**Background:**
Hyperkalemia, defined as a serum potassium level >5 mEq/L that results from multiple mechanisms, is a serious medical condition that can lead to life-threatening arrhythmias and sudden cardiac death. The coexistence of cardiac and renal diseases (ie, cardiorenal syndrome) significantly increases the complexity of care, but its economic impact is not well-characterized in this understudied Medicaid managed care population with hyperkalemia.

**Objective:**
To calculate the economic impact of hyperkalemia on patients with cardiorenal syndrome in a Medicaid managed care population in the United States using real-world data.

**Methods:**
In this retrospective cohort study, we used a proprietary Medicaid managed care database from 1 southern state. The total study population included 3563 patients, including 973 patients with hyperkalemia and 2590 controls (without hyperkalemia), who were matched based on age, comorbidities, and Medicaid eligibility status and duration, during a 30-month period between 2013 and 2016. The inclusion criteria for the hyperkalemia cohort were age ≥18 years, Medicaid-only insurance status, coded cardiorenal diagnosis, and a claim for hyperkalemia during the study period. The cost was determined using paid claims data.

**Results:**
The mean healthcare costs (medical and pharmacy per member per year [PMPY] for patients with hyperkalemia was higher than that for the control cohort without hyperkalemia ($56,002 vs $23,653, respectively). These cost differences were driven by medical costs accrued in the hyperkalemia and in the control cohorts ($49,648 and $18,399 PMPY, respectively). Two of the largest drivers of the medical cost variance were inpatient costs ($33,116 vs $10,629 PMPY for the hyperkalemia and control cohorts, respectively) and dialysis costs ($2716 vs $810 PMPY, respectively). The medical loss ratios were 552% for the hyperkalemia cohort and 260% for the control cohort. Both cohorts had revenue deficits to the health plan, but the hyperkalemia cohort had double the medical loss ratio compared with the control cohort.

**Conclusions:**
The findings from this Medicaid managed care population suggest that hyperkalemia increases healthcare utilization and costs, which were primarily driven by the costs associated with inpatient care and dialysis. Our findings demonstrate that the Medicaid beneficiaries who have cardiorenal comorbidities accrue high costs to the Medicaid health plan, and these costs are even higher if a hyperkalemia diagnosis is present. The very high medical loss ratio for the hyperkalemia cohort in our analysis indicates that enhanced monitoring and management of patients with hyperkalemia should be considered.

**Key Words:**
cardiorenal comorbidities, chronic kidney disease, diabetes, healthcare utilization, heart failure, hyperkalemia, Medicaid managed care plan, patiromer, RAAS inhibitors, sodium zirconium cyclosilicate
Hyperkalemia is a serious medical condition that can result in life-threatening arrhythmias and sudden cardiac death but is often undertreated.

This study used real-world regional Medicaid data between 2013 and 2016 to calculate the economic impact of hyperkalemia on Medicaid patients with cardiorenal comorbidities.

The per member per year (PMPY) mean healthcare costs were higher for patients with hyperkalemia ($56,002) than those without hyperkalemia ($23,653).

The differences in costs were driven primarily by medical costs and were $49,648 PMPY for those with hyperkalemia and $18,399 PMPY for the control cohort.

The 2 largest drivers of the medical cost variance were inpatient costs for those with or without hyperkalemia ($33,116 vs $10,629 PMPY) and dialysis costs ($2716 vs $810 PMPY).

The medical loss ratio was 552% for the hyperkalemia cohort and 260% for the control cohort.

The recent FDA approval of patiromer and of sodium zirconium cyclosilicate for the treatment of hyperkalemia has changed the treatment paradigm of this condition.

The high medical loss ratio in the hyperkalemia cohort highlights the need for monitoring and guideline-based management of patients with hyperkalemia.

that are known to increase potassium levels, the prevalence of hyperkalemia may be as high as 40% to 50%.1-6

In a study based on a large US Medicare and commercial claims database containing 1.7 million medical records between 2007 and 2012, the prevalence of hyperkalemia was 34.6% in patients with 2 or more potassium test results for CKD and 30% for patients with heart failure.7 In our review of published research on Medicaid populations using the search term “hyperkalemia,” we found no previous published work in this area.

