Strategies to Prevent Cancer Chemotherapy Errors

Raymond J. Muller, MS, RPh, FASHP
Associate Director
Division of Pharmacy Services
Memorial Sloan-Kettering Cancer Center (MSKCC)
New York, New York
September 2010
Presentation Outline

I. Causes of Chemo Errors
II. Benefits of CPOE
III. Strategies to Prevent Errors
IV. Institutional Self-Assessment
V. Ensuring a Safe Chemo Experience

- 44,000 - 98,000 patient deaths/yr due to error
- Total national costs of preventable adverse events: $17-28 billion/yr.
- Medication errors: Approx. 7000 deaths/yr.
- "More people die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer and AIDS".
Safety nets
(Professional, Institutional, Individual, Technological, etc.)
Systems not people

- Medication errors are property of the system as a whole rather than results of the acts or omissions of the people in the system.

- Performance improvement requires changing the system, not changing the people.
  - Practitioners now held to an unattainable standard
  - perfection
Reviewing Medication Orders for Cancer Chemotherapy

- Most toxic drugs
- Safe dose ranges are narrow
- Doses can vary at least 100-fold for different diseases
  - A “normal” dose of methotrexate can range from 10 mg to 20 grams.
- Dozens of errors are described in lay press
Report cancer-stricken wife of judge dies after being given the wrong medicine...

Rx FOR DEATH

Paraplatin
Platinol

This is Paraplatin, a drug that the wife of a top state judge was given.

This is Platinol, reportedly the drug that the wife of a top state judge was given.
Overdose death of cancer patient rocks Mass. hospital

By LAWRENCE K. ALTMAN
Of The New York Times

Two patients receiving experimental treatment for advanced breast cancer at one of the country's most prestigious can-

The patient who died was Betsy A. Lehman, an award-winning health columnist for the Boston Globe. The news of the mishap, detailed yesterday in an article published in the Globe, was all the more unsettled.
Response is slow to deadly mixups

Too little done to avert cancer drug errors

By Richard A. Knox
GLOBE STAFF

Time and again, the same dreadful mistake kept recurring. It killed a 5-year-old Texas child, a 21-year-old pregnant woman in New York, a 56-year-old man in England, a 15-month-old boy in Saudi Arabia and at least eight others.

Under treatment for cancer, all these patients had received mistaken spinal injections of vincristine, a highly toxic drug that should only be injected, with caution, into veins - never into the spine. But hurried doctors and nurses all over the world knew that the consequences were horrific. The victims experienced terrible back pain, followed by gradually ascending paralysis as the drug ate away nerve cells in the spinal cord and the brain. Most ended in a lingering coma - for 12 months in the case of a 23-year-old Virginia man - before they died. Only one victim is known to have survived, but with permanent nerve damage.

Accidental spinal injections of vincristine are a case study of how cancer chemotherapy errors happen repeatedly, and how slow hospitals, doctors, professional organizations, government agencies, nurses and pharmacists have been to take even simple actions to prevent them.

And the vincristine tragedy is just one of many serious errors caused by human failures.
Boy Received Wrong Medication

Family: Did Mix-Up Cause Death?

By KAREN GARLOCH
Staff Writer

Relatives of a 5-year-old Shelby boy are questioning whether a mix-up in medications at Duke University Medical Center may have caused the boy's death last week.

Brandon Aly Quintero, 5, died Friday about 5:30 p.m., two weeks after receiving incorrect medication for treatment of a benign tumor on his left lobe.

Brandon received his first and only chemotherapy injection about two weeks ago and "went downhill."

"We were supposed to go home the next day," she said Monday, several hours after Brandon's funeral. "But he just got sick. And then he died."

Hospital officials on Monday acknowledged the mix-up but refused to release details, citing patient confidentiality.
Oversight panels don’t see all facts of medical mistakes cases

By Michael J. Berens
Tribune Staff Writer
September 12, 2000

The full extent of medical errors in hospitals – made by nurses, doctors and now shrouded by a haphazard system of regulatory oversight that allows hospitals to report problems and provide only the sketchiest of information – is tripling over the past decade, a study finds.

