Guidelines for describing cancer chemotherapy regimens in all aspects of drug development, including treatment protocols, order forms, and product labels, are proposed.

To complement the approaches to reducing medication errors that have been recommended by the American Society of Health-System Pharmacists and others, pharmacists at the National Institutes of Health and the National Cancer Institute, with the input of oncology pharmacists from diverse areas of practice, developed guidelines for describing chemotherapy dosage schedules and treatment regimens. The guidelines present standards that are broadly applicable and can be adopted by other institutions. Clear and unambiguous expression of all medication orders and consistency of treatment descriptions are suggested. Written treatment plans and orders should contain enough information to allow health care providers from diverse disciplines to compare them with published treatment descriptions and investigational protocols and must therefore include planned dosages and schedules expressed in patient-specific units. In general, drug dosages should be expressed as the amount of drug administered from a single container. When ordering drugs that are part of complex or combination-drug regimens, prescribers should write as many of the orders at one time as is possible so that continuity might be preserved.

Standard rules are proposed for describing chemotherapy regimens.

Key Words: American Society of Health-System Pharmacists; antineoplastic agents; dosage schedules; medication errors; forms; labeling; medication orders; neoplasms; nomenclature; organizations; pharmacists, institutional; protocols; standards.

Antineoplastic drugs, by virtue of their low therapeutic index, come with tremendous risks. Toxicity is an expected and accepted consequence of most standard cancer treatment regimens, but even modest deviations

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from planned antineoplastic dosages and schedules can result in substantial toxicity or a suboptimal therapeutic outcome.

The American Society of Health-System Pharmacists (ASHP), the American Medical Association (AMA), and the American Nurses Association (ANA) have recommended systematic standard approaches to reducing medication errors. These include educating health care providers and patients about appropriate drug therapy, improving collaboration among health care providers, establishing dosage limits, and developing a standard prescribing vocabulary.1-10 We at the National Institutes of Health (NIH) and National Cancer Institute (NCI) support these recommendations and further propose that developing a clear, consistent method for expressing chemotherapy dosage schedules and treatment regimens is an important public health issue.

Because physicians and other health care practitioners are frequently unaware of factors related to drug preparation, stability, and storage, it seems incumbent on pharmacists to develop a rational and standard model for describing and ordering antineoplastic drug treatments. Pharmacists have training and practical experience that uniquely qualify them for this function. Ideally, guidelines should be comprehensive and broadly applicable to all oncology practice settings. We propose guidelines for standardizing the way in which antineoplastic pharmacotherapy is described in (1) protocol development, (2) written treatment guidelines intended for local clinical practice and for publication, (3) printed forms for written order sets and preformatted templates for computer-based order sets, (4) pharmaceutical product packaging information, and (5) drug-product labeling for clinical use.

OVERVIEW

Development

The guidelines were developed by oncology pharmacy specialists in clinical practice at the NIH Clinical Center in collaboration with clinical research pharmacists at the Pharmaceutical Management Branch of the Division of Cancer Treatment and Diagnosis (DCTD), NCI. The draft guidelines were distributed to pharmacists in oncology practice for review and comment. To ensure that the guidelines accurately represented the diversity of oncology pharmacy practice, we contacted more than 30 oncology pharmacists with expertise in home health care and with clinical, regulatory, and administrative practices in the United States and abroad. We evaluated their comments and subsequently incorporated them into the refined guidelines. Despite the broad range of expertise contributed by the guidelines' developers, the document is not a consensus recommendation. It does, however, incorporate practice recommendations that we and a majority of the practitioners who contributed to it endorse.

Among the agreed tenets of the guidelines are that all published and written medication orders should be expressed clearly in unequivocal language, that treatment descriptions should demonstrate consistency by incorporating standard expressions, and that generally "more information is better." At the very least, treatment descriptions should provide adequate information without redundancy. Ideally, written treatment plans and orders should contain enough information to allow health care providers from diverse disciplines to compare them with published treatment descriptions and investigational protocols and independently verify drug dosages, administration schedules, and other relevant information. Accordingly, it is essential that treatment plans and drug orders not only identify an absolute or calculated dose but also include planned dosages and schedules expressed in patient-specific units (eg, body weight in milligrams per kilogram, body surface area in milligrams per square meter), which should be based on current measurements.8

The "container rule"

Drug dosages should be expressed in terms of the amount of drug prepared in and administered from a single container over a period not exceeding 24 hours. We have termed this principle the "container rule." A well-publicized error in which a patient received an overdose of cyclophosphamide might not have occurred had all protocol and treatment order documents expressed the drug dosage and schedule as the amount of drug intended for daily administration from a single container (eg, "1000 mg/m² per day for four days"). We also advocate appending the planned total course dose to published treatment descriptions, protocol schema, and prescribers' orders. This provides an additional means for independently confirming a prescriber's order and emphasizes the importance of evaluating the complete treatment course, not only an individual dose.