Hyperkalemia is often asymptomatic, but it is clinically one of the most important electrolyte abnormalities that can potentially lead to cardiac arrhythmias and sudden cardiac death.1,8

The patients who are at greatest risk for hyperkalemia are older (≥65 years) and have cardiorenal conditions, such as CKD, hypertension, congestive heart failure (CHF), or diabetes mellitus, and/or those who are taking medications that are known to increase serum potassium levels.1,9-10 Among the medications known to cause hyperkalemia, renin-angiotensin-aldosterone system (RAAS) inhibitors—which include angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), and mineralocorticoid receptor antagonists—are the most relevant to patients with cardiorenal syndrome.1,3,11

The classes of RAAS inhibitors are guideline-recommended for the treatment of hypertension, CHF, and CKD associated with diabetic nephropathy, thanks to their significant benefits in reducing morbidity and mortality observed in randomized clinical trials of patients with these conditions.12-14 These national guidelines specifically recommend that RAAS inhibitor therapy be titrated to the moderate to high doses that have been used in clinical trials to derive the maximum clinical benefit.12-14 However, the presence of hyperkalemia often leads physicians to down-titrate or discontinue the use of RAAS inhibitors.

In a retrospective analysis using a large database of patients with commercial, Medicare, and Medicaid coverage and cardiorenal comorbidities, more than 50% of the patients were prescribed lower-than-recommended doses of a RAAS inhibitor, and approximately 15% of the patients discontinued their RAAS inhibitor therapy.15 In addition, patients who were receiving submaximal doses or discontinued treatment with a RAAS inhibitor had worse cardiorenal outcomes and greater mortality than patients who were receiving optimal doses.15 This represents a treatment gap between the guideline-recommended use of RAAS inhibitors and their real-world use.

Currently, the treatment strategies used in patients with acute hyperkalemia are to reverse the cardiac effects, shift potassium into the cells using insulin or other emergent treatments, and remove potassium using commercially available potassium binders to normalize serum levels.1,16,17 Until recently, the treatment of chronic hyperkalemia has been limited to dietary potassium restriction, use of loop or thiazide diuretics, discontinuation or a reduction in the doses of a RAAS inhibitor, and the use of potassium binder sodium polystyrene sulfonate, which is rarely used long-term, because of concerns about its safety and tolerability.16

The recent US Food and Drug Administration (FDA) approvals of the new potassium binders patiromer and sodium zirconium cyclosilicate have prompted a paradigm shift in the approach to the treatment of hyperkalemia.16,18

The purpose of this study was to analyze the economic impact of hyperkalemia on patients with cardiorenal syndrome in a US Medicaid managed care population.
Methods

This retrospective, matched-cohort study was based on a proprietary Medicaid managed care database from 1 southern state. The database included 879,511 unique Medicaid members in that state who were identified during a 30-month period between 2013 and 2016. Of these members, 325,664 were adults aged ≥18 years (age range, ≥18–≤100 years).

Outcome measures were the annualized means of drug costs, medical costs, and total costs in US dollars based on paid claims. The medical costs were subdivided into inpatient hospital costs, emergency department costs, outpatient hospital costs, physician costs, dialysis costs, and other costs.

The study cohort inclusion criteria consisted of any member aged ≥18 years who had a claim that included an International Classification of Diseases, Ninth Revision (ICD-9) or International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code for hyperkalemia (codes 276.7 and E87.5, respectively) and at least 2 medical claims per disease with diagnosis codes for CKD, CHF, hypertension, and/or diabetes mellitus (ie, diseases of interest). The criteria for inclusion in the control cohort were age ≥18 years and at least 2 claims with ICD-9 or ICD-10-CM codes for CKD, CHF, hypertension, and/or diabetes mellitus (Figure 1, and Appendix Table available at www.AHDBonline.com).

The study cohort consisted of 2813 Medicaid members identified with claims for the diseases of interest and a claim for hyperkalemia taken from 75,139 members with the diseases of interest, which resulted in a hyperkalemia prevalence of 3.7%.

The control cohort (ie, those without hyperkalemia) was matched to the study cohort (ie, those with hyperkalemia) based on age, eligibility status for Medicaid-only or Medicaid and Medicare dual-eligibility status, eligibility duration in months, and diseases of interest; that is, exact combination of comorbidities, by member. For example, members with CHF and diabetes were matched to members with CHF and diabetes in the control group of patients who had no other diseases of interest, and this matching method was applied to all other possible combinations of the diseases of interest. (Although all patients were considered for inclusion in the study, the analysis was conducted on those with Medicaid-only coverage.)

