



# Outcomes Assessment

## Heart Failure

Prepared for Kansas Medical Assistance Program in July, 2009

### EXECUTIVE SUMMARY

Purpose of Intervention	The primary purpose of this intervention is to improve the treatment of heart failure (HF) by reducing practice variance through the use of clinical practice guidelines.
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Intervention	Intervention Type	Population-based mailing
	Intervention Mailing Date	June 2008
	Pre-intervention Period (Baseline)	December 2007 – June 2008
	Post-intervention Period (Post)	August 2008 – November 2008
	Number of Letters Mailed	647
	Number of Targeted Physicians	647
	Number of Targeted Patients	761
	Adjusted Targeted Patients	490

### Changes in Clinical Indicators

Clinical Indicators	Target		
	Baseline	Nov-08	% Change
Increased Risk of ADE	226	159	-29.6%
Drug-Drug Interaction	18	14	-22.2%
Non-Compliance	52	27	-48.1%
Underutilization	220	176	-20.0%
<b>Total</b>	<b>516</b>	<b>376</b>	<b>-27.1%</b>

### Savings Calculation

Intervention-Related Drug Savings	
Target Group: Actual Average Paid Amount Per Patient Per Month (Baseline)	\$22.44
Target Group: Actual Average Paid Amount Per Patient Per Month (Post)	\$18.88
% Change in Target Group from Baseline to Post	-15.83%
Estimated Savings Per Patient Per Month	\$3.55
Total Number of Target Patients	490
<b>4-Month Total Savings</b>	<b>\$6,959.84</b>

Intervention-Related Medical Savings	
Target Group: Actual Average Paid Amount Per Patient Per Month (Baseline)	\$56.65
Target Group: Actual Average Paid Amount Per Patient Per Month (Post)	\$21.76
% Change in Target Group from Baseline to Post	-61.59%
Estimated Savings Per Patient Per Month	\$34.89
Total Number of Target Patients	490
<b>4-Month Total Savings</b>	<b>\$68,379.97</b>

## BACKGROUND

Heart failure (HF) affects almost five million Americans and 550,000 new cases are diagnosed annually. Despite recent medical advances, the incidence and prevalence of HF continues to rise due to the increased survival after myocardial infarctions and increasing longevity. Heart failure incidence approaches 10 per 1,000 patients after age 65.<sup>2</sup> It is the most common cause of hospitalizations in patients over 65 years of age and accounts for approximately 300,000 deaths per year. Hospital discharges for HF rose from 377,000 in 1979 to 995,000 in 2002, an increase of 157 percent.<sup>2</sup> Estimated direct and indirect costs for 2005 have been estimated to be nearly \$28 billion.<sup>1</sup> Nearly 70 percent of the economic burden of HF is due to hospitalization and up to two-thirds of these hospitalizations may be preventable.<sup>3,4</sup>

There are numerous factors, some of which are avoidable, that can precipitate HF exacerbations<sup>5-15, 19</sup>.

Medication Related	Comorbidities	Other
<ul style="list-style-type: none"> <li>◆ Noncompliance with medications (e.g., digoxin, certain antihypertensives)</li> <li>◆ Use of inappropriate medications:               <ul style="list-style-type: none"> <li>○ Antiarrhythmic agents (except amiodarone)</li> <li>○ Calcium channel blockers (except amlodipine or felodipine)</li> </ul> </li> <li>◆ NSAID use</li> <li>◆ Underutilization or sub-optimal doses of ACE inhibitors</li> <li>◆ Underutilization of beta blockers</li> <li>◆ Inappropriate reductions in HF medications</li> <li>◆ Alcohol, amphetamine, and cocaine abuse</li> </ul>	<ul style="list-style-type: none"> <li>◆ Uncontrolled hypertension</li> <li>◆ Depression</li> <li>◆ Myocardial ischemia</li> <li>◆ Arrhythmias (primarily tachyarrhythmias)</li> <li>◆ Cardiomyopathy</li> <li>◆ Miscellaneous non-cardiac disorders (e.g., pulmonary infectious processes)</li> <li>◆ Renal insufficiency</li> <li>◆ Anemia</li> <li>◆ Diabetes</li> <li>◆ Hyperthyroidism</li> </ul>	<ul style="list-style-type: none"> <li>◆ New York Heart Association (NYHA) classification III to IV</li> <li>◆ Advanced age</li> <li>◆ Excessive salt intake (greater than 2000 to 3000mg per day)</li> <li>◆ Noncompliance with diet</li> </ul>

