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Value-Based Payments and Incentives to Improve Care: A Case Study of Patients with Type 2 Diabetes in Medicare Advantage

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ABSTRACT

Objectives: To estimate the impact of increased glycated hemoglobin (A1C) monitoring and treatment intensification for patients with type 2 diabetes (T2D) on quality measures and reimbursement within the Medicare Advantage Star (MA Star) program. **Methods:** The primary endpoint was the share of patients with T2D with adequate A1C control (A1C $\leq$ 9%). We conducted a simulation of how increased A1C monitoring and treatment intensification affected this end point using data from the National Health and Nutrition Examination Survey and clinical trials. Using the estimated changes in measured A_{1C} levels, we calculated corresponding changes in the plan-level A_{1C} quality measure, overall star rating, and reimbursement. **Results:** At baseline, 24.4% of patients with T2D in the average plan had poor A1C control. The share of plans receiving the highest A1C rating increased from 27% at baseline to 49.5% (increased monitoring), 36.2% (intensification), and 57.1% (joint implementation of both interventions). However, overall star ratings increased for only 3.6%, 1.3%, and 4.8% of plans, respectively, by intervention. Projected per-member per-year rebate increases under the MA Star program were $7.71 (monitoring), $2.66 (intensification), and $10.55 (joint implementation). **Conclusions:** The simulation showed that increased monitoring and treatment intensification would improve A1C levels; however, the resulting average increases in reimbursement would be small.

Keywords: diabetes, quality measures, value-based purchasing, medicare.

Background

Recently, payers have implemented a number of programs that use financial incentives to improve quality of care. In fact, the Centers for Medicare and Medicaid Services (CMS) aim to link 90% of Medicare fee-for-service reimbursements to quality measures by 2018 [1]. Currently, CMS evaluates Medicare Advantage (MA) plan quality and performance by using a star rating system (MA Star program). In 2016, the system used 47 quality measures, including those related to member outcomes, customer experience, and clinical practice. Plans ranking in the highest tiers are eligible to receive financial incentives, including higher rebates and an extended enrollment period [2].

The success of pay-for-performance programs depends on a link between improvements in quality metrics and financial rewards, but the conditions under which plan-level quality initiatives will lead to improved reimbursement are not well understood. In particular, the link between improvement on quality-of-care measures for specific diseases and overall reimbursement remain unclear.

One disease for which care quality is frequently measured in pay-for-performance programs is type 2 diabetes (T2D). T2D affects nearly 1 in 10 Americans [3]. It can lead to severe complications, including retinopathy, renal disease, and premature death [4], with annual costs in excess of $160 billion [5]. Interventions, such as increased hemoglobin A1C monitoring and intensified use of medication to control A_{1C} levels, have been shown to improve clinical outcomes [6,7], but in the context of the MA Star program, the effect of these interventions on plan-level quality ratings and reimbursement is not clear.

Objectives

We aimed to simulate how three interventions (increased A1C monitoring, treatment intensification for patients with poorly controlled A1C levels, and joint implementation of increased monitoring and treatment intensification) affect plan quality measures and reimbursement under the MA Star program.

Methods

Our simulation was constructed in Microsoft Excel 2010 and used a three-phase approach. In phase I, we estimated the effect of improved monitoring (phase Ia) and treatment intensification (phase Ib) on the observed percentage of plan members with diabetes who had controlled A1C. Phase II measured the effect of

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these changes on plan-level performance on the A1C control star measure (Diabetes Care – Blood Sugar Controlled) and on overall star rating. Finally, we calculated the expected change in reimbursement in phase III. We obtained data for the complete universe of plans participating in the MA Star program in the 2016 program year and simulated effects for the subset of plans (n = 392) that did not have missing values for the A1C control Star measure [8].

Phase Ia: Increased A1C Monitoring

We estimated the effect of increased monitoring on A1C control among members. (MA Star defines control very conservatively, i.e., the percentage of members with A1c ≤ 9% / 75 mmol/mol). Under the 2016 program rules [8], all patients without a measured A1C value reported in a given year are assumed to have poor control. Thus, higher levels of monitoring would increase the observed share of patients with well-controlled diabetes. For example, if a plan had 1000 members with diabetes, with 900 in A1C control and 100 with poor control (A1C > 9%), then the true level of control would be 90% (900/1000). If 200 of the 900 patients in control were not tested, then only 70% ((900–200)/1000) of patients would be recorded as having their AIC under control. In phase Ia, we modeled the effect of a hypothetical A1C monitoring intervention that would reduce the share of patients with unobserved A1C levels by 50%.

