Organization
University of Maryland Medical Center (UMMC), Department of Pharmacy

Solution Title
Impact of a Physician and Pharmacist Collaborative Practice Agreement on Clinical Care and Economic Outcomes

Program/Project Description, including Goals
Transplant recipients present a variety of complex medical and surgical issues requiring a multidisciplinary approach for effective management. As a result of the high volume of transplants performed annually at our center and the complex nature of these patients, there were concerns about the amount of time surgeons and prescribers would be able to devote to the more complicated medical and surgical issues of these patients. The transplant team members felt that there needed to be a change in the process of how care was delivered to these patients with the following goals: 1.) Limit and reduce potential medication errors, 2.) Increase the amount of time prescribers are allowed to devote to the more complicated surgical and medical issues of the patient, and 3.) Reduce potential expenditures and improve cost savings for the institution by delivering more effective and efficient care.

Process
Pharmacists are an underutilized resource in most health systems. At UMMC, a team of clinical pharmacists with specialized training and experience in solid organ transplantation play a pivotal role in the care of transplant patients. Knowing the direct role and impact that the transplant pharmacists can have in the care of these patients, the departments of pharmacy and transplant surgery sought to develop a practice model that would utilize the services provided by these pharmacists while providing more efficient and effective care.

Solution
A collaborative practice agreement was established by the department of pharmacy between credentialed transplant pharmacists and physicians, allowing the pharmacists to provide a variety of clinical services while giving more time to the prescribers to focus on the complex medical and surgical issues of the patient. The transplant pharmacist-provided services include management of immunosuppression and infectious disease prophylaxis, electrolyte management, and anemia management.

Through the collaborative practice agreement, the transplant pharmacist evaluates the immunosuppression regimen daily and makes appropriate adjustments based on a predetermined plan made by the interdisciplinary team during rounds. Additionally, the transplant pharmacist enters a daily electronic consult note indicating the immunosuppression plan, which is then cosigned by the transplant surgeon. This note serves as a form of documentation and communication to other healthcare teams taking care of the patient, which is crucial in ensuring safety for the patient.

Additionally, the transplant pharmacy team maintains the immunosuppression protocol and clinical pathway for patients. Annually, the transplant pharmacy team makes edits to the protocol through discussions with the transplant surgery and medicine teams to ensure that current
practices are up to date. This not only ensures consistency in our practice as a transplant center, but also that our practices align with the most up-to-date evidence and guidelines in the field. The transplant pharmacy team will also order the outpatient immunosuppression and prophylaxis medications for patients prior to discharge, ensuring that dosing regimens are appropriate prior to leaving the hospital.

Through maintaining a consistent presence with the transplant surgery and medicine teams, the transplant pharmacists evaluate the entire medication regimen daily, optimizing medications and identifying potential drug interactions. The transplant pharmacy office is located on the floor designated for kidney and liver transplant patients, allowing the team to serve as a resource to nurses and providers throughout the workday. This improves the safety of medication administration on the floor.

In the months following kidney transplant, recipients attend a transitional care clinic located on the transplant floor. The transplant pharmacy team is involved in this clinic by adjusting immunosuppression to goal levels and evaluating medications for renal adjustments. Additionally, the transplant pharmacy documentation system previously described is heavily relied upon by the providers in the clinic. This documentation provides valuable information that allows the provider to evaluate patient and donor risk factors. The presence of the transplant pharmacists ensures patient-specific care while maximizing patient safety and minimizing medication errors.

**Measurable Outcomes**

Over a 5-week period, three of the transplant pharmacists recorded all interventions that they made practicing under the collaborative practice agreement. These interventions were categorized and entered into Quantifi®, which is a clinical applications software that assigns cost savings based on the nature and significance of the intervention. Estimated cost savings for various interventions are summarized in the table below:

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Estimated Savings per Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Therapy Management</td>
<td>$25-$2647</td>
</tr>
<tr>
<td>Medication Counseling</td>
<td>$208</td>
</tr>
<tr>
<td>Dosage Adjustment</td>
<td>$112</td>
</tr>
<tr>
<td>Antibiotic Selection</td>
<td>$100</td>
</tr>
<tr>
<td>Lab Evaluation</td>
<td>$76</td>
</tr>
<tr>
<td>Pharmacokinetic Evaluation</td>
<td>$76</td>
</tr>
<tr>
<td>Other</td>
<td>$1-$76</td>
</tr>
<tr>
<td>Drug Information</td>
<td>$20-$60</td>
</tr>
</tbody>
</table>

A total of 1060 interventions were made by the transplant pharmacists during this time period. Results on the types of interventions that were made are summarized in the figure below:
Total estimated savings came out to more than $107,000, or roughly $36,000 per pharmacist, during the study period. When these results are extrapolated out further, we estimate that each transplant pharmacist would provide more than $373,000 per year to the institution.

**Sustainability**
To ensure the sustainability of this practice model, the transplant pharmacists provide daily coverage for the Transplant Surgery and Medicine services, as well as maintain availability through an on-call pager at all times (24 hours/day, 7 days/week). By providing 24 hour consultation to nursing, medical, and other pharmacy staff patient safety is improved through the avoidance of potential medication errors that may otherwise occur without these services. In addition, we are currently working with the Cardiothoracic Transplant department to develop a collaborative practice agreement with their service, which we feel is an excellent opportunity to allow for the further expansion of this practice model.

**Role of Collaboration and Leadership**
The collaboration between different members of the transplant team and the dedication to patients from the transplant pharmacy team enabled the creation of a collaborative practice agreement. The transplant surgeons, transplant nephrologists, and transplant hepatologists partnered with the transplant pharmacy team to enable the introduction of this agreement. This arrangement has continuously been supported by the leaders in the department of pharmacy, department of surgery, and department of medicine, allowing for the practice model to continuing functioning at the level it currently does.

**Innovation**
Clinical pharmacists have not routinely or historically practiced at such a high level as they do in transplant at UMMC. The collaborative practice agreement allows transplant pharmacists the unique opportunity to initiate, modify, or change immunosuppression therapy as deemed appropriate. In addition, the direct involvement that the transplant pharmacists have in the care of transplant recipients is not commonly seen throughout other areas of medicine.
Related Tools and Resources
None

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