Angiotensin modulating therapy has been shown to decrease morbidity and mortality in patients with HF. Practice guidelines recommend that ACE inhibitor therapy at therapeutic doses to all patients with left ventricular systolic dysfunction heart failure unless a contraindication is present (i.e., anuric renal failure, angioedema, pregnancy). For patients intolerant to ACE inhibitors, angiotensin II receptor blockers (ARBs) are recommended.<sup>5</sup>

Beta blocker use (i.e, carvedilol, metoprolol, bisoprolol) in conjunction with an angiotensin modulating agent (e.g., ACE inhibitor or ARB) substantially decreases morbidity and mortality in patients with HF.<sup>16-18</sup> Current practice guidelines recommend the use of beta blockers in all patients with stable HF due to left ventricular systolic dysfunction, unless the use of these medications is contraindicated or not tolerated.<sup>5</sup>

## METHODOLOGY

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Changes in intervention-related pharmacy dollars paid, pharmacy dollars paid per patient per month (PPPM), and number of pharmacy claims were examined. This intervention identified providers whose patients were affected by medication non-compliance, increased risk of ADE, drug-drug-interactions, and underutilization. To assess the impact of the intervention, pharmacy drug claims were reviewed from August 2008 through November 2008.

Clinical Criteria: Criteria, rationale, and text message(s) to providers are listed below. All physicians with recipients “hitting” on criteria received letters.

- Medication Non-Compliance

This indicator identifies patients taking maintenance medications that may be non-compliant with therapy because they have received less than 66% of the cumulative amount prescribed.

Rationale: Compliance with prescribed maintenance drug regimens is paramount to successful patient outcomes. More than \$100 billion is spent yearly for problems related to noncompliance. Over half of written prescriptions are taken incorrectly.<sup>1</sup>

Sample Provider Paragraph:

Your patient may be non-compliant with the identified chronic cardiovascular drug therapy. From prescription data, it appears that your patient received less than 60 days of maintenance therapy in a 90 day period. Please review this information to determine the best course of action for your patient.

- Increased Risk of Adverse Drug Events

The increased risk of adverse drug event indicator identifies patients receiving medications who are at risk of experiencing an adverse drug event due to predisposing medical conditions. Additionally, certain concomitant medication therapy may result in additive effects resulting in adverse events.

Rationale: Medication related adverse events are common in primary care, and many are preventable or ameliorable. Improvements in monitoring for and responding to symptoms are especially important for the prevention of adverse drug events in outpatients.

Sample Provider Paragraph:

It appears that your patient has received an ACE inhibitor or angiotensin II receptor antagonist (AIIRA) and potassium-sparing diuretic concurrently. ACE inhibitors or AIIRAs can increase serum potassium by inhibiting adrenal aldosterone secretion. If a potassium-sparing diuretic is required, serum potassium levels and signs/symptoms of toxicity should be monitored.

- Underutilization

The underutilization of therapy indicator identifies patients with a diagnosis of heart failure who do not have documented history of angioedema, renal failure or bilateral renal stenosis or are currently pregnant.

Rationale: Studies have shown that ACEIs decrease morbidity and mortality in patients with heart failure. However, physicians are often reluctant to use sub-therapeutic doses

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<sup>1</sup> Berg JS, Dischler J, Wagner DJ, Raia JJ, Palmer-Shevlin N. Medication compliance: a healthcare problem. *Annals of Pharmacotherapy*. 1993;27(suppl 9):S1-S19



of ACEIs because of potential side effects including hypotension, cough or worsening renal function.

