals[8] for excessive rates of readmissions[9] for Medicare patients with specified conditions. At launch, the readmission reduction program focused on heart failure, heart attack, and pneumonia. CMS added elective hip and knee replacements and a lung disease (chronic obstructive pulmonary disorder) at the end of 2014.

Early evidence suggests that the Medicare's readmission reduction program is reducing hospital readmissions.[10,11] Much of the research utilizes data from years that fall between the new health law's implementation and the launch of the readmission reduction program (i.e., between 2010 and 2013). Researchers attribute the early positive results to hospitals employing preemptive strategies to lower readmission rates before the program began.[12] Similarly, hospitals could have predicted that elective hip and knee replacements would eventually be included in the readmission reduction program based on CMS activities that began in 2009.[13]

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To augment these findings, we examined hip and knee replacement procedure rates and post-procedure unplanned hospital readmission rates between 2009 and 2013. In contrast to previous research that focused on beneficiaries in fee-for-service Medicare, this analysis uses data from the OptumLabs™ Data Warehouse, which includes claims from a large health insurance carrier. We were also able to compare hospital readmission rates across different age groups.

The study sample includes over 142,022 health insurance claims between 2009 and 2013 for adults ages 50 and older enrolled with a large health insurance carrier. Our goal was to determine whether readmission rates for elective knee and hip replacements decreased in the years immediately prior to CMS' first application of the Medicare readmission reduction program fines.

METHODS

Using insurance claims data from a large US insurance carrier, we calculated rates of elective hip and knee replacement procedures, length of subsequent hospital stays, and unplanned hospital readmissions within 30 days of hip or knee replacements among adults ages 50 to 84. The data were for procedures completed between 2009 and 2013.

We defined the population of interest as patients electively admitted to a nonfederal acute care hospital with ICD-9-CM procedure codes for Total Hip Arthroplasty (81.51) or Total Knee Arthroplasty (81.54) between 2009 and 2013. We excluded patients who had a principal discharge diagnosis for their original (or index) admission that was indicative of a non-elective arthroplasty (e.g., hip fracture, mechanical complication). We also excluded patients who had a procedure code for an arthroplasty procedure that was not an elective primary arthroplasty (e.g., partial hip arthroplasty, revision procedure).

We defined an unplanned hospital readmission as a subsequent acute care hospital inpatient admission within 30 days of the discharge date for a hip or knee replacement procedure. If a patient underwent a second elective primary hip or knee replacement procedure within 30 days of the discharge date for the index admission, we considered the readmission "planned" and did not count it as a readmission in the measure.

Due to the dichotomous nature of the readmission variable used in this study, any index admission with multiple readmissions within 30 days of discharge contributed only one outcome event to the model (i.e., any post–hip or –knee replacement admission is either an index admission or a potential readmission, but not both).

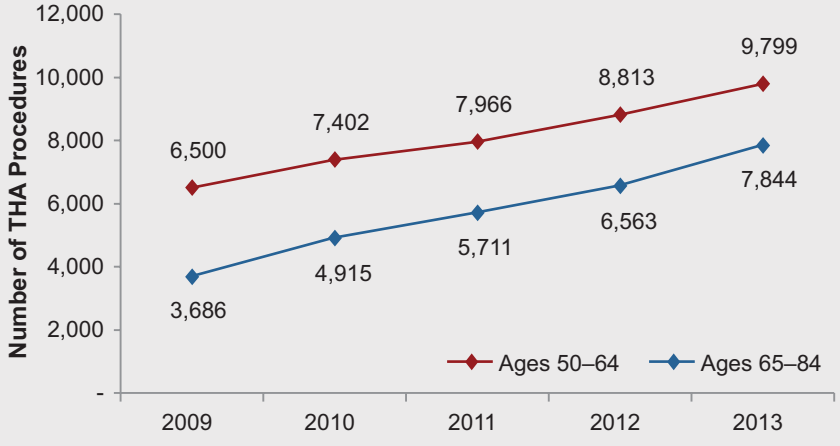
RESULTS

Number and Rate of Elective Hip Replacements Grew Substantially between 2009 and 2013

The total number of older adults in the study population who underwent an elective hip replacement procedure increased substantially between 2009 and 2013 (figure 1). The number of adults

FIGURE 1

Population Age 65–84 Had Bigger Increase in Total Number of Hip Replacement Procedures between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

ages 50 to 84 who received a hip replacement in 2013 represents a 73 percent increase from the number of 50- to 84-year-olds who received a hip replacement in 2009.