Phase Ia relied on two key parameters: 1) the share of patients with unobserved A1C levels; and 2) the relative rate of A1C control among tested and untested patients with diabetes. We obtained an estimate of the first parameter from the 2014 Healthcare Effectiveness Data and Information Set [9]. We calculated the latter quantity by using data from National Health and Nutrition Examination Survey (NHANES) respondents ages ≥ 65 years with diabetes. We predicted A1C levels by using an ordinary least-squares regression controlling for patient demographic and clinical attributes. We used these predicted A1C levels to measure whether individuals' A1C levels were under control and computed the mean percentage in control for those with both observed and unobserved A1C.

Phase Ib: Treatment Intensification for Patient with Poor A1C Control

We simulated how intensifying treatment for patients with poor control would affect their A1C levels, considering six broad classes of treatments: metformin, sulfonylureas, thiazolidinedione, dipeptidyl peptidase-4 inhibitors, sodium-glucose cotransporter-2 inhibitors, and glucagon-like peptide-1 receptor agonists. The treatment intensification algorithm moved patients between treatment scenarios: patients not on medication were moved to monotherapy, patients on monotherapy to dual therapy, and patients on dual therapy to triple therapy. The treatments used within each scenario were selected on the basis of published market share data [10].

As in phase Ia, we modeled the baseline distribution of A1C levels among plan members with T2D by using NHANES data. Next, we used evidence from Agency for Healthcare Research and Quality–sponsored meta-analyses on oral antidiabetes treatments—supplemented by data from pivotal trials—to derive efficacy by treatment type, applying weights proportional to class market share [11–21]. We estimated treatment effects for the T2D population and applied these derived treatment effects to the NHANES baseline A1C distribution data (which included patients with type 1 diabetes [T1D] and T2D) to calculate the new simulated distribution of A1C levels and the share of patients with A1C ≤ 9% following treatment intensification. Treatment was only intensified for T2D patients with poor A1C control.

Phase II: Effects on MA Star Quality Measures

In the MA Star program, plans receive 1 to 5 stars for the A1C control measure, depending on the actual percentage of members with diabetes meeting the program's standard for A1C control (≤ 9%). (MA Star diabetes measures do not distinguish between T1D and T2D.) Phase II of the simulation mapped the post-treatment percentage of plan members with diabetes having adequate A1C control (estimated in phase I) to this schema. We assumed that the interventions only affected the A1C level diabetes measure and had no effect on any other quality measures. In addition to A1C, we modeled the effects of treatment intensification on low-density lipoprotein cholesterol and blood pressure; because antihyperglycemic medications with a meaningful impact on cholesterol and blood pressure are used infrequently, we found those effects were small enough to be considered negligible. Because the MA Star program does not distinguish between T1D and T2D, we assumed improved monitoring for both groups.

Similar to all individual quality measures in the MA Star program, performance on the A1C control measure is determined stepwise: increases in the assigned star score are achieved only when threshold values are crossed. For example, in 2016, if ≥ 84% of members with diabetes have A1C ≤ 9%, the plan will receive 5 stars, but if the value is 83.9%, the plan would receive only 4 stars [8].

The overall star rating is also assigned stepwise and is based on a weighted average of the star values assigned for the 47 individual quality measures; weights are based on the CMS's assessment of the relative importance of the different measures [8]. As a result, an improvement in the percentage of members with measured A1C ≤ 9% will lead to an improvement in the overall star rating only if 1) the increase is large enough to shift the plan across a threshold value for the A1C control measure; and 2) the resulting increase in the weighted average of the 47 individual quality measures shifts the plan across a threshold value for the calculation of the overall star rating.

Phase III: Effects on Reimbursement

Plan reimbursement from the CMS is determined by the "benchmark" and the "bid." The "benchmark" is the maximum amount the CMS will reimburse plans for delivering services; the "bid" is the plan's estimated cost for providing those services. If the bid exceeds the benchmark, the plan receives only the benchmark amount. If the bid is below the benchmark, the plan receives its bid amount as well as a percentage of the difference as a rebate.

