Clinical Pharmacist in Oncology Care
Expanded Role and Growing Value

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Disclaimer

I declare to meeting attendees that there are no financial relationships with any for-profit companies that are directly or indirectly related to the subject of my presentation.
Learning objectives

At the end of this presentation, the audience should be able to:

• Describe the role of the oncology clinical pharmacist in each step of the medication management process

• Conduct an in-depth review of chemotherapy orders

• Apply the medication reconciliation procedure

• Put in practice a therapeutic drug monitoring on narrow therapeutic index medications

• Provide patient counseling to ensure the continuity of care after discharge
Introduction

• As an integral part of the cancer care team, oncology pharmacists are involved with the care of cancer patients at all phases of their treatment.
The Joint Commission outlines a process of seven critical steps that constitute safe and complete medication management.

Medication management: an overarching concept that describes the delivery of patient-centered care to optimize safe, effective, and appropriate drug therapy.
Treatment Management Process: 7 Steps

The Joint Commission outlines a process of seven critical steps that constitute safe and complete medication management:

1. Selection
2. Prescribing
3. Dosing
4. Transcribing
5. Oncology Clinical Pharmacist Role
6. Procurement
7. Storage
8. Preparation
9. Administration
10. Monitoring
11. Evaluation
12. Counseling


1. Selection

- Oncology clinical pharmacists provide medical information about:
  - Antineoplastic pharmacology
  - Dosing adjustments for organ dysfunction
  - Adverse-effect profiles

- Frequently asked questions:
  - Availability of an investigational drug, updated information on recent developments
  - Literature documenting off-label use of an anticancer drug
  - Published and ongoing clinical trials

- Pharmacogenomics considerations: optimal drug selection, dose and treatment duration
  - Examples: EGFR Inhibitors (gefitinib, erlotinib, and cetuximab)
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- Procurement
- Storage
- Preparation
- Administration
- Oncology Clinical Pharmacist Role
- Monitoring Evaluation Counseling


2. Prescribing, dosing, and transcribing

Steps of Chemotherapy Order Assessment and Review by Oncology Pharmacist

- Verify Patient Identify
- Confirm Protocol Matches Clinical Indication and Eligibility for Treatment
- Review Medical History for Potential Interactions and Allergies
- Check Timing of Treatment and Dosage Schedule
- Determine Patient’s Body Surface Area
- Check Appropriateness of Chemotherapy Dose(s) and Route
- Review Laboratory Values
- Complementary Steps
Steps of Chemotherapy Order Assessment and Review

1. Verify Patient Identify
   • Use at least two identifiers to confirm that the order has been written for the correct patient:
     ▪ Name
     ▪ Identification Numbers
     ▪ Date of Birth
   • If possible, use a technology such as automated identification (e.g., barcoding, radiofrequency).

2. Confirm Protocol Matches Clinical Indication and Eligibility for Treatment
   • Example: Eligibility Criteria for Adjuvant Therapy for Breast Cancer using Cyclophosphamide, DOXOrubicin and DOCEtaxel
     ▪ Less than or equal to 65 years of age
     ▪ ECOG 0-1
     ▪ Node positive early stage breast cancer (any T, N1-3)
     ▪ HER-2 negative
     ▪ Adequate renal and hepatic function
     ▪ Adequate cardiac function
Steps of Chemotherapy Order Assessment and Review

3. Review Medical History for Potential Interactions and Allergies

**Medication Reconciliation**

- Medication reconciliation (MedRec) is a formal process in which healthcare providers work with patients and families, to ensure that accurate and complete medication information is communicated consistently across transitions of care.
- MedRec requires a systematic and comprehensive review of all the medications a patient is taking to allow evaluation of any medications that are being added, changed, or discontinued.
- The cornerstone of MedRec is a comprehensive medication list known as the BPMH: a complete and accurate list of all the medications the patient is taking using 2 sources of information including a patient/family interview.