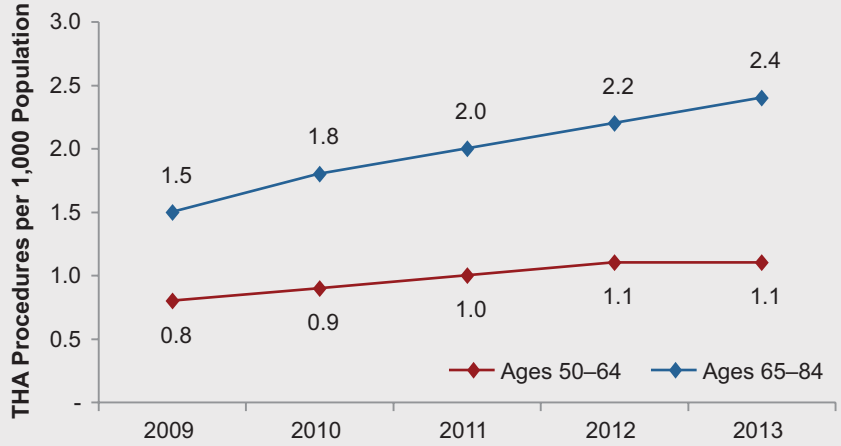
Further analysis revealed considerable differences by age group. Compared with the 50 to 64 age group, the 65 to 84 age group had a larger increase in the total number of hip replacement procedures. The older age group saw a 113 percent increase between 2009 and 2013. In contrast, the 50- to 64-year-old population saw a 51 percent increase over the same time period.

Our results also indicate that a growing share of older adults in the study population is undergoing elective hip replacement procedures. The share of adults ages 50 to 84 who underwent a hip replacement procedure increased by 58 percent between 2009 and 2013. The 65- to 84-year-old age group experienced an increase of 60 percent, while the 50- to 64-year-old population saw a 38 percent increase over the same time period (figure 2).

Our analysis also revealed notable gender differences in the share of older adults who underwent an elective hip replacement procedure. The share of females ages 50 to 84 who received a hip replacement increased by 75 percent between 2009 and 2013, while the share of males ages 50 to 84 who received a hip replacement increased by 66 percent over the same time period (data not shown).

FIGURE 2

Rates of Hip Replacement Procedures Increased Substantially among Adults Ages 65–84 between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

Number and Rate of Elective Total Knee Replacements also Saw Considerable Growth between 2009 and 2013

The total number of older adults in the study population who received an elective knee replacement procedure grew considerably between 2009 and 2013 (figure 3). The number of adults ages 50 to 84 who received a knee replacement increased by 46 percent between 2009 and 2013.