In developing the guidelines, we experienced the most difficulty in achieving consensus on how best to express dosage when drug stability and sterility data support preparing a single container designed to hold a greater amount of drug than would be administered over 24 hours. This situation commonly arises when antineoplastic drugs are administered by prolonged continuous infusion with portable infusion devices. Ideally, a single rule should encompass all expressions of dosage and scheduling. In reality, some institutions have policies that prohibit preparing dosage forms containing more
than a 24-hour supply, and others do not. This can complicate treatment descriptions, especially in multiple-institution cooperative studies, and increase the potential for confusion and interpretational errors among health care providers in institutions that do not operate under the same policies. For this reason, treatment descriptions and prescribers’ orders should identify the drug dose to be administered each day, followed immediately by the number of days on which it is to be administered. Although published treatment descriptions should indicate, for informational purposes, whether physicochemical stability data permit extended-duration drug administration from a single container, practice-specific procedural instructions, treatment protocols, and printed order sheets should not offer alternative drug preparation, dispensing, and administration options. In all practice settings, a uniform method for drug preparation and administration should be selected before treatment regimens are accepted or approved for clinical use. Treatment descriptions and prescribers’ orders should clearly identify when a dosage form is to contain an amount of medication that will be administered for more than 24 hours and should specify the duration.

In this circumstance, we have deviated from the container rule. If an order for a drug (eg, "XYZ 16 mg per day for three days; total dose will be mixed in one container") is misstated or misinterpreted such that the daily dose is administered over the entire three-day treatment course, a total of 16 mg of drug, rather than 48 mg, will be administered. This would constitute a serious error. Nevertheless, the result would be an underdosage, and the consequences would be preferable to those of a potentially life-threatening overdosage. Thus, we strongly advocate that when drug products can be prepared and administered in more than one way, regulatory groups and practitioners select a priori exactly how these products are to be prescribed, prepared, and administered before that regimen is implemented. All site-specific documents that describe the regimen should subsequently express drug preparation and administration in accordance with the method selected.

We strongly recommend that when ordering medications that are part of a combination drug regimen or other complex treatments (eg, one drug given on consecutive days and another given on nonconsecutive days), prescribers write as many orders of the complete treatment regimen as possible. This practice preserves continuity in prescribing and checking. Prescribers who rely on their memory or on some artificial prompt might not recall that some of the orders have not been written, thereby compromising patient care and safety. Patient safety may also be compromised if medication ordering is deferred or postponed and becomes the responsibility of a caregiver who is less familiar with the patient’s case or who is pressed for time or otherwise diverted. The task of confirming a caregiver’s prescribing accuracy and adherence to planned administration schedules is facilitated when all medication orders in a treatment regimen are simultaneously available for verification.

GUIDELINES FOR DESCRIBING CANCER TREATMENT REGIMENS

Instructions for dosage regimens should be complete, clear, and simple to follow. Treatment regimens should be expressed accurately, completely, and consistently throughout all facets of drug development, including letters of intent, treatment protocols, publications, medical notes, drug orders, product labeling, and prescription labels.

GENERAL GUIDELINES

In general, descriptions of cancer treatment regimens should conform to the following guidelines:

- Do not abbreviate drug names or treatment schedules. Abbreviations can be misinterpreted.
- Use complete, approved generic drug names. Brand names and abbreviations are not acceptable (eg, specify “carboplatin” instead of CBDA, “cisplatin” instead of CDDP).
- Spell out the word “units” to avoid confusion. A letter “U” can be easily mistaken for a zero and could result in a 10-fold overdose.
- Make treatment instructions explicit. No detail, no matter how minor, should be omitted; however, avoid unnecessary redundancy.
- Delete extraneous information that might confuse readers (eg, protocols that use only injectable drug products should not include information about tablets).
- Use consistent notation in expressing quantifiable units. For example, consistent notation in a treatment protocol or guideline would not allow for simultaneous use of the following:
  
