**Implementation of Pharmacist Counseling for Inpatient Chemotherapies**

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Abstract:

**Background**

Studies have demonstrated that pharmacist medication counseling improves patient adherence, reduces adverse reactions, increases patient understanding and satisfaction, and ultimately improves patient outcomes. The majority of antineoplastic treatment and pharmacist counseling occurs in the ambulatory setting. Inpatient chemotherapy is also a key component in the cancer care process, but pharmacist counseling is less common in the inpatient setting. As a result, the benefits of pharmacist counseling are less established for hospitalized patients. Historically, at Renown Regional Medical Center, inpatient chemotherapy education has consisted of general sessions with registered nurses. Renown Regional Medical Center’s pharmacy department has implemented a pharmacist counseling program for new-start inpatient chemotherapies. The goal of this project is to evaluate the pharmacist counseling program for newly initiated chemotherapy regimens.

**Methods**

This is a quality improvement project and feasibility study that occurred at Renown Regional Medical Center. It includes adult patients receiving their first cycle of inpatient oncolytic therapy who received a face-to-face counseling session with a clinical pharmacist. Data was collected from October 1, 2024 to February 28, 2025. Data collected includes patient demographics, day of therapy completed, additional interventions made from the session, patient questions, diagnoses and associated treatment regimens, and amount of time spent on face-to-face interaction with the patient. The primary endpoint is the number of new-start chemotherapy patients who received a full counseling session with a pharmacist. Secondary endpoints include mean time spent with the patient, number of pharmacist interventions made from these sessions, and day of therapy that counseling was completed.

**Results**

In total, 44 counseling interventions were included in this study. Of these, 41 (93%) counseling sessions were completed and 3 (7%) were unable to be completed. A counseling session took 13 minutes on average to complete. There were 15 additional interventions attributed to counseling. Thirty-four (83%) were completed on Day 1 of therapy.   
**Conclusion**   
The addition of pharmacist counseling on new start antineoplastics is feasible and beneficial in the inpatient setting. There are opportunities for more educational material options and further research, such as on the impact to patients’ perception of chemotherapy, outpatient adherence, and readmission rates.

Keywords: chemotherapy, pharmacist counseling

1. Background

The American Society of Health Systems Pharmacists (ASHP) recognizes the key role that pharmacists play in patient education. Pharmacists can act as a source of knowledge and support to the patient, as well as offer additional resources. A 2014 meta-analysis of pharmacist counseling estimated that approximately 60% of counseling occurs in the ambulatory setting, and 25% occurs at discharge, leaving 15% for other settings, such as during inpatient admissions1, making the pharmacist resource underutilized in the inpatient setting.   
 Antineoplastic regimens, often initiated inpatient, are high-risk, complex medication regimens with many factors, supportive medications, and unique challenges for the patient. Antineoplastics are associated with a decrease in quality of life2. However, pharmacist counseling on antineoplastics has been demonstrated to improve quality of life and mental health scores, and increase adherence3,4,5,6.

Most of these findings occurred in outpatients, however Sebring et al in 2020 did study the impact of pharmacist consultation prior to discharge for inpatients receiving cycle 1 of chemotherapy. They studied the impact on outpatient follow-up visit adherence, demonstrating a statistically significant improvement.

Overall, patients admitted for antineoplastics are less likely to receive pharmacist counseling and therefore less likely to receive the potential benefits. At Renown Regional Medical Center, pharmacists are heavily involved in the process of antineoplastic initiation. Pharmacists assist in the selection and dosing of antineoplastic regimens based on patient and disease characteristics and are responsible for order verification and the safe compounding of the final product. Given the significance of pharmacists in this process, Renown identified an opportunity for involvement with the education process as well. In September of 2024, pharmacist counseling of new-start inpatient antineoplastics began.

Historically, inpatient education was performed by the registered nurse (RN). Pharmacists would be involved upon request. RN education consisted primarily of generalized information on isolation precautions, infection prevention and recognition, and outpatient follow-up instructions. With the implementation of pharmacist counseling, nurses still perform their portion of education. The pharmacist would address drug-specific information and patient questions, allowing nurses more time to focus on other factors. The objective of this study is to evaluate the impact of pharmacist counseling on inpatient new-start chemotherapies on both the patient and pharmacist staff.

**2. Process**

*2.1 Identification*

Renown Oncology uses EPIC’s Beacon™ oncology module to manage antineoplastic regimens.   
 A pharmacy consult order for pharmacist counseling was added to all inpatient EPIC Beacon™ plans. The pharmacy consult order would be released from the plan and used to identify new-start chemotherapies in need of counseling. Once released, the consult would appear on the pharmacist daily workflow.

*2.2 Preparation*

Upon identification of eligible patients, the pharmacist would chart review the patient to identify potential areas of focus, concerns, or questions to ask the patient.   
 The pharmacist would then select appropriate educational material. The preferred resource for educational materials was the National Community Oncology Dispensing Association (NCODA) which provides comprehensive education for complete regimens. If NCODA was unavailable for the patient’s regimen, the secondary preference was Cancer Care Ontario, which provides education on individual agents in the regimen. If an agent was not available on either resource, it was left to pharmacist discretion to determine the appropriate resource.