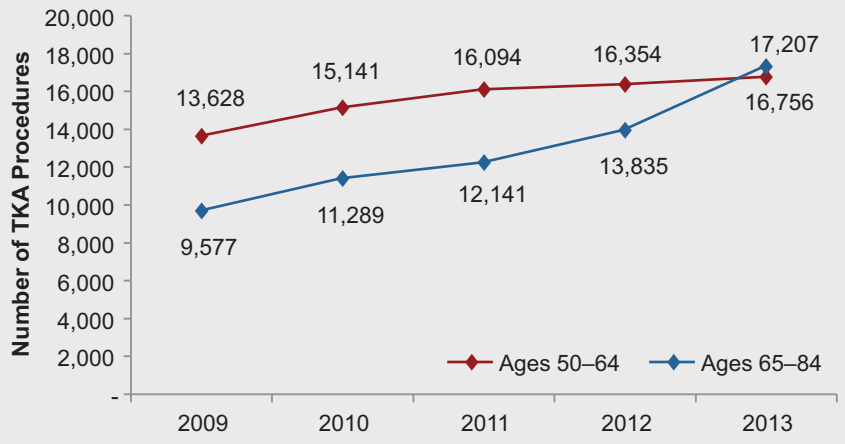
Like hip replacement procedures, additional analysis revealed substantial differences between the 50- to 64-year-old and 65- to 84-year-old age groups. The 65- to 84-year-old population saw an 80 percent increase in the total number of knee replacement procedures between 2009 and 2013. In contrast, the 50- to 64-year-old population saw a 23 percent increase over the same time period. As of 2013, the total number of knee replacements was actually higher among the 65- to 84-year-old population than among the 50- to 64-year-old population.

Our results also indicate that a growing share of older adults is undergoing knee replacement procedures. The rate that adults ages 50 to 84 received a knee replacement increased by 34 percent between 2009 and 2013, with the older age group experiencing a considerably higher rate of increase. The 65- to 84-year-old age group experienced an increase of 36 percent, while the 50- to 64-year-old population saw an 18 percent increase over the same time period (figure 4).

Our analysis also revealed that the rate of increase for elective knee replacements was somewhat higher for males between 2009 and 2013. More specifically, the share of males ages 50 to 84 who received a knee replacement increased by 47 percent, while the share of females ages 50 to 84 who received a knee replacement increased by 43 percent over the same time period (data not shown).

FIGURE 3

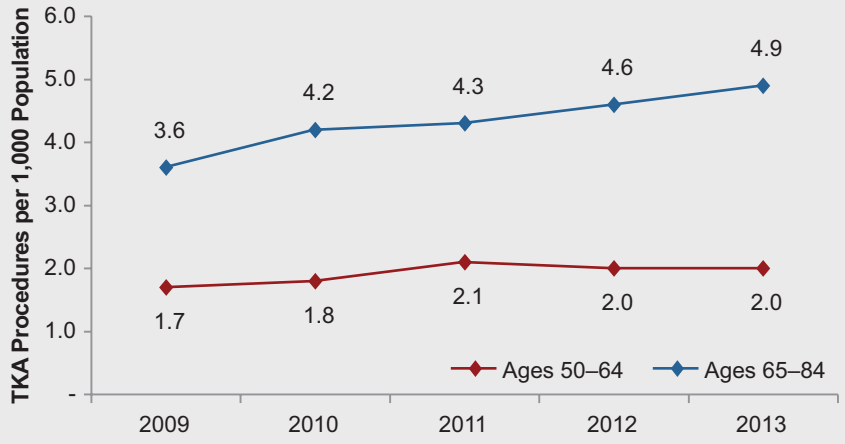
Population Age 65–84 Had Bigger Increase in Total Number of Knee Replacement Procedures between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

FIGURE 4

Rates of Knee Replacement Procedures Increased among Older Adults between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

Hip and Knee Replacement–Related Hospital Readmission Rates Fell Dramatically among Age 65+ Population between 2009 and 2013

The rates of unplanned 30-day hospital readmissions following hip or knee replacement procedures fell in our study population between 2009 and 2013. The rate of unplanned readmissions for hip replacement procedures fell by 20 percent among adults ages 50 to 84, while the rate of unplanned readmissions for knee replacement procedures fell by 23 percent.

We also found substantial age differences in rates of hospital readmissions following a hip or knee replacement. For example, the decrease in rates of unplanned 30-day hospital readmissions following a hip replacement procedure was 13 times larger for adults ages 65 to 84 than the decrease in rates for adults ages 50 to 64 (38 percent v. 3 percent, respectively) between 2009 and 2013 (figure 5). It is also notable that, while readmission rates for 65- to 84-year-olds were considerably higher than readmission rates for 50- to 64-year-olds in 2009, the readmission rates for both populations were nearly the same by 2013.