Medication Reconciliation in the clinical setting

Completing MedRec in primary care involves 4 main activities

Step 1: Collect - Collect the Best Possible Medication History (BPMH)
- Gather sources of information (e.g., community pharmacy list, discharge summary, medication vials, drug information system list, etc.)
- Interview the patient using a systematic process to determine actual medication use by the patient
- Document the BPMH

Step 2: Compare - Identify discrepancies
- Compare the BPMH with information contained in the patient’s primary care chart
- Document the differences (discrepancies) that need clarification.
Medication Reconciliation in the clinical setting

Completing MedRec in primary care involves 4 main activities

**Step 3 Correct - Resolve discrepancies**
- Correct the discrepancies as appropriate through discussion with the primary care provider and the patient.
- Update the BPMH with the resolved discrepancies; this becomes the reconciled list. Document the reconciled list in the primary care chart.

**Step 4 Communicate - Ensure continuity of medication information**
- Communicate any medication changes to the patient and verify the patient’s understanding of their medication regimen and the importance of keeping an up-to-date medication list.
- Provide the reconciled list to the patient’s community pharmacist and others involved in the patient’s circle of care.

...making sure the right information is communicated about a patient’s medications each time the patient moves throughout the healthcare system
Steps of Chemotherapy Order Assessment and Review

4. Check Timing of Treatment and Dosage Schedule
   • Length of course
   • Time interval between each cycle

\[ BSA \ (m^2) = \sqrt{\frac{\text{height (cm)} \times \text{weight (kg)}}{3600}} \]

Example:
   • For patients on Herceptin 6mg/Kg, treatments are given as a single dose, once every 3 weeks
   • Whereas patients on 2mg/Kg regimen receive a dose weekly

5. Determine Patient’s Body Surface Area
   • A commonly used equation for BSA calculation is the Mosteller formula:

Example
   • Chemotherapy doses are based on the actual BSA of a young and otherwise healthy patient.
   • For an older, very frail patient, may cap the doses.
Steps of Chemotherapy Order Assessment and Review

6. **Check Appropriateness of Chemotherapy Dose(s) and Route**
   - Based on: BSA (most chemotherapy drugs) /Weight (e.g., trastuzumab) /Renal function (e.g., carboplatin)
   - A maximum of 5% variance in dosage calculation is permitted: if discrepancy, physician should be contacted.
   - If the chemotherapy doses are to be administered as ordered, the pharmacist should place a note clarifying this in the patient’s chart.
   - **Check Maximum Cumulative Doses (if applicable)**
     - Some cytotoxic agents, such as bleomycin and the anthracyclines, have a suggested maximum lifetime dose due to toxicities associated.
     - Example: For Bleomycin, a cumulative dose of greater than 450 units is a risk factor for developing pulmonary toxicity, and no dose is considered safe.
Steps of Chemotherapy Order Assessment and Review

7. **Review Laboratory Values**
   - Screen for Preexisting Disease
   - Monitor for Chemotherapy-Induced Toxicity
   - Determine the Need for Dose Modifications
     - Organ dysfunction can lead to reduced clearance of a drug and increased toxicity. Example: DOCEtaxel
     - Chemotherapy that causes organ toxicity to an organ that is already damaged can lead to further damage. Example: CISplatin
   - Monitor Treatment Progress
     - Example: Liver function tests, Tumor markers etc.
Steps of Chemotherapy Order Assessment and Review

8. Complementary Steps

- Follow-up of any non-formulary drug orders, recommending a formulary equivalent
- Ensuring that appropriate therapy monitoring is implemented
- Ensuring that all necessary medication is ordered, e.g. premedication, prophylaxis and supportive care
- Reviewing medication for cost effectiveness
Treatment Management Process: 7 Steps

The Joint Commission outlines a process of seven critical steps that constitute safe and complete medication management.
3. Procurement

• The care of cancer patients continues to be challenged with:
  ▪ High cost therapies
  ▪ Medication shortages (leucovorin, liposomal doxorubicin, fluorouracil, and paclitaxel)
  ▪ Regulatory requirements
  ▪ Dwindling reimbursement

• Many biologic and cancer therapies are expensive and available only through restricted channels or specialty pharmacies

• The oncology pharmacist is heavily relied upon to provide support for the clinical team
  - Oncology pharmacists are well equipped to navigate the retail and reimbursement process
  - Along with members of the patient care team, they may be able to locate resources for co-pay assistance, drug replacement, or manufacturer discounts

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Oncology Clinical Pharmacist Role