Cohort matching based on specific staging levels (stages 1-5) of CKD was not possible, because of the significant coding of approximately 30% of members as unspecified CKD stage (stages 1-4) or no staging codes present. However, we conducted an additional analysis to evaluate if specific disease staging codes had higher variance in medical costs in the hyperkalemia group versus the control group. We determined that CKD staging did not explain the medical cost variance between the 2 groups, and that the hyperkalemia group had consistently higher costs than the control group across all stages of CKD. The date of death was included in the database and was used to determine the mortality rate.

The matched population in the 2 cohorts consisted of 10,193 members, including 2813 plan members with hyperkalemia (ie, the hyperkalemia cohort) and 7380 members without hyperkalemia (ie, the control cohort; Figure 1). The matching ratio between the 2 cohorts was 2.6 to 1. Overall, 3563 members were included in this analysis, including 973 patients with hyperkalemia and 2590 controls. The analysis consisted of the Medic-
aid-only population and excluded any patients with Medicaid and Medicare dual-eligibility status. (These dual-eligible patients were excluded, because most services for this subset population are covered by Medicare, and their claims data are incomplete.)

The medical loss ratio was determined by using annualized premium per patient data for each participant and comparing that with the total cost of care, which was determined by direct claims payments by the health plan. The base premiums vary and are set at the regional level based on rate groups and rate cells that include specific age ranges, sex, and major eligibility group (eg, Medicaid only, Medicare-Medicaid dual-eligible, long-term care). For the Medicaid-only group, these premiums are further broken into eligibility subgroups, such as Temporary Assistance for Needy Families, Supplemental Security Income, HIV infection, and Serious Mental Illness.

In addition, the premiums are risk-adjusted at the health plan and regional levels (but not at the member level) based on the Medicaid CDPS (Chronic Illness and Disability Payment System) plus Rx risk model, which uses major disease group and drug coding to calculate and weigh the risk-adjustment factors. The premiums paid for members are determined by the base premiums, with additional adjustment up or down based on the risk factor calculations applied for that plan, by region, at the rate group and at the rate cell levels.

The total costs were summed for all eligible months for each member over the 30-month study period and were then divided by the total number of eligible months for each member to determine the average cost per eligible month (per member per month), and were then converted to an annualized cost (per member per year [PMPY]) to adjust for the variance in eligible months across the study population.

Hyperkalemia as a medical condition specifically would not be one of the major disease categories factored into any risk-adjustment model. However, the other diseases of interest we studied would fall under those major disease categories (ie, CKD, diabetes, hypertension, and heart failure). All members in this study were in the same Medicaid managed care health plan.

### Results

The baseline demographics and characteristics, divided by the 2 cohorts, as well as the mortality rate, are presented in the Table. The mean patient age was approximately 52 years, and the mean duration of Medicaid eligibility was 17 months. More than 50% of the study population in each cohort were women. Dialysis was more common in the hyperkalemia cohort than in the control cohort (17% vs 4%, respectively). In the Medicaid population, we calculated an annualized incremental cost increase of $32,349 PMPY for the hyperkalemia cohort (Figure 2).

The total mean cost was $56,002 PMPY in the hyperkalemia cohort versus $23,653 PMPY in the control cohort. The PMPY pharmacy costs were $6354 versus $5254, respectively. The medical costs represented the major portion of the PMPY total costs in the hyperkalemia cohort ($49,648) and the control cohort ($18,399). The medical loss ratio was 552% for the hyperkalemia cohort versus 260% for the control cohort (Figure 2).

The breakdown of the medical cost shows that inpatient costs are the main driver of the medical spending, with $33,116 PMPY spent in the hyperkalemia cohort and $10,629 PMPY spent in the control group (Figure 3). As shown in Figure 3, dialysis represents a small percentage of the overall costs in each cohort: 5.5% in the hyperkalemia group versus 4.4% in the control group.

We evaluated the PMPY costs for each cohort, strati-

### Table

Patient Baseline Characteristics and Comorbidities

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Hyperkalemia cohort (N = 973)</th>
<th>Control cohort (N = 2590)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible for Medicaid, mean, months</td>
<td>16.94</td>
<td>17.00</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male, N (%)</td>
<td>509 (52)</td>
<td>1440 (56)</td>
</tr>
<tr>
<td>Female, N (%)</td>
<td>464 (48)</td>
<td>1150 (44)</td>
</tr>
<tr>
<td>Age, mean, yrs</td>
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<td>51.78</td>
</tr>
<tr>
<td>Disease of interest</td>
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<td></td>
</tr>
<tr>
<td>Diabetes mellitus, N (%)</td>
<td>590 (61)</td>
<td>1550 (60)</td>
</tr>
<tr>
<td>Chronic kidney disease, N (%)</td>
<td>540 (56)</td>
<td>1337 (52)</td>
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<tr>
<td>Congestive heart failure, N (%)</td>
<td>354 (36)</td>
<td>791 (31)</td>
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<tr>
<td>Hypertension, N (%)</td>
<td>870 (89)</td>
<td>2359 (91)</td>
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<tr>
<td>Dialysis, N (%)</td>
<td>164 (17)</td>
<td>106 (4)</td>
</tr>
<tr>
<td>Mortality, N (%)</td>
<td>172 (18)</td>
<td>147 (6)</td>
</tr>
</tbody>
</table>

