Outcomes-Based Incentive Program for the Control of Phosphorus in an In-Center Dialysis Unit

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INTRODUCTION
Phosphorus control is a challenge for patients on dialysis. Non-adherence to prescribed therapies is the most frequent cause of poor serum phosphorus levels and related poor health outcomes (1). Abnormalities in markers of chronic kidney disease mineral and bone disorder (CKD-MBD) (phosphorus, calcium and intact parathyroid hormone (PTH)) have been associated with an increase in morbidity and mortality in patients with end stage renal disease (ESRD) (2,3). Hyperphosphatemia is linked to cardiovascular risk, bone disease, and the hyperphosphatemic milieu and is associated with vascular calcification through cellular changes in vascular smooth muscle cells (4).

Incentive programs promoting healthy outcomes have been used as effective strategies for facilitating learning and behavior change for achieving positive health-related outcomes. Results of programs that have used financial incentives for positive health related outcomes have been successful (5).

Often in healthcare, financial incentives are used to reward physicians to deliver quality care but are not used to reward patients for improved management of their chronic conditions. As part of its ongoing effort to improve the quality of dialysis care, the Center for Medicare & Medicaid Services (CMS) Conditions for Coverage recommends demonstration of an increased percentage of patients within target phosphorus range (6). Poor phosphorus levels have been associated with increased Medicare costs (7).

The objective of this quality improvement project was to ascertain if an outcome-based incentive program would improve overall phosphorus control in a dialysis facility. The secondary objective was to determine if the incentive program would continue to be effective on phosphorus levels after the conclusion of the project.

METHODS
This quality improvement project was reviewed by the University of Vermont Institutional Review Board. The incentive period occurred over 6 months (April-September 2014). At this dialysis unit, the phosphorus target was set at 3.5-4.5 mg/dL.

For this quality improvement project, we used 3.5-5.5 mg/dL for benchmarks for percentage of patients within target phosphorus range for the data analysis (7,8).

Image of a “Buck” and an arrow on a target for goals were used as these images were available on Clipart™. During the month prior to the start of the incentive program, a handout outlining the incentive program was provided to the dialysis patients.

- During the incentive program, patients were awarded one “Phosphorus Buck” for labs within the target of 3.5-4.5 mg/dL (Figure 1).
- An “Almost There Buck” (one-half buck) was awarded to patients achieving target within one point of target or reduced their phosphorus level closer to goal by 15%.
- Each month patients were provided their “Phosphorus Buck” update and told how many “Bucks” they had acquired so far and how much time was left in the program. Patients who did not receive a “Buck” were reminded of the program for motivation and standard of care education was provided.
- “Phosphorus Bucks” were tallied each month and totaled at the end of the 6-month period.
- Maximum number of “Bucks” per person each month was 1, with a maximum of 6 given out over the 6-month period.

Figure 1: Phosphorus Bucks: Front Images

Figure 1: Phosphorus Bucks: Back Image
Phosphorus education was not ramped up or changed during this program; standard of care education and monthly nutrition laboratory reports were provided.

Maximum reward for patient incentive was $50 as mandated per memo from Department of Health and Human Services, Office of the Inspector General Financial regarding gifts to patients (9).

Subjects were not selected. All patients receiving dialysis during the designated 6-month period in the dialysis unit were included. Patients excluded from receiving Bucks were those who received a transplant, died, or transferred to another clinic during the study period. “Phosphorus Bucks” were to be only redeemed after the study ended. Gift cards were attached to specific stores (2 grocery stores, 1 bookstore, and 1 department store) near the dialysis unit.

**STATISTICAL ANALYSIS**

One way ANOVA analysis using IBM/SPSS Statistics version 23 were carried out on data for phosphorus levels in the 3.5 – 5.5 mg/dL, greater than 5.5 mg/dL and mean phosphorus for the unit. Time periods were selected to capture seasonal variations. The time periods for data analysis were:

- Pre-Same (April-September, 2013)
- Pre (October, 2013-March, 2014)
- During (April – September, 2014)
- Post (October 2014-March, 2015)
- Post-Same (April-September, 2015)

Data in each time period consisted of monthly percentages of patients in the two phosphorus ranges and the mean monthly phosphorus level of all patients. Statistical significance was set at a P value of less than 0.05.

**RESULTS**

The mean percent of patients within the target of 3.5-5.5 prior to incentive program was 59.58% and 60.40%. During the program the mean percent was 63.66% and 6 months post was 64.19%. A year later during the same time period, the mean percent within target declined to 60.69%. (Figure 2, Table 1). During the incentive period the percentage of patients with high phosphorus levels (greater than 5.5 mg/dL) declined (Figure 3, Table 1). The percentage of patients with low phosphorus levels (less than 3.5 mg/dL) did not change. The mean phosphorus level declined during the incentive period but returned to baseline after the incentive period (Figure 4, Table 1). Confidence intervals overlapped and no significant differences were found among time periods (one way ANOVA, p>0.10), but the trends observed suggested improvement.