Sample Provider Paragraph:

Potential underutilization: congestive heart failure (HF) diagnosis without beta blocker therapy. Beta blocker use (i.e, carvedilol, metoprolol, bisoprolol) in conjunction with an angiotensin modulating agent (e.g., ACE inhibitor or angiotensin II receptor antagonist) substantially decreases morbidity and mortality in patients with HF. Current practice guidelines recommend the use of beta blockers in all patients with stable HF due to left ventricular dysfunction, unless the use of these medications is contraindicated or not tolerated. Contraindications include reactive airway disease, unstable fluid status, and symptomatic bradycardia or advanced heart block without a pacemaker. Please review this patient's current therapy and comorbidities to determine if use of a beta blocker would be appropriate for this patient.

Definitions:

**Adjusted Target Patients** – All patients of physicians who were included in the intervention, who had pharmacy claims and were active plan members throughout the post-intervention time period. Additionally, when outcomes are performed, these patients' pre-intervention (baseline) hits are re-evaluated to make certain that the status of clinical indicators haven't changed for each patient due to late pharmacy and medical claims.

**Intervention-Related Pharmacy** –Angiotensin modulators, beta blockers, digoxin, antihypertensives, and ACE inhibitors.

## RESULTS

### Characteristics

Table 1 describes the patient populations for the target group included in the population-based intervention based upon mean age, gender, number of providers, average number of prescriptions per patient per month, and total drug utilization. As can be seen from the table, the target group had a mean age of 52.4 years, was mostly female, saw 4.4 providers, and utilized 10.2 prescriptions per month in the baseline period.

**Table 1: Patient Characteristics**

	Target (N=490)
Mean Age	52.4
Percentage Male	36.3%
Percentage Female	63.7%
Number of Providers	4.4
Average Number of Prescriptions PPM*	10.2
<b>Intervention-Related Drug Utilization**</b>	
Average Number of Drugs***	2.0
Average Number of Claims	9.0
Average Days Supply	263.9
Average Amount Paid	\$134.61

\* Number of prescriptions per patient per month (PPM) is the average for the 6 month baseline period

\*\* Based on 6 months of baseline claims data

\*\*\* A distinct drug is defined by using a coding system similar to the Hierarchical Ingredient Code List (HICL) in that distinct drugs are identified at the ingredient level.

### Medication Non-Compliance

Table 2 displays the changes in target patients who were flagged for non-compliance. Overall, this indicator decreased by 48.1% in the target group.

**Table 2: Changes in Non-Compliance**

Non-Compliance	Target		
	Baseline	Nov-08	% Change
Cardiovascular med, no HTN dx	49	26	-46.9%
Digoxin	3	1	-66.7%
<b>Total</b>	<b>52</b>	<b>27</b>	<b>-48.1%</b>

### Increased Risk of ADE

The changes in the number of patients flagged for being at an increased risk of adverse drug events are displayed in Table 3. Overall, there was a 29.6% reduction in the number of target patients.

**Table 3: Changes in Increased Risk of ADE**

Increased Risk of ADE	Target		
	Baseline	Nov-08	% Change
ACE & K+ sparing, >1MD	3	0	-100.0%
ACE & K+ sparing, 1MD	3	2	-33.3%
ACE & K+ suppl, >1MD	2	1	-50.0%
ACE & K+ suppl, 1MD	4	3	-25.0%
ACE+K sparing+K suppl, 1MD	1	1	0.0%
Cilastazol and HF	3	1	-66.7%
Digoxin & CRF	1	0	-100.0%
Digoxin and Diuretics Loop, > 1MD	6	3	-50.0%
Digoxin and Diuretics Thiazide, > 1MD	2	2	0.0%
Glitazone-Metformin with Heart Failure Dx	2	2	0.0%
Metformin-Containing Product(s) with Heart Failure	123	90	-26.8%
NSAID use with CHF dx	16	11	-31.3%
Thiazolidinediones & HF DX	51	41	-19.6%
Verapamil and HF	9	2	-77.8%
<b>Total</b>	<b>226</b>	<b>159</b>	<b>-29.6%</b>

### Underutilization

The changes in the number of patients flagged for underutilization of therapy are displayed in Table 4. Overall, there was a 20.0% reduction in the number of target patients.