  1.2 g and 1200 mg
  1 U, 1 μg, and 1 mg
  q.i.d. and q 6 h
  7 days and 1 week
  amount of drug per kilogram or pound of body weight and amount of drug per square meter of body surface area
Table 1. Suggested Elements Describing Cancer Treatment Regimens

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosage</td>
<td>2000 mg/m²/dose</td>
<td>50 mg/m²/day</td>
<td>15 mg/m²/day</td>
</tr>
<tr>
<td>Vehicle name and volume</td>
<td>0.9% sodium chloride injection 500 mL</td>
<td>—</td>
<td>5% dextrose injection 90 mL (plus 10 mL of excess fluid and drug)</td>
</tr>
<tr>
<td>Route of administration</td>
<td>Intravenously</td>
<td>Oraly</td>
<td>Intravenously</td>
</tr>
<tr>
<td>Instructions for administration</td>
<td>Over 1 hr</td>
<td>With food</td>
<td>3.8 mL/hr (total volume to infuse = 90 mL)</td>
</tr>
<tr>
<td>Administration schedule</td>
<td>Every 12 hr</td>
<td>Every morning</td>
<td>Daily</td>
</tr>
<tr>
<td>No. doses to administer, treatment duration, or date when treatment should be discontinued</td>
<td>For 6 doses</td>
<td>For 14 days</td>
<td>For 4 days</td>
</tr>
<tr>
<td>Starting dates (days drug is to be taken)</td>
<td>Start on day 1</td>
<td>Start on day 1 (day 1 to 14)</td>
<td>Start on day 1 (days 1 to 4)</td>
</tr>
<tr>
<td>(Total amount of drug administered per course)</td>
<td>(Total dose/cycle = 12,000 mg/m²)</td>
<td>(Total dose/cycle = 700 mg/m²)</td>
<td>(Total dose/cycle = 60 mg/m²)</td>
</tr>
</tbody>
</table>

*The approved generic name for a drug should be used at all times.

1000 mL and 1 L or 10 mL and 0.01 L

- Never trail a whole number with a decimal point followed by a zero (eg, use 5 mg, not 5.0 mg). The decimal point might not be seen, resulting in a 10-fold overdose.
- In expressing units that are less than the number 1, write the dosage with a decimal point preceded by a zero (eg, use 0.125 mg, not .125 mg). Without the zero prefix, the decimal point might be missed.

Table 1 summarizes the expression and nomenclature that should be used in describing cancer treatment regimens.

DURATION OF ADMINISTRATION

The duration of administration should be clearly indicated. If a drug is to be administered on more than one day per cycle, each day of the cycle should be explicitly identified. "Day 1" typically describes the day on which treatment commences when enumeration of treatment days is arbitrary. Avoid using "Day 0" when describing treatment schedules (the use of Day 0 may be necessary, eg, when describing the day on which hematopoietic progenitor cells are administered after a cytotoxic conditioning regimen in bone marrow transplantation protocols).

Example: XYZ 1 mg by mouth daily for three consecutive days starting on day 7

TOTAL DOSE PLANNED PER TREATMENT COURSE

In all drug orders, reiterate the planned treatment dosage as a function of patient-specific measurements (eg, body weight, body surface area) followed by the calculated dosage. In all treatment plans and drug orders, identify and append parenthetically the total dose (as a function of body weight or surface area) that patients are to receive during a treatment course or cycle.

Example for a patient with a body surface area of 2 m²: XYZ 10 mg/m²/dose = 20 mg by mouth daily for three consecutive days starting on day 7 (days 7, 8, and 9; total dose per cycle = 30 mg/m²).

CONSECUTIVE TREATMENT DAYS

Treatment plans should specify the total number of days a drug is to be administered and the cycle day on which treatment is to commence. Include parenthetically the cycle days on which the drug is to be administered.

Example: XYZ 1 mg by mouth daily for three consecutive days starting on day 7 (days 7, 8, and 9; total dose per cycle = 3 mg)

NONCONSECUTIVE TREATMENT DAYS

Treatment plans should specify the cycle days on which each dose should be given.

Example: XYZ 1 mg by mouth on days 1 and 8 of each cycle (total dose per cycle = 2 mg)
DURATION OF CYCLE OR COURSE

The duration of the treatment cycle should be specified. When a treatment regimen is 21 days long, the regimen will be repeated starting on the 22nd, 43rd, and 64th days, and so on, after initiation of treatment.