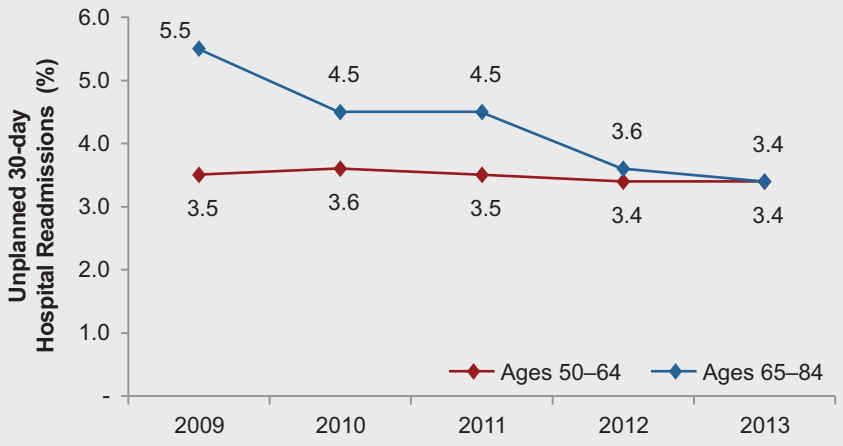
Similarly, the decrease in rates of unplanned 30-day hospital readmissions following a knee replacement procedure was 36 percent for the 65- to 84-year-old age group, while the decrease for the 50 to

64-year-old age group was 12 percent, a three-fold difference (figure 6). Like hip replacement procedures, readmission rates for the 65- to 84-year-old age group were considerably higher than readmission rates for 50- to 64-year-olds in 2009. However, since the annual declines in readmission rates among the 65- to 84-year-old age group were consistently larger, their hospital readmission rates were lower than those of 50- to 64-year-olds by 2013.

Our analysis also revealed notable gender differences in the 5-year change in unplanned 30-day hospital readmissions from 2009 to 2013. Rates of hospital readmission following a hip replacement decreased by 22 percent between 2009 and 2013 among women ages 50 to 84. In contrast, rates of hospital readmission decreased by 15 percent among 50- to 84-year-old men who underwent the same procedure. Similarly, rates of hospital readmission following a knee replacement decreased by 27 percent among women ages 50 to 84, while rates of hospital readmissions fell by 18 percent among men ages 50 to 84 who had the same procedure (data not shown).

FIGURE 5

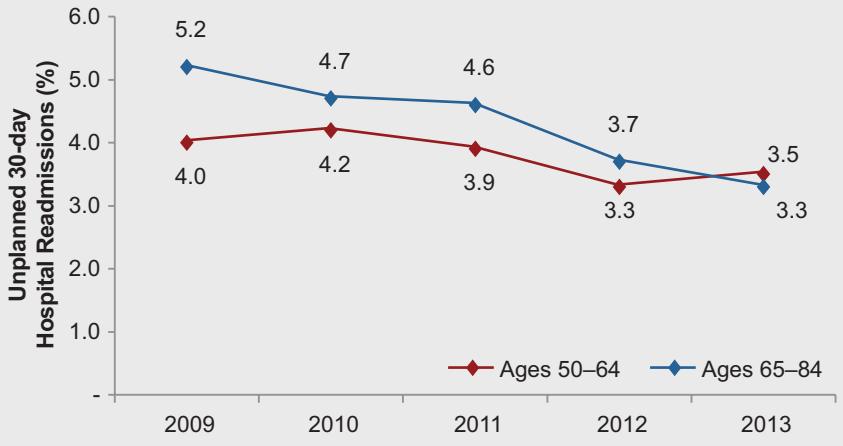
Unplanned 30-Day Hospital Readmission Rates for Hip Replacement Procedures Fell Considerably Faster among Age 65–84 Population between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

FIGURE 6

Trends in Unplanned 30-Day Hospital Readmission Rates for Knee Replacement Procedures Reversed between 2009 and 2013



Source: Based on 2009–13 claims data from OptumLabs for adults ages 50–84.