4. Storage

• Proper storage of antineoplastic agents in recommended lighting and temperature is crucial to ensure the maintain of their full dose activity

• **Lookalike/soundalike (LASA) medications:** improper storage may impact proper preparation
  - vinCRIStine and vinBLAStine,
  - CARBOplatin and CISPlatin,
  - DAUNORubicin, DOXORubicin, IDARubicin

• **Solutions:**
  - Store physically apart
  - Special font/size labeling

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Oncology Clinical Pharmacist Role


5. Chemotherapy Preparation

- Oncology Clinical Pharmacists have a role in assuring the Safe Handling of Hazardous Drugs and the facility compliance with Regulatory Standards for Biological Safety.
Chemotherapy Preparation in the Oncology Pharmacy

This room should be ventilated into the ante room to maintain a **negative air pressure gradient**

Any person who opens a container to handle chemotherapy drugs wears **personal protective equipment (PPE)** including gloves and protective clothing.

The principle of **aseptic drug preparation** will be followed, along with the techniques specific for chemotherapy drugs.

The Chemotherapy Preparation Area is in a dedicated clean room that includes a buffer zone where the **Biological Safety Cabinet** is located.

American Society of Health-System Pharmacists. ASHP guidelines on handling hazardous drugs. Am J Health-Syst Pharm, 2006; 63: 1172-93
Pharmacists prepare standardized charts for drug dilution, type of carrier solutions and volumes, specific containers, infusion rates, and stability.

Chemotherapy product labels include:

- **a.** Name of patient, identification number, unit
- **b.** Generic drug name
- **c.** Date of preparation
- **d.** Dose, total final volume, infusion solution
- **e.** Route of administration (e.g. IT)
- **f.** Drug concentration
- **g.** If sequential, Bag 1 of 2 etc.
- **h.** Expiry date and time, initials of pharmacy personnel
- **i.** Storage requirements
- **j.** Label that identifies the dose as a “Hazardous Agent”/“Vesicant”
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6. Administration

Oncology Pharmacist Consultations Include

- Compatibilities with multiple infusion lines
- Scheduling and sequencing
- Infusion rates, volume to prime IV lines properly
- Fluid restriction, type of carrier solutions in cases of metabolic abnormalities
- Infusion rates to make up delayed administration, especially where short time frames are given for drug stability
- Discussion on viable IV access (centrally placed infusion catheters versus peripherally placed lines to avoid extravasation)
- Providing supportive care in cases of extravasation and antidotes protocols
6. Administration

Practical Examples

- Prehydration and Forced-diuresis protocols in high-dose chemotherapy regimens (e.g. Cisplatin)
- Chemoprotective agents (e.g. Mesna with high-dose Ifosfamide, Dexrazoxane with doxorubicin etc.)
- Prophylaxis to avoid anaphylactic or allergic reactions with monoclonal antibody drugs (e.g. rituximab)
- Antiemetic protocols that match levels of regimen emetogenicity in collaborate with physicians

6. Administration

Administration Challenges with Oral Chemotherapy for Pharmacists

• Drug Adherence: Key issue
  - Several studies indicate that higher survival rates occur with patient adherence with oral chemotherapy regimens
  - Pharmacist counseling addresses major barriers of adherence

• Major drug-drug interactions with new oral chemotherapy agents
  - TK inhibitors: Major substrates and inhibitors of major cytochrome P450 3A4

6. Administration

Administration Challenges with Oral Chemotherapy for Pharmacists

• Method of administration
  - Taken with or without food? Crushability?
  - Opening capsules (e.g. NG tubing)
  - Allergic reactions- prophylaxis with histamine antagonist
  - Nausea- antiemetics

• Adverse side effects management
  - Diarrhea (e.g. irinotecan)
  - Skin rashes (e.g. acneiform rashes with EGFR inhibitors: pre-emptive treatment)
  - Serious events: Neutropenia, infusion reactions, cardiac...
The Joint Commission outlines a process of seven critical steps that constitute safe and complete medication management.
7. Monitoring, evaluation, and counseling

Monitoring and evaluating drug therapy, notably when joining clinical rounds, has long been an area that Oncology Clinical Pharmacists have helped in to optimize anticancer drug therapy.