Example: XYZ 1 mg by mouth daily for three consecutive days starting on day 7 (days 7, 8, and 9) every 21 days (total dose per cycle = 3 mg).

ADMINISTRATION DATES AND TIMES

Include specific starting dates and times in medication orders and medical notes and on product labeling and prescription labels (eg, “start at 9:00 a.m. on January 1, 1997”). When 12 o’clock is abbreviated as “12:00 a.m.” or “12:00 p.m.,” it might be incorrectly interpreted. Directions indicating events for these times should be spelled out as “12:00 noon” and “12:00 midnight.” Expressing time in 24-hour notation likewise precludes errors caused by ambiguous a.m. and p.m. time notations.

TREATMENT PLANS, DRUG ORDERS, AND PRODUCT LABELING

Treatment plans
Treatment plans are protocols, publications, manufacturers’ product package inserts, and prescriber’s progress notes.

Drug dosages may be expressed as a function of body surface area or body weight or may be calculated to produce a pharmacokinetically targeted endpoint (eg, serum or plasma concentration, area under the serum concentration-time curve [AUC]). Treatment plans should specify whether absolute (ie, actual), ideal, or lean body weight is used in calculating drug dosage from body weight. If drug dosage is a function of a calculated ideal or lean body weight, an equation describing how that value is calculated should appear in the treatment plan. If drug dosage is a function of a calculated pharmacokinetic endpoint, the equation(s) describing how that value is calculated should also appear in the treatment plan.

Treatment plans should explicitly identify when treatment modifications (typically dosage modifications) are appropriate because of changes in patients’ weight or body surface area from prior values. Treatment modifications and their predicating factors should be explicit and clear.

Drug orders
Drug orders are prescribers’ orders for treatment. Prescribers’ orders should include the patient-specific data from which drug dosages are calculated (eg, body surface area, height, weight).

Product labeling
Product labeling refers to the labels on containers of drug products.

- Patient’s name, with or without a patient-specific unique identifying code;
- Date, with or without the time, that the drug product was dispensed;
- Drug name;
- Strength of dosage form;
- Amount of drug per dose (when the container dispensed holds more than one dose);
- Detailed instructions to the patient for self-administration;
- Route of administration;
- Supplemental administration instructions (eg, starting and completion dates and times, prohibitions about when medications are to be taken with reference to food ingestion and other medications, ancillary instructions and warnings about route of administration, storage conditions); and
- Number of drug product units in each container (eg, the number of tablets packaged in a single container).

All drug container labels for injectable dosage forms should include at least the following information:

- Patient’s name, with or without a patient-specific unique identifying code;
- Date, with or without the time, that the drug product was prepared;
- Date, with or without the time, that the drug product will expire;
- Drug name;
- Route of administration;
- Amount of drug per dose (when the container dispensed holds more than one dose, eg, multiple doses administered intermittently over a 24-hour period, and when excess drug product is added.
to a container to compensate for dead space in the administration set;

- Amount of drug per container (labeling should also indicate how much additional drug is added to a container when overfill drug and fluid volumes are added);
- Name and amount or concentration of any drug additives in the formulation;
- Diluent (vehicle) name;
- Volume of fluid to be administered (volume to be administered should be labeled, especially when that amount differs from the total volume within a drug product container, eg, when a container includes excess or overfill fluid);
- Duration of infusion and rate of administration (providing both the rate of administration and the duration is ideal. Administration rate is, however, easily calculated from the volume to be administered and duration data; therefore, duration of infusion is the minimally necessary component.); and

- Supplemental administration instructions (eg, starting and completion dates and times, prohibitions about when medications are to be administered with reference to other medications, ancillary instructions and warnings about route of administration, handling and storage conditions).

When it is necessary to prepare a drug product in more than one container intended for sequential administration, we recommend that all container labels be numbered to indicate each container's number in sequence and the total number of containers (eg, bag #2 of 4, bottle 3/7).

**ADMINISTRATION BY INJECTION**

Injectable drug products should be prepared within documented stability and sterility guidelines in accordance with practitioners' local clinical and institutional policies and procedures. Drug containers should be changed at least daily unless extended stability and sterility data are available.