Device Complications and Surgery Complications Are Common Causes of Hospital Readmission Following Hip and Knee Replacement Procedures

Hip Replacement Procedures

We also examined the most common causes of hospital readmissions following a hip replacement procedure. We found that two causes of hospital readmissions—device complications and complications of surgery—were particularly prevalent in our study population.

There were slight age differences in the 50- to 84-year-old population readmitted to the hospital after undergoing a hip replacement. For

example, device complications and complications of surgery were among the top three causes of hospital readmission following a hip replacement in the 50- to 64-year-old population in both 2009 and 2013 (table 1). We found similar results for the 65- to 84-year-old population, but device complications was consistently the highest cause of hospital readmissions, and there was a much larger gap between it and the next-most-common cause of hospital readmissions within the population (i.e., complications of surgery).

It is also noteworthy that, in both age groups studied, the share of hospital readmissions following a hip replacement that were due to device complications or complications of surgery did not change over the study period. More specifically, in both 2009 and 2013, 33 percent of hospital readmissions among 50- to 64-year-old THA patients and 35 percent of hospital readmissions among 65- to 84-year-old THA patients were due to device complications or complications of surgery.

TABLE 1

Device Complications Most Common Cause of Hospital Readmission after Hip Replacement among Age 65–84 Population in 2009 and 2013

	2009		2013	
50–64	Device complications	19%	Other aftercare	19%
	Complications of surgery	14%	Device complications	19%
	Osteoarthritis	12%	Complications of surgery	14%
65–84	Device complications	22%	Device Complications	24%
	Complications of surgery	13%	Complications of surgery	11%
	Rehabilitation/ device adjustment	11%	Other aftercare	4%

Source: Based on 2013 claims data from OptumLabs for adults ages 50–84.

TABLE 2

Complications of Surgery Most Common Cause of Hospital Readmission after Knee Replacement among Age 65–84 Population in 2009 and 2013

	2009		2013	
50–64	Complications of surgery	16%	Other aftercare	18%
	Other aftercare	13%	Complications of surgery	16%
	Device complications	11%	Device complications	9%
65–84	Complications of surgery	14%	Complications of surgery	17%
	Rehabilitation/ device adjustment	9%	Device complications	12%
	Device complications	8%	Gastrointestinal hemorrhage	5%

Source: Based on 2013 claims data from OptumLabs for adults ages 50–84.

Knee Replacement Procedures

We also looked at the most common causes of hospital readmissions following a knee replacement procedure. Like hip replacement procedures, two causes of hospital readmissions—device complications and complications of surgery—were particularly prevalent in our study population (table 2).

However, the share of hospital readmissions caused by surgical and device complications was not as high among the 50- to 84-year-olds who received a knee replacement. In addition, while 50- to 84-year-olds who underwent a hip replacement were most commonly readmitted to the hospital due to *device* complications, the most common cause of hospital readmissions among same-age knee replacement patients was *surgical* complications.

There were also notable age differences in the 50- to 84-year-old population readmitted to the hospital after undergoing a knee replacement procedure. Among the 50- to 64-year-old population, device complications and complications of surgery were responsible for nearly the same share of hospital readmissions following knee replacement in 2009 and 2013 (27 percent v. 25 percent, respectively). However, the 65- to 84-year-old population did not have similarly consistent results: the share of

hospital readmissions following knee replacement due to device complications or complications of surgery increased markedly between 2009 and 2013 (22 percent v. 29 percent, respectively).