Lethal drugs, lax rules a deadly mix in hospitals

By Jaman Haana
Tribune Staff Writer

Nothing about Julia Sims’ medical condition was life-threatening when she arrived at the emergency room at Gottlieb Memorial Hospital with symptoms of nausea, vomiting and diarrhea that doctors believed were the result of food poisoning.

Medication errors triple over decade, study finds

Washington Post
Fatal medication errors in the United States between 1983 and 1993, hospital stays dropped by 43 percent, and patient visits increased by 20 percent, the study published in the Lancet last week found.

FDA Considers Ways to Limit Medicines’ Dangers

May 11, 1999

WASHINGTON (CNN) — Hoping to decrease the 100,000 patient deaths caused by medication side effects each year, the U.S. Food and Drug Administration has announced plans to improve patient safety.

The agency is expecting to boost its watch over new drugs after they hit the market and...
Scope of the problem

→ 7% of hospital admissions suffer an adverse event

→ Medication errors harm 1.5 million Americans/year

→ 40% of patients do not take meds as prescribed

→ Fatal and serious ADRs increased 25% in 2009 vs 2008; 20,000 medication-related deaths in 2009
Potential Causes of Chemotherapy Medication Errors

- Miscommunicated verbal orders
- Total course dose given every day
- Lack of pertinent patient healthcare information
- Excessive interruptions during order processing or dose preparation
- Substantial distance between the pharmacy and the patient treatment area
Potential Causes of Chemotherapy Medication Errors – Cont’d

- Poor packaging and labeling by manufacturers.
- Use of abbreviations of drug names
- Similar-sounding drug names within the therapeutic class
- Lack of proper copy of the physician order or use of a fax copy, which might be illegible
- Use of trade names, which may vary even for generically available agents, rather than generic names.
Potential Causes of Chemotherapy Medication Errors – Cont’d

- Lack of access to laboratory data and/or patient demographics such as age, height, and weight.
- Use of inappropriate lab data
- Inadvertent intrathecal administration of drugs such as vincristine, doxorubicin, and daunorubicin
- Failure to round drug doses to the nearest whole integer
Total Course Dose Given Daily

Problem

– Example: “cyclophosphamide 4 g/m² over 4 days”

– Ambiguous order misinterpreted and patient received a 4-fold overdose resulting in death

Solution: standardized order form with daily dose only

– Example: cyclophosphamide 1g/m² (1.7 g) daily x 4 d (3/18, 3/19, 3/20, 3/21)
Standardized Order Form

- Should be used for all oral and parenteral drugs
- Should be approved by P&T Committee or equivalent
- Includes: Protocol #, cycle #, age, weight, height, BSA, pertinent lab data (e.g., WBC, platelets, serum creatinine), hydration fluids, antiemetics, supportive meds
- Standard format: generic name only, daily dose, route of administration, frequency, administration guidelines
CONFIDENTIAL PATIENT INFORMATION - HANDLE ACCORDING TO HOSPITAL POLICY

Memorial Hospital for Cancer and Allied Diseases

Adult Treatment Orders

Location: O 34 J 0068 J DG J INPT J RT

Use Central Access Device: J Y Y N J Other

J See OMS for lab orders

J CBC J PLT J lysa J Glucose J PT/INR J APTT J EKG J Other

DIAGNOSIS & TREATMENT PLAN:

NON-CHEMOTHERAPY ORDERS:

INITIATE STANDARD HYDRATION, ANTIEMETICS, & SUPPORTIVE MEDICATION PER MSKCC GUIDELINES

See Chemotherapy/Biologic Therapy Guidelines under Reference Manuals on MSKCC Intranet

Indicate any Modifications To Standard:

J Omit Dexamethasone

Medications:

Hydration:

Parameters for Treatment:

WBC: ANC: PLT: CREAT: CRCL: HGB: Other:

** If on IRB protocol, parameters are per protocol, unless otherwise indicated

| Height | Weight | BSA | Protocol | On: IRB

DATE of Rx

<table>
<thead>
<tr>
<th>CHEMOTHERAPY BIOLGIC THERAPY</th>
<th>NORMIZED DOSE</th>
<th>TREATMENT DOSE</th>
<th>ROUTE</th>
<th>FREQUENCY DURATION</th>
<th>TOTAL DAILY DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use generic names</td>
<td>mg, units, micrograms</td>
<td>per ml, mg/kg, ml/kg</td>
<td>Day</td>
<td>Day</td>
<td>Day</td>
</tr>
</tbody>
</table>

Indicate reason for Treatment/Dosage modification:

J Toxicity

J Progression Of Disease

J Change in BSA

J Ideal Weight Modification

Fellow/NP Signature/Beeper

Attending Signature/Beeper

Verification RN: Signature/Date/Time

RPh Signature/Date

Printed Name: Fellow/NP

Printed Name: Attending

RPh Signature/Date

RPh Signature/Date

Date order written: / / Time: am/pm

99-99133 O53 CICM Approval Date: 12/96 Rev: 12/19/03 Page 1 of 2 D/13.020
Literature Errors
Don’t Believe Everything You Read

Problem
– Article read: vincristine 1.4 mg/m$^2$ Days 1-5
– Should have read: vincristine 1.4mg/m$^2$ on Day 1

Solution: Do not administer therapy with an unfamiliar regimen unless you review more than one citation
Verbal Orders

Problem

- **V/O:** MD RN RN RPh
- Request vinblastine 20 mg syringes x 5
- Actual order: infuse 3mg/d x 5 days via pump
- Hard copy not checked against verbal order
- Patient received 3 days of therapy patient death
- $11.1 million awarded to family

Solution: Verbal orders are not permitted with cancer
Ambiguous order

• “Give pt. 24 VP-16 capsules before discharge”
Verbal order for an 18 month old child

“give the kid .8 of morphine”
Packaging and Labeling of Oncology Drugs

Problem

- Many products (especially from the same company) look incredibly similar
- Brand name or corporate logo is often much larger than the generic name or strength
- Several deaths have been attributed to product mix-ups or overdoses because the wrong size vial was used
- Concentration misunderstood and thought to be vial size
DILUENT for TAXOTERE

17% ethanol in water for injection.

For 1.83 mL

Caution: Use the entire contents of the vial of Taxotere 20 mg vial. Store in a refrigerator.

Exp. 08/24/06

Description:

Made by: C.R. Bard, Inc.

1150 King St., Covington, KY 41011
BRISTOL LABORATORIES®
ONCOLOGY PRODUCTS

NDC 0015-3220-22 50 mL
Platinol®-AQ
CISPLATIN INJECTION
50 mg in 50 mL
1 mg per mL Aqueous

Exercise caution to prevent inadvertent Platinol overdose. See Package Insert.
Vincristine errors

- Mix-ups with vinblastine
- IV overdoses due to
  - Availability of 5 mg vial
  - Lack of dosing check systems for calculation errors
  - Trailing zero (2.0 mg read as 20 mg)
- Accidental intrathecal injection
Wrong Route of Administration

Problem

- Intravenous doses of vincristine or doxorubicin have been given intrathecally and is almost always fatal

- Despite packaging modifications made in the US, this error continues to occur worldwide
Wrong Route of Administration (cont’d)

Solution

• Unique protocol for preparing, dispensing, administering, and labeling intrathecal products as intrathecal

• Pharmacy computer system with built-in route contraindications

• New data demonstrating stability of 25 mL to 50 mL dilution of vincristine to deter intrathecal administration

• IV drug (e.g., vincristine) not delivered to treatment area until after the lumbar puncture completed
Access to Information

• Informational guidelines about conventional and investigational chemotherapy must be readily available

• MSKCC IV guidelines
  - “On-line” with usual doses, adverse effects, supportive meds and dose adjustment for renal or hepatic dysfunction
MEDICATION: Oxaliplatin (Eloxatin™)

RESTRICTION: Nurses may administer this agent after they have successfully completed the MSKCC Chemotherapy/Biologic Therapy Competency Program.