In protocol descriptions and orders for treatment, drug dosage should be expressed as the total amount of drug that will be administered from a single container, that is, the total amount of drug that will be dispensed per syringe, bag, or other container. An exception to this rule applies to drug products with extended stability, which are administered from a single container for more than 24 hours. In such cases, treatment plans and prescribers' orders should specify the amount of drug that is administered during each 24-hour interval. Container labels should always identify the amount of drug in the container.

For drug admixtures that can be prepared in more than one way, practitioners should institute a priori, standard, consistent methods governing how each drug will be prepared and administered.

Specific fluid volumes and types should be included when possible.

**Bolus infusion (administration duration ≤24 hours)**

The treatment plans, drug orders, and product labels should:

- Note the amount of drug per container and
- Include the rate of administration, infusion duration, and days on which the drug is to be administered.

For example, a treatment plan for a patient with a body surface area of 2 m² should be written as:

**XYZ 15 mg/m² diluted in 50 mL of 0.9% sodium chloride injection; infuse intravenously over 15 minutes for one dose on day 1 (total dose per cycle = 15 mg/m²).**

A drug order for the same patient should be written as:

**XYZ 15 mg/m²/dose = 30 mg in 50 mL of 0.9% sodium chloride injection; infuse intravenously over 15 minutes for one dose on day 1. Start at 9:00 a.m. on October 14, 1996 (total dose per cycle = 15 mg/m²).**

A product label should be written as:

**XYZ 30 mg in 50 mL of 0.9% sodium chloride injection; infuse intravenously at 200 mL/hr over 15 minutes starting at 9:00 a.m. on October 14, 1996.**

As a further example, a treatment plan for a patient with a body surface area of 2 m² should be written as:

**ABC 8 mg/m² diluted in 100 mL of 5% dextrose injection; infuse intravenously over 24 hours every 48 hours for three doses starting on day 1 (days 1, 3, and 5; total dose per cycle = 24 mg/m²).**

A drug order for that patient should be written as:

**ABC 8 mg/m²/dose = 16 mg in 100 mL of 5% dextrose injection; infuse intravenously over 24 hours every 48 hours for three doses starting on day 1. Start at 1400 on October 31, 1996 (days 1, 3, and 5; total dose per cycle = 24 mg/m²).**

A product label should be written as:

**ABC 16 mg in 100 mL of 5% dextrose injection; infuse intravenously at 4.2 mL/hr over 24 hours. Start at 1400 on October 31, 1996.**
Drug products stable for ≥24 hours when containers are prepared daily

The treatment plans and drug orders should:

- Note the dose per container and
- Include the total dose (as a function of body surface area, weight, etc, when appropriate) in parentheses.

For example, a treatment plan for a patient with a body surface area of 2 m² should be written as:

XYZ 8 mg/m² per day diluted in 50 mL of 0.9% sodium chloride injection; administer by continuous intravenous infusion over 24 hours daily for three doses starting on day 1 (days 1, 2, and 3; total dose per cycle = 24 mg/m² over 72 hours).

A drug order for that patient should be written as:

XYZ 8 mg/m²/day = 16 mg in 50 mL of 0.9% sodium chloride injection; administer by continuous intravenous infusion over 24 hours daily for three doses starting on day 1. Start at 9:00 a.m. on February 22, 1997 (days 1, 2, and 3; total dose per cycle = 24 mg/m² over 72 hours).

Product labels should note the dose per container.

For example, a product label for the patient in the previous example should be written as:

XYZ 16 mg in 50 mL of 0.9% sodium chloride injection; administer by continuous intravenous infusion at 2.1 mL/hr over 24 hours. Start at 9:00 a.m. on February 22, 1997.

Drug products stable for ≥24 hours when containers may contain all or a portion of the total course dose

The treatment plans and drug orders should:

- Note the dose as the amount of drug administered per day and indicate the number of days for which it is administered and
- Include the total dose (as a function of body surface area, weight, etc, when appropriate) in parentheses.

Product labels should:

- Identify the total amount of drug per container, the rate of administration, and the duration of infusion.

For example, with daily container exchanges for three days, a treatment plan for a patient with a body surface area of 2 m² should be written as:

XYZ 8 mg/m² per day diluted in 50 mL of 0.9% sodium chloride injection, by continuous intravenous infusion for three days starting on day 1 (total dose = 24 mg/m² over 72 hours).