*2.3 Counseling*

The pharmacist would bring the educational materials to the patient, introduce themselves, counsel the patient, and provide an opportunity to ask questions. Patients were informed that if questions arose after counseling, they could request a pharmacist to return to their room. There was no specific script for counseling; the flow and style were left to pharmacist discretion.

*2.4 Documentation*

Upon completion, the pharmacist would document the encounter in an EPIC™ i-vent. They would record the amount of time spent with the patient, the diagnosis, regimen name, day of therapy, general discussion points, patient questions, additional interventions made, and what educational material was provided.  
 Additional interventions were categorized (table 1). An additional intervention was defined as a problem or opportunity identified in the process of counseling that, by the pharmacist’s judgment, would not have been identified without performing education. Potential examples would include: a patient mentioning an untreated adverse effect, a home medication that may interact with their regimen, or a medical condition that may influence their treatment or supportive care.

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| --- |
| Disease state without pharmacotherapy: prophylaxis |
| Disease state without pharmacotherapy: antiemetics |
| Disease state without pharmacotherapy: granulocyte colony stimulating factors |
| Disease state without pharmacotherapy: other |
| Drug-drug interaction |
| Adverse drug reaction prevented |
| Outpatient follow-up/logistics |
| Other |

*Table 1: categories of interventions*

Once all tasks were completed, the pharmacist would close the intervention and discontinue the consult order from the patient chart and pharmacist workflow.

**3. Methods**

This Institutional Review Board (IRB)-exempted retrospective chart review of electronic medical records was performed for adult patients who received pharmacist counseling on the Cancer Nursing Unit (CNU) from October 1st, 2024, to February 28th, 2025.

Patients were excluded if they received exclusively intrathecal chemotherapy or exclusively hormonal therapy or if they were receiving chemotherapy on a floor other than CNU. Pediatric patients (< 18 years old) and pregnant patients were also excluded.

The primary outcome was the number of patients who received counseling from a pharmacist. Secondary outcomes include mean face-to-face time spent with the patient, additional interventions made because of pharmacist counseling, and the day of therapy that counseling was completed.

***3.1 Data Collection***

Data was collected via the electronic medical record and included demographics such as age, sex, and race, oncologic diagnoses, chemotherapy regimens including medication name, route, dose, frequency, and duration, and chemotherapy counseling interventions opened and documented by the performing pharmacist.

***2.2 Data Analysis***

There was no comparison period. Descriptive statistics, including percentages, means, and medians were used to describe data.

**4. Results**

Of the 45 patients who met criteria, 44 were included. One patient was excluded due to chemotherapy being initiated on a floor other than the cancer nursing unit.

***4.1 Characteristics***

Baseline characteristics are described in table 2. The average age was 58, 47.7% were female, and 88.6% spoke English as their primary language. The only other primary language spoken was Spanish. The antineoplastic indications are described in table 3. The most common group of malignancies were hematological, with 61.3% of patients. The most common overall diagnosis was acute myeloid leukemia, with 13.6% of patients overall.  
 The regimens counselled on are described in table 4 and 5. These are broken down based on the availability of full-regimen resources. Of all regimens in this study, 48% study had full-regimen resources available. The most frequently reported regimen was carboplatin + etoposide + an additional agent, which did not have a full regimen resource available. Other frequently reported regimens included rituximab, cyclophosphamide, doxorubicin, vincristine, prednisone (R-CHOP) and derivatives, and cyclophosphamide, bortezomib, and dexamethasone (CyBorD).

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| **Characteristic** | **N = 44** |
| Average age (years) | 58 |
| Male, n (%) | 23 (52.3) |
| Female, n (%) | 21 (47.7) |
| English speakers, n (%) | 39 (88.6) |
| Spanish speakers, n (%) | 5 (11.4) |

*Table 2: Baseline characteristics of patients*

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| **Oncologic diagnosis** | **N = 44** |
| Hematological malignancy, n (%) | 27 (61.3) |
| Lung, n (%) | 6 (13.6) |
| Testicular, n (%) | 3 (6.8) |
| Unknown primary, n (%) | 2 (4.5) |
| Breast, n (%) | 2 (4.5) |
| Other, n (%) | 1 (2.3) |
| Gastrointestinal n (%) | 1 (2.3) |
| Neuroendocrine, n (%) | 1 (2.3) |
| Sarcoma, n (%) | 1 (2.3) |

*Table 3: Categories of oncologic diagnoses*

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| **Regimens with full regimen resource available** | **n=21** |
| Rituximab + cyclophosphamide + doxorubicin + vincristine + prednisone and derivatives, n (%) | 5 (23.8) |
| Cyclophosphamide + bortezomib + dexamethasone, n (%) | 4 (19.0) |
| Daunorubicin + cytarabine + gemtuzumab ozogamicin, n (%) | 2 (9.5) |
| Rituximab + etoposide + prednisone + vincristine + cyclophosphamide + doxorubicin, n (%) | 2 (9.5) |
| Blinatumumab, n (%) | 2 (9.5) |
| Other regimens (single uses), n (%) | 6 (28.6) |