FUTURE RESEARCH

We believe that our results provide direction for future research. Our finding that rates of hospital readmission following joint replacement procedures have decreased substantially among the 65- to 84-year-old population could be indicative that the Medicare hospital readmission reduction program is having its intended impact. However, it would be helpful to learn whether rates of hospital readmissions following a joint replacement began declining prior to 2009, which could indicate that hospitals were working to lower readmission rates prior to the enactment of the new health law. It would also be useful to determine whether any non-hospital-related factors (e.g., enrollment in accountable care organizations) could have contributed to the observed decline in readmissions.

Further, our analysis was limited to Medicare beneficiaries enrolled in Medicare Advantage (MA) plans provided by a large US insurance carrier. A more comprehensive analysis would include beneficiaries in both fee-for-service and all MA plans.

CONCLUSION

This study confirmed that joint replacement procedures are increasingly popular among older Americans. We also found that rates of unplanned hospital readmissions following elective hip and knee replacement procedures fell markedly among the 50- to 84-year-old population between 2009 and 2013. These results were primarily driven by substantial reductions in readmissions among the 65- to 84-year-old population. Overall, the rapid reductions in hospital readmission rates among the 65- to 84-year-old age group resulted in rates that are now much more comparable to those found in the 50-to 64-year-old age group.

Our results are clearly promising from a Medicare beneficiary perspective. However, the relative stability in readmission rates among the 50- to 64-year-old population raises concerns that hospitals could be focusing their readmission reduction efforts on Medicare beneficiaries rather than the broader population. Alternatively, the fact that 50- to 64-year-olds and 65- to 84-year-olds now have similar hospital readmission rates following hip and knee replacements could be a sign that it may become increasingly difficult to reduce such readmissions after they reach a certain level.

Finally, it is notable that device complications were responsible for a large share of hospital readmissions following a hip or knee replacement. In fact, the share of hospital readmissions linked to device complications actually increased between 2009 and 2013 among the 65- to 84-year-old age group. Experts have consistently expressed concerns that the US Food and Drug Administration does not adequately regulate the safety and effectiveness of medical devices like artificial joints.[14] The results of our analysis should serve as a warning to supporters of recent efforts to further reduce such oversight.[15]

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7 C. Boccuti and G. Casillas, "Aiming for Fewer Hospital U-turns: The Medicare Hospital Readmission Reduction Program," Kaiser Family Foundation, January 29, 2015.

8 The Medicare hospital readmission reduction program applies to most acute care hospitals. Some hospitals are exempted from the penalties, including critical access hospitals and postacute care providers.

9 CMS defines excessive readmission rates as higher than the national average readmission rate per condition. Readmission rates are risk-adjusted by condition severity and patient characteristics like age. CMS bases its fines on the amount Medicare paid for excess readmissions, and can reach up to 3 percent of Medicare payments for all conditions.

10 US Department of Health and Human Services, *New HHS Data Shows Major Strides Made in Patient Safety, Leading to Improved Care and Savings,* May 2014.

11 Boccuti and Casillas, "Aiming for Fewer Hospital U-turns."

12 Ibid.

13 In 2009, CMS contracted with Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation to develop hospital outcomes measures that reflect the quality of care for patients undergoing elective primary total hip and/or total knee arthroplasty procedures. In 2012, CMS completed a "dry run" of collecting data on readmissions following hip and knee replacements from nonfederal acute care hospitals. Public reporting of these data began in 2013, and CMS announced it was adding elective hip and knee replacements to the readmissions reduction program the same year.

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AARP's Public Policy Institute conducted this study using the OptumLabs Data Warehouse. The retrospective administrative claims data utilized in this study include medical claims and eligibility information from a large national US health insurance plan. Individuals covered by this health plan, about 28.2 million (51 percent female) in 2013, are geographically diverse across the United States, with greatest representation in the South and Midwest US Census regions. The health insurance plan provides fully insured coverage for professional (e.g., physician), facility (e.g., hospital), and outpatient prescription medication services. All study data were accessed using techniques that are in compliance with the Health Insurance Portability and Accountability Act (HIPAA) of 1996, and no identifiable protected health information was extracted during the course of the study.