Use is restricted to the Gastrointestinal Oncology Service

CATEGORY: Di-aminocyclohexyl (DACH) organo-platinum antineoplastic agent

COMMON INDICATIONS AND CLINICAL USES:
Gastrointestinal malignancies

PRINCIPAL ADVERSE EFFECTS

- Also refer to Patient Information Chemotherapy Fact Card.

<table>
<thead>
<tr>
<th>Category</th>
<th>Adverse Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal</td>
<td>Nausea, vomiting, diarrhea, mucositis/stomatitis</td>
</tr>
<tr>
<td>Hematologic</td>
<td>Anemia, thrombocytopenia, leukopenia, neutropenia</td>
</tr>
<tr>
<td>Hepatic</td>
<td>Chemistry elevations in AST, ALT and total bilirubin</td>
</tr>
<tr>
<td>Hypersensitivities</td>
<td>Angioedema and anaphylactoid reactions</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Acute peripheral neuropathy, transient paresthesia, dysesthesia and hypoaesthesia in the hands, feet, perioral area, or throat, jaw, apraxia, abnormal tongue sensation, dysarthria, eye pain, and a feeling of chest pressure have also been observed. These may be initiated or aggravated by exposure to external temperature extremes. Persistent (&gt;14 days), primarily peripheral, sensory neuropathy, characterized by paresthesias, dysesthesias, hypoaesthesias, deficits in proprioception. (Dose Limiting Toxicities)</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>Pulmonary fibrosis, other interstitial lung disorders</td>
</tr>
<tr>
<td>Renal</td>
<td>Elevations in serum creatinine</td>
</tr>
</tbody>
</table>

SUPPLIED AS

- 50 mg or 100 mg of oxaliplatin as a sterile, preservative-free lyophilized powder for reconstitution

RECONSTITUTION

- The lyophilized powder is reconstituted by adding 10 mL (for the 50 mg vial) or 20 mL (for the 100 mg vial) of sterile water for injection USP.
- Do not administer the reconstituted solution without further dilution.

STORAGE AND STABILITY

- Store vials at room temperature under normal lighting conditions [25°C (77°F); excursions permitted to 15-30°C (59-86°F) ]
- Do not freeze.
- After reconstitution in the original vial, the solution may be stored up to 24 hours under refrigeration.
- Oxaliplatin is not light sensitive.
- The reconstituted solution must be further diluted in D₂W.
- Refrigerated – infusions prepared in D₂W are stable for 24 hours.
- Room temperature – infusions prepared in D₂W are stable for 6 hours.
Guidelines for Writing Chemotherapy Orders

Do

• Always double-check dose against the current protocol

• Use full generic name of the drug

• Prescribe all drug doses in mg

• Date all orders with month, day, and year

• Use a leading zero when the dose is less than a whole unit (e.g., 0.1 mg, not .1 mg)
Guidelines for Writing
Chemotherapy Orders (cont’d)

Do

• List dose as mg/m² or when applicable, mg/kg
• Give daily dose x number of days (do not list course dose)
• Always state units following total dose
• Round total doses above 5 mg to nearest whole number (e.g., 5.8 mg = 6 mg)
Guidelines for Writing Chemotherapy Orders (cont’d)

Do

• List route of administration and infusion duration in hours for all intravenous solutions

• Include current body surface area and diagnosis with the chemotherapy order

• List relevant lab values
Guidelines for Writing Chemotherapy Orders (cont’d)

Do Not

• Refer to drugs by brand names, nicknames, company names or abbreviations

• Use a trailing zero when writing order (e.g., an order for 10.0 mg can be read as 100 mg)

• Use dangerous abbreviations (e.g., “U” for units can be read as a zero and the patient could get 10-fold overdose)

• Refer to drugs by common drug classes (e.g.
Chemotherapy Error Avoidance Program at MSKCC (continued)

- Categorization of errors with interdisciplinary discussions
- Orders written by fellow are countersigned by an attending
- Virtually all orders are reviewed and initialed by 2 pharmacists and 2 nurses.
# Max Chemo Guidelines - Single Dose Parenteral Agents