*Table 4: Regimens included with full regimen resources available*

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| **Regimens without full regimen resource available** | **n=23** |
| Carboplatin + etoposide + additional agent, n (%) | 6 (26.1) |
| Venetoclax + HMA, n (%) | 3 (13.0) |
| Anastrazole + Abemaciclib, n (%) | 2 (8.7) |
| Arsenic + ATRA, n (%) | 2 (8.7) |
| Bispecific agents (tarlatamab, elratamab), n (%) | 2 (8.7) |
| Other regimens (single uses), n (%) | 8 (34.8) |

*Table 5: Regimens included without full regimen resource available*

***4.2 Primary Outcome***

Among the 44 included interventions, 41 (93.2%) were completed. There were 3 (6.8%) that were unable to be completed.

***4.3 Secondary Outcomes***

Fifteen additional interventions were made as a result of counseling over 14 patients (34.1%). Two interventions were attributed to 1 patient.   
 Amongst these interventions, the most frequent was under the category of disease state without pharmacotherapy – other, having 5 interventions occur. Other categories include adverse drug reactions prevented (2), disease state without pharmacotherapy (4), drug-drug interaction (1), and outpatient follow-up and logistics (3) (Figure 1).   
 Table 6 describes the face-to-face time spent with the patient. Average face-to-face time spent was 13 minutes. Of note, 1 intervention did not document time spent, so was not included in this average.

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| **Face to face time spent** |  |
| Average (standard deviation) | 13 (7.3) |
| Minimum time spent, minutes | 5 |
| Maximum time spent, minutes | 30 |

*Table 6: Face-to-face time spent with the patient*

Among the 41 included counseling sessions, 34 (82.9%) were completed on Day 1 of therapy, 5 (12.2%) were completed on Day 2 of therapy, and 2 (4.9%) were completed on Day 3 of therapy. There were no occurrences past Day 3 (Figure 2).   
 Of note, among the 7 that were completed after Day 1, 3 were completed by a back-up pharmacist. Nine total were completed by this back-up pharmacist.

**5. Discussion**

This study demonstrates that the addition of pharmacist counseling in the inpatient setting is time-efficient and results in an opportunity for pharmacists to identify and act on medication issues. Among identified patients, 93% received a face-to-face counseling session with a pharmacist, with 83% of these occurring on the first day of therapy and 34% resulting in additional interventions. They took an average of 13 minutes, but could potentially take as long as 30 minutes.

Examples of pharmacist interventions include a patient complaining of significant diarrhea immediately after starting chemotherapy. The pharmacist took this information to the provider and was able to add appropriate antidiarrheal therapy. Another patient expressed concern about her outpatient follow-up appointment times, so the pharmacist contacted the pharmacist from the outpatient infusion center to change their appointment times. One patient asked about feeling hot with her chemotherapy. The pharmacist noted that she felt warm, requested a temperature be taken, and when it was found that she was febrile, took this to the provider to hold chemotherapy and initiate a febrile neutropenia workup and antibiotics.

***5.1 Barriers to implementation***

A major initial concern was the amount of time required. Inpatient pharmacists have a significant workload, and the addition of another item may have posed a challenge. The purpose of this study was in part to evaluate that concern.

Another barrier faced was the frequent inavailability of preferred educational materials. Of the regimens in this study, only 48% were available as complete regimens. This posed a challenge to pharmacists when they had to collect appropriate materials on each individual agent. Pharmacists estimate that, for longer regimens, this could take an additional 30 minutes prior to counseling. Additionally, material for each individual agent may be considerably longer to read than a complete regimen, which could be overwhelming to the patient. For example, an complete regimen document for da-R-EPOCH, which contains 6 individual agents, is 10 pages long. Individual agent documents for carboplatin and etoposide, only 2 agents, is 15 pages long.

***5.2 Study limitations***

Limitations of this study include its retrospective design, and variability in documentation in interventions, including 1 intervention with incomplete documentation. Data points in this study required manual chart review and full data may not have been captured during collection. The collection of face-to-face time does not account for additional time spent prior to or following face-to-face time, so this data may not fully elucidate time requirements involved.

**6. Conclusion**

The addition of pharmacist counseling on new antineoplastics in the inpatient setting is feasible and beneficial, it enables pharmacists to proactively identify supportive care needs and manage adverse reactions. The lack of available educational resources was a barrier, but there are opportunities to develop internal educational materials to overcome this. Further studies would be beneficial to evaluate the impact on patient perceptions, readmissions, and outpatient follow-up adherence.

Conflicts of Interest

The authors of this manuscript have nothing to disclose and declare no conflicts of interest.

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Figures:

*Figure 1: Additional interventions made as a result of pharmacist counseling*

*Figure 2: Day of therapy that counseling was completed*