*Most members had ≥2 of these conditions, and matching was done on exact comorbidities.

### Figure 2

Mean (SD) Annualized Total Costs PMPY: Hyperkalemia Cohort versus Control Cohort

*Medical loss ratio (MLR) is defined as the ratio of total costs of care to premiums received. PMPY indicates per member per year; SD, standard deviation.

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fied by the 4 comorbid conditions—CKD, CHF, diabetes mellitus, and CKD plus CHF (Figure 4). The CKD plus CHF group had the highest incremental increase of $36,047 PMPY in the hyperkalemia patient cohort versus the control cohort. The second highest incremental increase in PMPY was $34,218 in the CHF subgroup. The CKD group had an incremental increase of $33,814 PMPY, and the diabetes mellitus subgroup had the lowest incremental increase ($18,778) in PMPY in the hyperkalemia cohort.

Medical costs were the key driver of spending in the hyperkalemia cohort when stratified by comorbidities. The medical PMPY costs ranged from $32,120 to $83,657 in the hyperkalemia subgroups, and the pharmacy PMPY costs were significantly less, ranging from $5447 to $8331.

The 2 main cost drivers of the medical costs were inpatient care and dialysis for the CKD and CKD plus CHF subgroups, excluding the “other” category. The inpatient mean costs PMPY were $32,744 for the patients with hyperkalemia and CKD versus $10,006 for the control group with CKD, and $59,013 for the hyperkalemia group with CKD and CHF versus $35,494 for the control group with CKD and CHF.

The dialysis-related mean costs were $3545 PMPY in the patients with hyperkalemia and CKD versus $1692 PMPY in the control group with CKD, and $6290 PMPY in the hyperkalemia group with CKD and CHF versus $1460 PMPY in the control group with CKD and CHF. Conversely, for patients with CHF and diabetes mellitus, the primary cost driver was inpatient costs rather than dialysis costs in the CKD subgroups.

The pharmacy costs were significantly lower than the medical costs. The pharmacy costs for all groups, except the CHF subgroup, were slightly higher in the hyperkalemia cohort than in the control cohort. For example, in the hyperkalemia with CKD and CHF subgroup, the incremental pharmacy increase was only $1561 PMPY compared with the incremental inpatient increase of $23,519 PMPY.

Finally, a comparison of the annual medical costs for hyperkalemia and the control group in patients with CKD, by stage, shows a large variance between the hyperkalemia and control groups for all stages of CKD. These costs ranged from the greatest ($38,000) average annual cost variance for unspecified CKD stages 1 to 4, or no stage ($20,000), stage 1 ($21,000), stage 2 ($35,000), stage 3 ($15,000), stage 4 ($17,000), and stage 5 ($33,000). Therefore, the specific stage of CKD is not driving the variance in annual medical costs for either group.

**Discussion**

In our review of published research on Medicaid populations, using the search term “hyperkalemia,” we found
Our analysis of the economic impact of hyperkalemia in patients in a Medicaid managed care health plan demonstrates that hyperkalemia was associated with significantly increased costs, which were mainly driven by increased hospitalization. With a medical loss ratio of 55% found in our study, hyperkalemia presents economic and clinical challenges. Based on our review of the inpatient hospital claims data, the common reasons for hospitalization across the 2 groups of patients with and without hyperkalemia included septicemia, sepsis, acute renal failure, acute respiratory failure, diabetes, heart failure, cardiac issues, and others. Both groups utilized intensive care unit and critical care unit services significantly, which contributed to the large inpatient hospital costs.

As many healthcare providers know, managing costs in the Medicaid population is complex. Medicaid beneficiaries often use multiple physicians and pharmacies, and the emergency department is often their source for primary care. Medicaid managed care health plans have been working to provide home healthcare, behavioral health support, transportation, and the use of medical homes as an alternative strategy to the use of the emergency department. This fractured treatment strat-
ergy, however, makes the coordination of care difficult. This also applies to the management of hyperkalemia. The Healthcare Cost and Utilization Project hospitalization data showed that approximately 50% of patients who are diagnosed with hyperkalemia in the emergency department are admitted to the hospital.