<table>
<thead>
<tr>
<th>Drug</th>
<th>Adult</th>
<th>Pediatric (Non-Transplant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alemtuzumab</td>
<td>15 mg/m²</td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.3 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Asparaginase</td>
<td>10,000 units/m²</td>
<td>25,000 units/m²</td>
</tr>
<tr>
<td>Bleomycin</td>
<td>15 units/m²</td>
<td>15 units/m²</td>
</tr>
<tr>
<td>Carboplatin</td>
<td>500 mg/m²</td>
<td>600 mg/m²</td>
</tr>
<tr>
<td>Carmustine</td>
<td>200 mg/m²</td>
<td></td>
</tr>
<tr>
<td>(Transplant 600 mg/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cisplatin</td>
<td>120 mg/m²</td>
<td></td>
</tr>
<tr>
<td>(Transplant 300 mg/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cladribine</td>
<td>0.14 mg/kg</td>
<td>9 mg/m²</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>3000 mg/m²</td>
<td>3000 mg/m²</td>
</tr>
<tr>
<td>Cytarabine</td>
<td>6000 mg/m²</td>
<td>6000 mg/m²</td>
</tr>
<tr>
<td>Daunorubicin</td>
<td>60 mg/m²</td>
<td>60 mg/m²</td>
</tr>
<tr>
<td>Docetaxel</td>
<td>100 mg/m²</td>
<td>100 mg/m² *</td>
</tr>
<tr>
<td>Doxorubicin</td>
<td>80 mg/m²</td>
<td>80 mg/m²</td>
</tr>
<tr>
<td>Etoposide</td>
<td>200 mg/m²</td>
<td>200 mg/m²</td>
</tr>
<tr>
<td>(Transplant 500 mg/m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluorouracil</td>
<td>25 mg/m²</td>
<td>25 mg/m²</td>
</tr>
<tr>
<td>Gemcitabine</td>
<td>1000 mg/m²</td>
<td>1000 mg/m²</td>
</tr>
<tr>
<td>Idarubicin</td>
<td>40 mg/m²</td>
<td>40 mg/m²</td>
</tr>
<tr>
<td>Ifosfamide</td>
<td>5000 mg/m²</td>
<td>3500 mg/m²</td>
</tr>
<tr>
<td>Interferon Alfa-2A</td>
<td>18 million units/m²</td>
<td>20 million units/m²</td>
</tr>
<tr>
<td>Interleukin-2</td>
<td>5000 mg/m²</td>
<td>3500 mg/m²</td>
</tr>
<tr>
<td>Irinotecan</td>
<td>150 mg/m²</td>
<td></td>
</tr>
<tr>
<td>Methotrexate</td>
<td>50 mg/m²</td>
<td>500 mg/m²</td>
</tr>
<tr>
<td>Melphalan</td>
<td>5 mg/m²</td>
<td>45 mg/m³</td>
</tr>
<tr>
<td>(Transplant 70 mg/m³)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate, no</td>
<td>50 mg/m²</td>
<td>500 mg/m²</td>
</tr>
<tr>
<td>Leucovorin</td>
<td>5000 mg/m²</td>
<td>36000 mg/m²</td>
</tr>
<tr>
<td>with Leucovorin</td>
<td>50 mg/m²</td>
<td>50 mg/m²</td>
</tr>
<tr>
<td>Mitomycin</td>
<td>10 mg/m²</td>
<td>12 mg/m²</td>
</tr>
<tr>
<td>Mitoxantrone</td>
<td>30 mg/m²</td>
<td>30 mg/m²</td>
</tr>
<tr>
<td>Paclitaxel</td>
<td>250 mg/m²</td>
<td>250 mg/m²</td>
</tr>
<tr>
<td>Pegaspargase</td>
<td>2000 units/m²</td>
<td>3750 units/m²</td>
</tr>
<tr>
<td>Pentostatin</td>
<td>4 mg/m²</td>
<td>4 mg/m³</td>
</tr>
<tr>
<td>Plicamycin</td>
<td>30 mg/kg</td>
<td>30 mg/kg</td>
</tr>
<tr>
<td>Rituximab</td>
<td>375 mg/m²</td>
<td></td>
</tr>
<tr>
<td>Streptozocin</td>
<td>200 mg/m²</td>
<td>200 mg/m²</td>
</tr>
<tr>
<td>Thiotepa</td>
<td>20 mg/m³</td>
<td>62 mg/m³</td>
</tr>
<tr>
<td>(Transplant 300 mg/m³)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topotecan</td>
<td>1.5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Trastuzumab</td>
<td>2 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Vinblastine</td>
<td>6 mg/m³</td>
<td>6 mg/m³</td>
</tr>
<tr>
<td>Vinorelbine</td>
<td>1.4 mg/m³</td>
<td>2.5 mg/m³</td>
</tr>
<tr>
<td>Vinorelbine</td>
<td>45 mg/m³</td>
<td>45 mg/m³</td>
</tr>
</tbody>
</table>