Quality affects MA plan reimbursement in four ways. First, plans with overall star ratings of ≥ 4 are allotted a benchmark that is > 5% compared with lower-quality plans. Second, plans with higher quality receive a higher percentage of the bid/benchmark difference as a rebate [22]. For instance, in 2016, plans with 4.5 or 5 overall stars received 70% of the bid/benchmark difference, whereas plans with 3.5 or 4 overall stars received 65%. Third, plans with a 5-star rating benefit from an extended enrollment period [23]. Finally, plans with high ratings may experience increased enrollment due to reputational benefits [24,25]. Phase III estimated the average effect (across plans) on reimbursement based on the first two channels; our model does not consider the effects of a longer enrollment period or reputational benefits.

Results

Both interventions increased the percentage of patients reported to have adequate A1C control. Overall, for the average plan, 7.4% of members with any form of diabetes had unobserved A1C levels

[26]; those with unobserved A1C levels were estimated to be 4% less likely to have A1C control than those with observed A1C. Averaged across all plans, increased monitoring (which was assumed to reduce the share of plan members with T2D who had unobserved A1C by 50%) would decrease the share of patients reported to have poorly controlled A1C levels by 11.8%.

Shifting patients with poor control from no therapy to monotherapy, from monotherapy to dual therapy, and from dual therapy to triple therapy would reduce A1C levels by 0.95, 0.84, and 0.72 percentage points, respectively. Our simulation found that treatment intensification would increase the percentage of members with adequate A1C control by an average of 3.06 percentage points. The effects of these changes on the plan-level distributions of the individual measure for A1C control and overall star rating are presented in Figure 1.

Both increased monitoring and treatment intensification would improve the observed level of A1C control. At baseline, only 27% of plans had ≥ 84% of patients with diabetes with A1C ≤ 9% (this threshold is required for plans to receive 5 stars for the A1C control measure). This proportion would rise to 49.5%, 36.2%, and 57.1%, respectively, under increased monitoring, treatment intensification, and joint implementation of both interventions. These are large increases: When the effects of both interventions were simulated jointly, the share of plans with a high proportion of patients with well-controlled A1C more than doubled.

Despite the magnitude of these changes, only a small number of plans would experience an increase in their overall rating. At baseline, 45.4% of plans had a rating of ≥ 4 stars; this proportion would rise to 47.4%, 46.2%, and 48.2% under increased monitoring, treatment intensification, and joint implementation, respectively. Further, only 3.6%, 1.3%, and 4.8% of plans would see any improvement in overall star rating as a result of the three simulated interventions, respectively (data not shown).

For plans experiencing an improvement in the overall star rating, expected reimbursement would rise significantly—the per-member per-year (PMPY) reimbursement increase would be

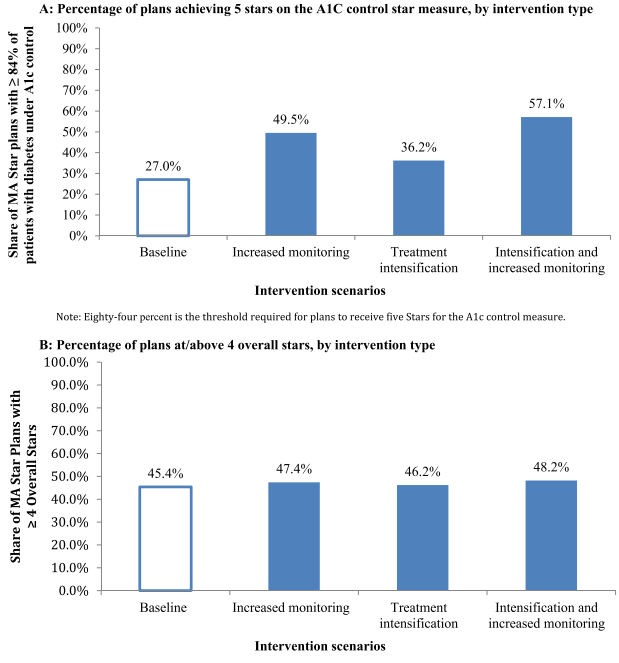

Fig. 1 – Effects of increased monitoring and intensification on the plan-level distributions of A1C control rating and overall star ratings.

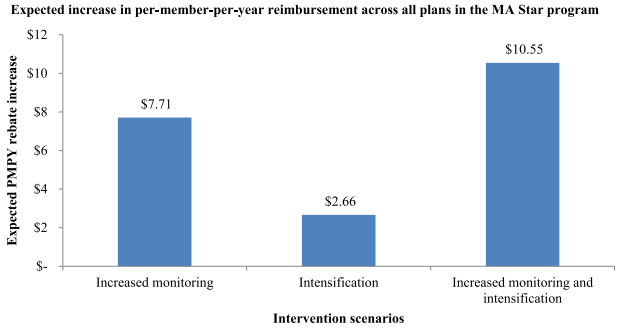

Fig. 2 – Expected increase in per-member-per-year reimbursement across all plans in the MA Star program.