The costs of the patients in the hyperkalemia cohort in our study were 5 times greater than the premium paid by the US government to the Medicaid plan to manage these patients. In addition, the costs for members with cardiorenal comorbidities and no history of hyperkalemia (ie, the control cohort) were 2 times the cost of the premium provided by the government to the health plan. Acknowledging that this is a small subset of the overall managed Medicaid population, we still found that 23% of the patients had a cardiorenal condition (ie, disease of interest) that increased their risk for hyperkalemia. The medical loss ratio of 552% for the hyperkalemia cohort represents an extremely costly set of patients for a health plan to insure. This finding suggests the need for better monitoring and management of hyperkalemia-related medical costs.

Hyperkalemia is often undertreated. An observational study that evaluated the prevalence of hyperkalemia in a large health system, including all payer types, showed a low (4.7%) use of a potassium binder therapy in adults with hyperkalemia >5.5 mEq/L. In our Medicaid population, we observed that less than 3% of patients with hyperkalemia received a potassium binder therapy. The standard of care for hyperkalemia rarely includes the use of a potassium binder therapy (ie, sodium polystyrene sulfonate).

Based on previous studies that support the finding that Medicaid members have low medication adherence rates, low sodium polystyrene sulfonate use is expected. This medication is often intolerable to patients because of its side-effect profile. Gastrointestinal disturbances and sodium load can prevent the use of sodium polystyrene sulfonate. Typically, potassium binder therapy has been used episodically as a treatment for hyperkalemia, usually in the emergency department setting.

Novel treatments for hyperkalemia are now available, with the advent of the new potassium binders—patiromer, and sodium zirconium cyclosilicate. These new interventions may be particularly valuable for Medicaid patients with cardiorenal conditions. Patiromer was approved by the FDA in 2015 for the treatment of hyperkalemia, and sodium zirconium cyclosilicate was approved in 2018. Both medications were included in studies lasting 52 weeks, which supports their long-term use further presenting the opportunity for a paradigm shift in the treatment of chronic hyperkalemia.

Cardiorenal conditions place patients at increased risk for recurrent hyperkalemia, which often results in the discontinuation of protective medications, such as ACE inhibitors or ARBs. Because the use of these protective medications (ie, ACE inhibitors and/or ARBs) is often discontinued, we may now be able to manage recurrent hyperkalemia better with the newer agents and continue to use these therapies as maintenance treatment.

In a 12-week randomized controlled trial of patiromer, more patients were able to maintain treatment with a RAAS inhibitor than patients who were randomized to placebo, based on an exploratory end point. A recent real-world descriptive study demonstrated that 78% of patients exposed to patiromer continuously for 6 months were receiving treatment with a RAAS inhibitor maintenance therapy compared with a 57% continuing use of a RAAS inhibitor in a cohort of patients who did not receive a potassium binder. In addition, a real-world analysis in a Veterans Affairs population showed a reduction in emergency department visits and hospitalizations in veterans with hyperkalemia 6 months after the start of patiromer therapy compared with the 6 months before the initiation of the drug. These newer agents may be a viable option to assist in reducing emergency department visits and hospitalizations in patients with hyperkalemia.

Determining the cost implications of these new agents is also important. A cost-effectiveness analysis of patiromer therapy in patients with heart failure (mean age, 65 years) concluded that treatment with patiromer and a RAAS inhibitor therapy (ie, spironolactone, ACE inhibitors) was projected to increase survival compared with ACE inhibitor therapy alone, with greater quality-adjusted life-years (QALYs) and costs yielding an incremental cost-effectiveness ratio of $52,700 per QALY. These results suggest that the use of patiromer to maintain RAAS inhibitor therapy is a cost-effective approach for patients with heart failure who are unable to tolerate RAAS inhibitor therapy because of hyperkalemia.

Limitations

Our study has several potential limitations. First, this study is based on a single database, based on claims data, and therefore may not be generalizable across the entire US population.

Second, patient selection and misclassification biases are probable, because hyperkalemia is often underdiagnosed or undercoded, and an inclusion criterion for the hyperkalemia cohort was the use of ICD-9/10-CM code for hyperkalemia in the medical claims.