*(Up to 185 mg/m² may be used for CCG - Approved Protocols)*

Revised by P&T Committee 5/22/98, 1/10/01
Updated 5/15/02
Patient: DUTCHER, SCOTT  Age: 41 yrs  Sex: M  Weight: 71 kgs
Id: 0309224312 [Visit#] 00922439 [MRN]
Loc: Ambulatory Outpatient Clinic
Date Printed: 02/06/2004 16:25
Group Allergy: PENICILLIN
New Drugs:
• Docetaxel Inj INV, 80 MG

Dose: 2

DOSE SCREENING

SEVERITY:
MAJOR
Docetaxel Inj INV, 80 MG
DOSE OUTSIDE RANGE:
200.000 MG is GREATER than Normal Dose Maximum 184.000 MG
1 dose(s) of 200.000 MG in 24.00 HRS is GREATER than Period Dose Maximum 3.762 MG

SEVERITY:
MAJOR

The user-specified dose exceeds the recommended period range when given at the frequency specified.
**MD handwriting study**1

<table>
<thead>
<tr>
<th>Category</th>
<th># MDs</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totally illegible</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Poor to difficult</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Fair to average</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Good to very good</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>Excellent</td>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

# Error-Prone Medical Abbreviations

<table>
<thead>
<tr>
<th>NO!</th>
<th>YES!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error-Prone Practice</td>
<td>Required Practice</td>
</tr>
<tr>
<td>IU</td>
<td>International unit</td>
</tr>
<tr>
<td>U, u</td>
<td>units</td>
</tr>
<tr>
<td>ug, Ug, ug, or mcg</td>
<td>micrograms</td>
</tr>
<tr>
<td>QD</td>
<td>daily</td>
</tr>
<tr>
<td>QOD</td>
<td>every other day</td>
</tr>
<tr>
<td>MS</td>
<td>morphine sulfate</td>
</tr>
<tr>
<td>MSO₄</td>
<td>magnesium sulfate</td>
</tr>
<tr>
<td>MgSO₄</td>
<td></td>
</tr>
<tr>
<td>T.I.W.</td>
<td>3 times weekly or three times weekly</td>
</tr>
<tr>
<td>OS, OD, OU</td>
<td>left eye, right eye or both eyes</td>
</tr>
<tr>
<td>AS, AD, or AU</td>
<td>left ear, right ear or both ears</td>
</tr>
</tbody>
</table>

**Do not use terminal zeros** for doses expressed in whole numbers i.e., NOT "5.0 mg"

Always **use zero before** a decimal when the dose is less than a whole number i.e., NOT ".5 mg"

| 5 mg | 0.5 mg |
Patient Education

• Patients should be well-educated about the names of their drugs, doses, route of administration, schedule, color of the infusion, and supportive drugs (e.g., antiemetics, hydration fluids, hematopoietic growth factors)

• Patients should be encouraged to remind caregivers to verify their identity (i.e., check armband)

• Patients should be encouraged to ask questions about their chemotherapy treatment
Patient education cards

Publications

Publications from Memorial Sloan-Kettering Cancer Center’s Patient Education Department

These publications were developed for our patients. They are presented in a pdf format. You will need Adobe Reader to view these documents. This software is available for free. Click here to if you do not have this software.

Select a topic for the drop-down menu below to view listings.