$845 for increased monitoring, $209 for treatment intensification, and $831 for both (data not shown). However, the vast majority of plans did not show an overall star increase in our simulation, and thus these plans do not receive any increase in reimbursement. When averaged across all plans—including the few that have a reimbursement increase and the vast majority that do not—expected PMPY would increase by only $7.71, $2.66, and $10.55, respectively (Fig. 2). The average enrollment of plans in this analysis was 9206 members; as such, the expected-value total reimbursement increase for the average plan would be only $70,978 under increased monitoring, $24,488 under treatment intensification, and $97,123 under joint implementation.

Discussion

We found that increased A1C monitoring and treatment intensification for Medicare patients with diabetes would increase the share of patients meeting the MA Star standard for A1C control. One-third of MA plans would improve their A1C control rating under increased monitoring, and 15% of plans would do so under treatment intensification. Under joint implementation of both, 44% of plans would improve their A1C control rating. However, the expected rebate increase would be low, ranging from $2.66 to $10.55 PMPY.

The path to better alignment between care quality and financial rewards under the MA Star program is not immediately apparent. Increasing the relative weight of the A1C control measure within the calculation of the overall score would improve the likelihood that improvement in A1C control would lead to financial reward, but its effect on other quality measures is unclear [27]. Alternatively, measures could be scored on a continuous basis so that incremental improvements would translate directly to improvements in reimbursement. Continuous measures, however, are more sensitive to year-to-year volatility because of measurement error and may be more difficult for physicians and patients to understand.

Although the interventions considered here would improve outcomes, the Medicare Star program does not provide sufficient financial incentives for plans to implement these initiatives. Increased monitoring would require that additional screening procedures be conducted, which was estimated by one study to be $13.50 per A1C screen [28]; the education/outreach program that would be needed to actually boost monitoring rates would require additional expense. As an example, one study of a program to educate primary care physicians about essential clinical practices for the management of T2D estimated the per-patient cost of the intervention to be $27 [29]. Direct pharmacotherapy intensification costs would also be significant. (Although the precise costs for a given payer would vary, depending on the mix of products used in the plan) [30]. Rational plans would

consider the potential financial rewards described in this article net of these additional costs; given the prevalence of T2D in the MA population, the expected costs would be far greater than the expected rewards.

Taking a longer view, however, both improved monitoring and treatment intensification can be thought of as investments that would generate a return, in future periods, in the form of improved patient health and reduced treatment costs. One study found that among Medicare patients with diabetes and A1C not in control, reducing A1C by 1 percentage point would yield PMPY savings of $52.20 as a result of reduced complications [31].

In other words, the MA Star program does not appear to provide strong financial incentives for plans to improve A1C control among patients with diabetes despite the fact that there are significant long-term advantages, in terms of both patient health and the economics of care. Without rebate structures that generate short-term positive incentives, long-term cost and health outcomes under the MA Star program may be negatively affected.

This study has important limitations. First, we focused on T2D, so it is unclear whether these findings could be generalized to other diseases. Second, our estimates of the effects of increased monitoring relied on assumptions about A1C control among individuals whose A1C levels were unobserved. Third, real-world effectiveness was assumed to be equal to efficacy as measured in clinical trials [32]. Fourth, our model omits some important factors, including, but not limited to, the value of the expanded enrollment window for 5-star plans, the value of improved reputation associated with an increase in quality ratings, the value of the reduced complications that would likely result from improved A1C control, and the costs that would be associated with actually implementing the interventions we have described. Fifth, the diabetes pharmacotherapies considered here were assumed to impact only A1C levels, but they may also impact performance on other individual quality measures. Finally, actually implementing the programs we have described would require plans to incur significant costs (e.g., the cost of actually providing intensified therapeutic treatment, or the cost of an education program which might improve monitoring rates); our model does not consider these.

Conclusions

Although plan-level initiatives to improve A1C control would benefit patient health, the resulting average direct financial rewards that would accrue to MA Star plans appear to be small. Using financial incentives to improve the quality of care for patients with diabetes is a laudable goal, but current incentives may be insufficient.

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