Third, this is a retrospective, observational study; therefore, we can only show different health resource utilization associations between the hyperkalemia cohort.
and the control cohort, which are not sufficient to establish causality. Finally, the total healthcare costs reported here were not adjusted for mortality. We did, however, perform a subset analysis on mortality, which did not change the costs.

Conclusion
Patients with cardiorenal conditions (ie, CHF, diabetes mellitus, CKD) present a significant financial burden on the entire US healthcare system. This real-world analysis of Medicaid managed care beneficiaries with at least 1 of these cardiorenal comorbidities demonstrates that the presence of hyperkalemia in this patient population further exacerbates the financial burden, with substantial increases in health resource utilization. Novel therapies that facilitate the long-term management of hyperkalemia and the use of guideline-recommended RAAS inhibitor therapy may lead to improved outcomes and cost reduction among this undertreated and challenging patient population.

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Author Disclosure Statement
Dr Desai is a consultant to Amgen, Boehringer Ingelheim, and Relypsa; Dr Reed and Ms Owens are consultants to Relypsa; Ms Alvarez, Dr Fogli, and Dr Woods are employees of Relypsa and own stock in Vifor Pharma.

References

### STAKEHOLDER PERSPECTIVE

**The Impact of Quality Care on a Medicaid Population with Hyperkalemia**

**By Byron C. Scott, MD, MBA**
Deputy Chief Health Officer, IBM Watson Health Simpler, San Diego, CA, and Adjunct Faculty, University of Massachusetts Amherst Isenberg School of Management

Hyperkalemia is an acute emergent condition that can lead to life-threatening arrhythmias and increased mortality.1 Some patient populations, because of the nature of certain medical conditions they have, are more prone to hyperkalemia than others. This is especially true in patients with renal disease and comorbidities. In their article in this issue, Desai and colleagues demonstrate the importance of managing closely a Medicaid managed care population with cardiorenal comorbidities to improve patient outcomes as well as be a good steward of financial resources.2

Specifically, Desai and colleagues emphasize some of the 6 aims of healthcare quality improvement that were featured in the now-famous 2001 Institute of Medicine’s article, *Crossing the Quality Chasm: A New Health System for the 21st Century*. That pivotal article introduced the concept of the 6 aims, focusing on the goal of ensuring the delivery of healthcare that is safe, timely, effective, efficient, equitable, and patient-centered.3

**PATIENTS:** As with all aspects of healthcare, we must always make sure we understand the impact of any management decisions on patients. Improving patient care management through enhanced care-management models and/or the use of evidence-based alternative pharmaceutical regimens can make healthcare safer, effective, and patient-centered in the patient population with cardiorenal disease. As can be expected, Desai and colleagues discuss the obvious economic costs related to increased hospital admissions and the utilization of resources in relation to this population; however, the one economic impact that is not mentioned by the authors is that of absenteeism from work and lost wages resulting from an inpatient admission, which would affect the total economic impact.

**PAYERS/POLICYMAKERS:** From the health policy and payer perspectives, everyone should be concerned. We are not efficient with resources if this patient population is not managed effectively, and if this results in an increased cost to federal and state taxpayers, considering that the article is focused on a Medicaid patient population. Questions we should ask in response include—can alternative care models help to improve the overall costs for a Medicaid patient population that is at risk for hyperkalemia? Is it more efficient to authorize and pay for a more expensive pharmaceutical drug (ie, potassium binders) as an outpatient in this population if we can reduce the overall cost and keep them out of the hospital by improving medication adherence by patients?

**PHYSICIANS:** For the physicians and healthcare organizations that provide patient care for patients with hyperkalemia—are we using the correct outpatient care models for this patient population? Should we take a...
closer look at the current care-team approach and the pharmacologic management of patients with cardiorenal disease in a Medicaid population to reduce the risk for hyperkalemia and inpatient admission?

Can these new models improve quality of life for these patients? Further research is needed to help answer some of these questions, which are very important questions, because providers of care address the aims of delivering patient-centered, equitable, efficient, and safe care.

In their article, Desai and colleagues increase the awareness about the treatment models for patients with cardiorenal disease in a Medicaid population. Although we may not be able to extrapolate the implications of this study to other state Medicaid populations, health systems, policymakers, and physicians should consider undertaking additional health economic research on other state Medicaid populations such as this, to see if they are consistent. From there, we may need some policy decisions to find ways to reduce cost (and increase cost-efficiency), while maintaining safe, equitable, efficient, and patient-centered care.

The opinion and views expressed in this perspective are solely those of the author and do not express the views or opinions of his employer or employment with IBM or UMass Amherst.