- Monitoring with chemotherapy administration:
  - Patient’s ability to tolerate hydration regimens
  - Electrolyte abnormalities
  - Possible tumor lysis syndrome
  - Control of nausea, vomiting

- Cumulative doses of cytotoxics
- Side effects of chemotherapy
- Pharmacists have played a key role in antibiotic selection, dosing, and pharmacokinetic monitoring
  - Significant decline in usage rates for inappropriate antibiotic use demonstrated in FN patients

7. Monitoring, evaluation, and counseling

Therapeutic Drug Monitoring: A growing role for Oncology Pharmacists

- **Definition**
  - Therapeutic drug monitoring (TDM) is the use of drug concentration measurements in plasma as an aid to the management of drug therapy for optimizing clinical outcome while minimizing the risk of drug-induced toxicity.

Therapeutic Drug Monitoring

Which drugs should be monitored?

- When there is a narrow concentration interval between therapeutic and toxic effects
  - For some drugs (e.g. anticoagulants, aminoglycoside antibiotics, immunosuppressants, cardiac glycosides) the therapeutic index is narrow and monitoring is valuable in achieving effective concentrations without systemic toxicity
- When there is poor correlation between dose and clinical effect
- When there are no good clinical markers of effect
- When plasma concentration shows a good correlation with clinical effect and toxicity
Therapeutic Drug Monitoring

Specimen
- Serum or plasma samples are normally used
- Whole blood is the preferred matrix for many immunosuppressive drugs (e.g., cyclosporine) as the drug is concentrated in red cells

Timing
- For TDM to be meaningful, the patient should be in steady-state on the present dose of the drug
  - Exception: when investigating suspected toxicity
- In practice, samples are taken after drug dosing has continued for at least four half-lives
  - For drugs with a long half-life (e.g., digoxin, phenobarbitone), two weeks or more may be required before steady-state sampling

How often drugs should be monitored?
Depends on the clinical question to be answered
- Daily monitoring may be necessary in critically ill patients with rapidly changing clearance, e.g., with aminoglycoside antibiotics
- Dosage requirements for immunosuppressive drugs vary markedly in the early days and weeks post-transplantation, and frequent monitoring is normally required (e.g., 3 times weekly for cyclosporine)
Calculation of dose adjustment

• For drugs following **first-order (linear) pharmacokinetics** the approach is to use **simple proportionality**
  - A new dose $DN$ can be calculated from the present dose $D$, the actual plasma concentration $C$ and the desired plasma concentration $CN$ as follows:
  $$DN = D \times \frac{CN}{C}$$

• For drugs that **do not exhibit first-order kinetics** (eg, phenytoin) the approach is to alter the dose interval rather than the dose amount (eg, for aminoglycosides). Published **nomograms** are available to facilitate dose adjustment
Patient Counseling by the Oncology Pharmacist

• Definition

  ▪ Patient counseling is defined as:
    “Providing medication information orally or in written form to the patients or their representatives on directions of use of medications, and advice on side effects, precautions, storage, diet and lifestyle modifications”

• Pharmacist counseling is considered the best method for improving patient adherence
Patient Counseling by the Oncology Pharmacist

• Content of patient counseling: *ASHP guidelines*
  1. The medication’s trade name, generic name
  2. The medication’s use, expected benefits and action
  3. The medication’s route, dosage form, dosage, and administration schedule (including duration of therapy)
  4. Directions for preparing and using or administering the medication
  5. Action to be taken in case of a missed dose
  6. Precautions to be observed during the medication’s use
  7. Adverse effects and actions to prevent or minimize their occurrence, including the need to notify the prescriber, or pharmacist
  8. Techniques for self-monitoring of the pharmacotherapy
  10. Proper storage and disposal (of contaminated or discontinued) medications
  11. Any information unique to an individual patient
Conclusion

• The knowledge and skills of an oncology pharmacist support a wide variety of functions in all aspects of patient care.

• The oncology pharmacist is often one of the few team members that fully understands the safety, efficacy, pharmacologic, and financial components of patient care in individuals with cancer.

• The changing landscape of health care and evolving approach to cancer care (e.g., oral therapies, targeted therapies, personalized medicine) will emphasize the need for the oncology health care team to include an oncology pharmacist.
We are defying the odds every day.