**Table 4: Changes in Underutilization**

Underutilization	Target		
	Baseline	Nov-08	% Change
Heart Failure: underutilization of angiotensin modulators	151	120	-20.5%
Potential underutilization of Beta-blocker in HF	69	56	-18.8%
<b>Total</b>	<b>220</b>	<b>176</b>	<b>-20.0%</b>

### Drug-Drug Interactions

The changes in the number of patients flagged for drug-drug interactions are displayed in Table 5. Overall, there was a 22.2% reduction in the number of target patients.

**Table 5: Changes in Drug-Drug Interaction**

Drug-Drug Interaction	Target		
	Baseline	Nov-08	% Change
Digoxin and Metoclopramide	4	4	0.0%
Digoxin-Amiodarone, >1 MD	1	0	-100.0%
Digoxin-Carvedilol, >1 MD	6	3	-50.0%
Digoxin-Spironolactone, >1 MD	1	1	0.0%
Metoprolol-Amiodarone	3	3	0.0%
Metoprolol-Diazepam	3	3	0.0%
<b>Total</b>	<b>18</b>	<b>14</b>	<b>-22.2%</b>

## BUSINESS ANALYSIS

The overall savings for the intervention are calculated in Tables 6 and 7. Per patient per month (PPPM) drug amount paid for intervention-related drugs and intervention-related medical costs were separately calculated for the target group for the six-month baseline and four-month post-intervention periods. First, the PMPM savings was calculated by finding the difference between the baseline and post-period PPPM paid amount. Then, the PPPM savings was multiplied by the number of intervention months and number of targeted patients.

Table 6 shows the intervention-related drug amount paid for target patients decreased \$3.55 PPPM in the post-intervention period. This yielded an overall estimated savings of \$6,960 in intervention-related drug expenditures during the four-month post-intervention period.

**Table 6: Intervention-Related Pharmacy Savings**

<b>Savings Calculation:</b>	
Target Group: Actual Average Paid Amount Per Patient Per Month (Baseline)	\$22.44
Target Group: Actual Average Paid Amount Per Patient Per Month (Post)	\$18.88
% Change in Target Group from Baseline to Post	-15.83%
Estimated Savings Per Patient Per Month	\$3.55
Total Number of Target Patients	490
4-Month Total Savings	\$6,959.84

Table 7 shows the intervention-related medical amount paid for target patients decreased \$34.89 PPPM in the post-intervention period. This yielded an overall estimated savings of \$68,380 in intervention-related medical expenditures during the four-month post-intervention period.

**Table 7: Intervention-Related Medical Savings**

<b>Savings Calculation:</b>	
Target Group: Actual Average Paid Amount Per Patient Per Month (Baseline)	\$56.65
Target Group: Actual Average Paid Amount Per Patient Per Month (Post)	\$21.76
% Change in Target Group from Baseline to Post	-61.59%
Estimated Savings Per Patient Per Month	\$34.89
Total Number of Target Patients	490
4-Month Total Savings	\$68,379.97

## LIMITATIONS

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A control group was not utilized for this intervention. This limited the comparisons that could be performed in the analysis. Therefore, instead of being able to compare an intervention group with a non-intervention group, the analysis is essentially limited to changes in the intervention group before and after intervention.

The time frame of 4 months may not capture the full extent of the impact of the intervention. Providers may be required some time before they can change their patient's drug regimens.

## CONCLUSIONS

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This intervention focused on improving prescribing practices and reducing the overall cost of care. Overall, the intervention was successful in reducing the total number of clinical indicators for target patients by 27.1%.

In terms of financial outcomes, the amount paid for intervention-related drugs decreased \$3.55 PPM in the post-intervention period. This yielded an overall estimated savings of \$6,960 in intervention-related drug expenditures during the four-month post-intervention period. Additionally, the amount paid for intervention-related medical decreased \$34.89 PPM in the post-intervention period, yielding an estimated \$68,380 savings during the post-intervention period. Therefore, the total estimated savings for this intervention is \$275,570.