As the program reached completion patients received more “Bucks” (Table 2, Figure 5). Patient census changed from month to month during the program, and there were a few “new start” patients who did not have the same amount of time to build up their “Bucks” account. To recognize efforts and motivation towards good phosphorus control, sub-categories of the “Buck” system were developed for more equitable awards (Table 3). A congratulations card was provided to accompany the gift card at the program conclusion to acknowledge patient efforts showing how many “Bucks” they received and the value of their gift card (Figure 5). This provided an additional educational opportunity to encourage them to continue with the phosphorus goal of 3.5-4.5 mg/dL. The cost of the program was $1770. The cost per patient was $20.11 based on an average of 88 patients in the unit. The total number of gift cards dispensed was 62 with 70% of patients receiving a gift card.

### Table 1: Descriptions for Figures 2-4 Box and Whisker Plots

<table>
<thead>
<tr>
<th>Time Periods</th>
<th>Percent of patients with phosphorus level 3.5-5.5</th>
<th>Percent of patients with phosphorus level &gt;5.5</th>
<th>Mean phosphorus level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median % ± SD (95% CI)</td>
<td>Median % ± SD (95% CI)</td>
<td>mg/dL ± SD (95% CI)</td>
</tr>
<tr>
<td>Pre Same</td>
<td>59.58±3.77 (55.63 – 63.54)</td>
<td>35.51±3.63 (31.70 – 39.32)</td>
<td>5.28±0.06 (5.22 – 5.34)</td>
</tr>
<tr>
<td>Pre</td>
<td>60.40±4.40 (55.78 – 65.01)</td>
<td>34.72±3.88 (30.65 – 38.79)</td>
<td>5.34±0.19 (5.14 – 5.55)</td>
</tr>
<tr>
<td>During</td>
<td>63.66±5.28 (58.11 – 69.20)</td>
<td>32.38±5.92 (26.16 – 38.6)</td>
<td>5.25±0.21 (5.04 – 5.47)</td>
</tr>
<tr>
<td>Post</td>
<td>64.19±6.79 (57.07 – 71.32)</td>
<td>34.51±7.17 (26.98 – 42.03)</td>
<td>5.33±0.24 (5.08 – 5.58)</td>
</tr>
<tr>
<td>Post Same</td>
<td>60.69±4.85 (57.66 – 63.71)</td>
<td>33.67±5.81 (27.57 – 39.78)</td>
<td>5.36±0.08 (5.28 – 5.44)</td>
</tr>
</tbody>
</table>

SD = Standard Deviation
CI = Confidence Interval (lower bound-upper bound)
ADVANCES IN PRACTICE: OUTCOMES-BASED INCENTIVE PROGRAM

Figure 2: Percent of Patients with Phosphorus Levels within Target (3.5-5.5 mg/dL)

In Box and whisker plots, the line across the boxes is the median value of Phosphorus percent, the lower and upper edges of the box represent the 25th and 75th percentiles, respectively, whiskers indicate 5th and 95th percentiles, and the dots represent observations beyond the 1.5 times the interquartile range (outliers).

Figure 3: Percent of Patients with High Phosphorus Levels (greater than 5.5 mg/dL)

Figure 4: Mean Phosphorus Levels (mg/dL)

Table 2: Number of Phosphorus Bucks Distributed*

<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Number of Bucks given</td>
<td>37.5</td>
<td>37.5</td>
<td>40.5</td>
<td>38.5</td>
<td>42.5</td>
<td>46</td>
</tr>
<tr>
<td>Patient Census</td>
<td>84</td>
<td>86</td>
<td>88</td>
<td>89</td>
<td>91</td>
<td>89</td>
</tr>
<tr>
<td>Percent of Potential Bucks Distributed</td>
<td>44.6</td>
<td>43.6</td>
<td>46</td>
<td>43.3</td>
<td>46.7</td>
<td>51.7</td>
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</tbody>
</table>

*A phosphorus level on target (3.5-4.5) is one Buck; half a Buck given for phosphorus levels close to target (within 1 point of target or declining 15% towards target). Patient census would indicate the maximum of Bucks that could be potentially distributed in one month.

Table 3: Gift Cards Dispensed

<table>
<thead>
<tr>
<th>Gift Cards Available</th>
<th>“Bucks” Needed for Gift Card Level</th>
<th>Total Number of Gifts Cards Dispensed</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10*</td>
<td>1.5*</td>
<td>4</td>
</tr>
<tr>
<td>$15</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>$20</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td>$25</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>$30</td>
<td>3.5-4.5</td>
<td>25</td>
</tr>
<tr>
<td>$50</td>
<td>5-6</td>
<td>8</td>
</tr>
</tbody>
</table>

*Only if patient showed motivation during program and was a new start during the program.