- Chemotherapy & Biologic Drugs

- Aldesleukin (Interleukin-2 (IL-2), Proleukin®)
  Aldesleukin.pdf - 66 KB

- Alemtuzumab (CamPath®)
  Alemtuzumab.pdf - 174 KB

- Asparaginase (Elspar®)
  Asparaginase.pdf - 71 KB

- Bexxar? Therapeutic Regimen (Tositumomab and Iodine I-131 Tositumomab, Bexxar)
  Bexxar.pdf - 168 KB

- Bevacizumab (Avastin®)
  Bevacizumab.pdf - 165 KB

- Bleomycin Sulfate (Blenoxane®)
  BleomycinSulfate.pdf - 141 KB

- Bortezomib (Velcade®)
Potential Benefits of a computerized prescriber order-entry system*

I. Quality Improvements

- Eliminate lost orders & illegible handwriting
- Standardize care
- Improve coding for outcome analysis
Potential Benefits of a computerized prescriber order-entry system* Cont’d

II. Process Improvements

- Order Sets
- Research Protocol Management
- Decrease time to refill order
- Virtual System Access
Potential Benefits of a computerized prescriber order-entry system* - Cont’d

III. Error Reduction

- Eliminate dosing errors; built in clinical formulas
- Interactions check; drug-drug, drug-food, drug-lab
- On-line knowledge - Maximum doses are "flagged"
- Verification of medication administration
Potential Benefits of a computerized prescriber order-entry system*- Cont’d

IV. Cost Reductions

• Eliminate duplicate orders
• Decrease time to verify orders
• Increase drug charge capture
• Decrease data entry
• Standardize costs for treatment interventions
Develop on-line tools - Dose Calculators

Chemo Dosage Calculator

Prescription

Normalized Dose: [mg, microgram units]

PER BODY

- Surface Area
- Weight

Patient Information

- Height: [cm]
- Weight: [kg]
- Body Surface: [m²]

Calculate

TREATMENT DOSE: [mg]
<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Base Dose</th>
<th>Units</th>
<th>Dose Per</th>
<th>Rx Dose</th>
<th>Route</th>
<th>Infuse Over (hrs)</th>
<th>Infuse Over (min)</th>
<th>Frequency</th>
<th>Tx Duration</th>
<th>Total Daily Dose</th>
<th>Tx Start Date</th>
<th>Admin Instructions</th>
<th>Adjust Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxaliplatin*</td>
<td>85 mg</td>
<td>m2</td>
<td>130</td>
<td>IVPB</td>
<td>2</td>
<td>once</td>
<td>1 Days</td>
<td>130</td>
<td>03/07/2010</td>
<td>Adjust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leucovorin*</td>
<td>400 mg</td>
<td>m2</td>
<td>600</td>
<td>IVPB</td>
<td>once</td>
<td>1 Days</td>
<td>600</td>
<td>03/07/2010</td>
<td>Adjust</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluorouracil*</td>
<td>400 mg</td>
<td>m2</td>
<td>600</td>
<td>IV push</td>
<td>once</td>
<td>1 Days</td>
<td>600</td>
<td>03/07/2010</td>
<td>Adjust</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FluorouracilIVD</td>
<td>1200 mg</td>
<td>m2</td>
<td>1900</td>
<td>IVCI</td>
<td>24</td>
<td>daily</td>
<td>2 Days</td>
<td>1900</td>
<td>03/07/2010</td>
<td>Adjust</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Medication Errors – a new way of thinking

FROM:

• Who did it?
• Punishment
• Errors are rare
• Each discipline acting alone to reduce errors
• Add more layers
• Calculating error rates
• No ownership

TO:

• What allowed it?
• Thank you!
• Errors are everywhere
• MDs, RNs, RPh, QA/RM working together
• Simplify/standardize
• No thresholds
• Empowered team ownership
Strategies To Prevent Cancer Chemotherapy Errors

- Mandate the use of preprinted order forms that standardize practice and “force functions”.
- Implement prescribing guidelines
- Work diligently to develop a CPOE system
- Distribute the ISMP’s Medication Safety Alert and conduct an educational program in medication error prevention regularly.
- Realize that errors can and will happen at your institution, and then create a culture of safety.
- Monitor and publicize errors that are described in JCAHO Sentinel Event Alerts.
When In Doubt, Ask!

- If you can’t read it, don’t guess
- Know what is being treated
- Take time to understand the protocol
- If the dose doesn’t appear to make sense, it probably doesn’t make sense
Strategies To Prevent Cancer

Chemotherapy Errors – Cont’d

• Consider possible ways to involve patients in the medication safety program.

• Develop tools to assess the competency of new staff and annually ensure (and document) competency of existing staff.

• Ensure that the pharmacy department well represented on the institutional review board and all other applicable committees that govern clinical research at your institution.
Strategies To Prevent Cancer Chemotherapy Errors – Cont’d

- Assess the clarity of a manufacturer’s vial, syringe, and other labels with the goal of avoiding confusion.

- Ensure that critically important laboratory results are available when needed with real-time interfaces.

- Ban verbal orders for initiation of cancer chemotherapy.
Institutional Self-Assessment
Chemotherapy Error Prevention Program

- Monitor External Communication – TJC, ISMP, AHRQ
- Prohibit Abbreviations
- Interdisciplinary Review of Errors
- Reporting System of Near-Misses
- Max Dose Guidelines
- Just Culture
- Supplemental Warnings – Intrathecal, Peds
- Formal Education of Physicians & RNs
Selected Web Sites for Safe Medication Practices

- [www.qualityindicators.ahrq.gov](http://www.qualityindicators.ahrq.gov) – Agency for Healthcare Research & Quality
- [www.safemedication.com](http://www.safemedication.com) – American Society of Health-System Pharmacists medication safety site
- [www.ihi.org](http://www.ihi.org) – Institute for Healthcare Improvement
- [www.ismp.org](http://www.ismp.org) – Institute for Safe Medication Practices
- [www.consumermedsafetysafety.org](http://www.consumermedsafetysafety.org) – Consumer
1. Who prepares chemo at your practice site?

A – Pharmacist only
B – Technician, checked by Pharmacist
C – Nurse or Physician
2. If a med error caused harm to a patient, what reaction would your Administrator have?

A – Open discussion with involved parties to prevent a future error
B – Disclose it immediately to patient
C – Terminate involved employees
Memorial Sloan-Kettering Cancer Center

Ensuring a Safe Chemotherapy Experience

**Education/Training**
- Clinician Credentialing
- Chemo Course for Fellows
- Orientation for staff and students
- Oncology Nursing Society Courses
- On-Site Pharmacy Continuing Education
- Annual Pharmacist Competency Test
- Performance Evaluation
- Nursing Chemotherapy Competence
- Customized Patient Education Materials

**Systems**
- Pharmacy/Lab Interface to 118 Drugs
- Pediatric Growth Chart Warning
- Customized Chemotherapy Guidelines
- Maximum Dose Program for All Chemo/Biologic Agents
- On-Line Formulary/Drug Information
- Drug/Route Contraindication
- Displays All Doses Ever Dispensed
- Comprehensive Electronic Medication Profile
- Displays Inpatient and Ambulatory

**Practice**
- Neutropenia Guidelines
- Hydration Guidelines
- Antiemetic Guidelines
- On-Line Chemotherapy Guidelines
- Anemia Guidelines
- Hypersensitivity Management
- Supportive Medications
- On-Line Chemotherapy Treatment Regimens
- Look Alike/Sound Alike Practices
- TALL MAN Lettering
- Storage Segregation
- Elimination of Error Prone Abbreviations
- "High Alert" Medication List

**Process**
- Preprinted Order Forms
- Attending Signature Required
- 4 step Order Verification
- Nurse Verification in Pharmacy
- Pharmacist Double Check System
- On-Line Potential Error Reporting
- Multidisciplinary Actual Event Reviews
- Ongoing Monitoring for Stability
- Patient Safety Walking Rounds
- Standardized Order Sets

150,000 Doses of Chemotherapy/Year

Ensuring a Safe Chemotherapy Experience