Figure 5: Percent of Potential Phosphorus Bucks Distributed
Incentives should align with condition and the behavior required the barriers recipients face when engaging in healthy behaviors. Incentives is not ideal or cost effective. Programs should address lower impact on patient finances (21). A lack of individualizing change, small incentives have not worked as well when there is a value of incentives seemed to be a factor but in terms of dietary performance reinforced an individual’s sense of failure (21). The returned to their former behavior (21). Penalizing poor during the program but once the incentive ceased, the participants (20). In more complex behaviors, the incentives were successful schemes were simple and time limited involving simple behavior financial incentive. In a systematic review, the most successful participation in prevention services improved when they received disease prevention (19). The analysis of this program found that to receive encouragement to improve health behaviors for chronic diseases (11-13). As many as half of US patients don’t take medications as prescribed and do not feel the medications are helpful. Prescription medicines remind people they are sick. Many have an aversion to taking prescription medicine and do not like the side-effects (14). Educational strategies to improve health outcomes (15) are helpful but often long-term adherence requires motivation.

Motivation represents the reason for actions, desires, and needs. A reward for showing the desired behavior is a form of extrinsic motivation (16). Financial incentives for positive health behaviors have become common as many corporations reward employees for positive health behaviors (17,18). The Affordable Care Act mandated the creation of incentives to develop evidenced-based prevention programs for Medicaid beneficiaries to receive encouragement to improve health behaviors for chronic disease prevention (19). The analysis of this program found that participation in prevention services improved when they received financial incentive. In a systematic review, the most successful schemes were simple and time limited involving simple behavior (20). In more complex behaviors, the incentives were successful during the program but once the incentive ceased, the participants returned to their former behavior (21). Penalizing poor performance reinforced an individual’s sense of failure (21). The value of incentives seemed to be a factor but in terms of dietary change, small incentives have not worked as well when there is a lower impact on patient finances (21). A lack of individualizing incentives is not ideal or cost effective. Programs should address the barriers recipients face when engaging in healthy behaviors. Incentives should align with condition and the behavior required for positive outcomes. In ethical discussions regarding the use of financial incentives, it was recommended to focus on the patient as a whole rather than paying for individual measures especially in patients with complex chronic conditions (22,23).

Rewards can be useful and an effective tool to sustain motivation when people need to complete something that they find difficult or uninteresting (16). Incentives, once removed, often are not sustainable as individuals return to their previous behavior because the motivation is removed to continue the targeted behavior. The failure of financial incentives to drive long-term behavior may be due to the participants’ focus on the reward so when the incentive is removed, they do not have the same drive to continue the positive behavior (21,25,26). Lifestyle behavior change including dietary habits is one part of an individual’s behavior choice which is influenced by an individual’s social environment (20,21,26). A 10-week pilot feasibility trial of financial incentives and tailored coaching improved phosphorus levels but this study was very small and short (27). Financial incentives may be useful as one part of a behavior change program but the program needs to address the complex environment (social and economic) which affects an individual’s choices.

Implementing financial incentives are attractive because they are easy. The current reimbursement for dialysis units is based on positive outcomes for the unit but is not shared with patients. Currently the focus often is on patients with poor laboratory values yet patients with good values are not recognized for their efforts. Economic evaluation of improved adherence to phosphate binder therapy and amount of time to achieve the recommended serum phosphorus range was associated with increased cost savings in total Medicare and inpatient costs (7). A patient-focused reimbursement sharing may help improve outcomes and address barriers to binder adherence and health-related behaviors.

During the incentive program patients were very engaged with their “Phosphorus Bucks”. Some patients commented they would do anything for money plus were requesting education to assist meeting the goal. Improvement of phosphorus levels were observed during the 6 months of the program. There was a slight, non-significant, numerical decrease in the number of “Bucks” provided in July but this may have been due to the 4th of July holiday. As the program neared completion, there was a competitive drive to get more “Bucks”. The program may have been successful in improving phosphorus levels during the incentive program even with a small incentive reward. The percent of patients within target maintained for the 6 months post incentive program, but it did not have a sustained effect once incentives were removed beyond the 6 months.

**CONCLUSION**

Financial incentives were helpful in increasing the percentage of patients within phosphorus target. Once the incentives were removed, the percent of patients achieving target levels returned to baseline at the one year post-incentive period. More research is needed to see if patient focused incentive programs can support long-term improvement of patients’ phosphorus levels remaining at goal range.
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REFERENCES