A drug order for that patient should be written as:

XYZ 8 mg/m²/day = 16 mg per day for three days in 50 mL of 0.9% sodium chloride injection, by continuous intravenous infusion starting on day 1. Start on April 1, 1997 at 0800 (total dose = 24 mg/m² over 72 hours).

A product label should be written as:

XYZ 16 mg in 50 mL of 0.9% sodium chloride injection, by intravenous infusion at 2.1 mL/hr over 24 hours. Start on April 1, 1997 at 0800. Bag #1 of 3.

As another example, with a three-day drug supply in a single container, a treatment plan for a patient with a body surface area of 2 m² should be written as:

XYZ 8 mg/m² per day diluted in 50 mL of 0.9% sodium chloride injection, by continuous intravenous infusion for three days starting on day 1 (total dose = 24 mg/m² over 72 hours; total dose is mixed in one container).

A drug order for that patient should be written as:

XYZ 8 mg/m²/day = 16 mg per day for three days in 150 mL of 0.9% sodium chloride injection, by continuous intravenous infusion starting on day 1. Start on April 1, 1997 at 0800 (total dose = 24 mg/m² over 72 hours; total dose will be mixed in one container).

A product label should be written as:

XYZ 48 mg in 150 mL of 0.9% sodium chloride injection, by intravenous infusion at 2.1 mL/hr over 72 hours. Start on April 1, 1997 at 0800. Cassette #1 of 1.

Continuous infusions that require multiple drug product containers

Treatment plans and drug orders should:

- Note the dose per container,
- Include the total dose (as a function of body surface area, weight, etc, when appropriate) in parentheses, and
- Include the total number of containers used per day.

Product labels should:

- Note the dose per container.

For example, a treatment plan for a patient with a body surface area of 2 m² should be written as:

XYZ 1 mg/m² diluted in 50 mL of 0.9% sodium chloride injection, by continuous intravenous infusion for three days starting on day 1 (total dose = 24 mg/m² over 72 hours).
chloride injection; administer by continuous intravenous infusion over three hours, every three hours for three days, starting on day 1 (eight bags per day, total dose = 24 mg/m² over three days). A drug order for that patient should be written as: XYZ 1 mg/m²/dose = 2 mg in 50 mL of 0.9% sodium chloride injection; by intravenous infusion over three hours, every three hours for three days, starting on day 1. Start on May 1, 1997 at 8:00 a.m. (total dose = 24 mg/m² over three days).

Product labels should be written as:

XYZ 2 mg in 50 mL of 0.9% sodium chloride injection; by intravenous infusion at 17 mL/hr over 3 hours. Start on May 1, 1997 at 8:00 a.m. Bag #1 of

and

XYZ 2 mg in 50 mL of 0.9% sodium chloride injection; by intravenous infusion at 17 mL/hr over three hours. Start on May 1, 1997 at 11:00 a.m. Bag

#2 of 24.

Special situations

In situations in which, for example, excess (overfill) drug and fluid volumes are routinely added to a drug product container to compensate for dead space within the tubing of a primary administration set or extension set, product labels should:

- Identify the excess drug and fluid added as a proportion of the amount to be administered or as an absolute amount in excess.

For example, a product label might be written as:

XYZ 16 mg in 50 mL of 0.9% sodium chloride injection. Bag contains 10% overfill (fluid plus drug); volume to be infused = 50 mL. Administer by continuous intravenous infusion at 2.1 mL/hr over 24 hours. Start at 9:00 a.m. on February 22, 1997. Bag #1 of 1.

As another example, a product label might be written as:

ABC 16 mg in 100 mL of 5% dextrose injection. Bag contains 10 mL overfill (fluid plus drug); volume to administer = 100 mL. Infuse intravenously at 4.2 mL/hr over 24 hours. Start at 1:00 p.m. on October 31, 1996. Bottle #1 of 1.

ORAL ADMINISTRATION

In treatment plans, drug orders, and product labeling, describe drug dosages and schedules as the amount of drug that will be given (or taken) each time the drug is administered, not as a total daily dose that will be given (or taken) in divided doses. For example, "ABC 20 mg orally every six hours for X days, start at 0800 on May 10, 1997" should be used, not "ABC 80 mg per day, given in four divided doses for X days."

Include guidelines for rounding-off doses to the nearest capsule or tablet size. Although breaking a tablet into halves at best approximates an accurately measured dose, rounding-off rules for treatment plans should indicate whether tablet formulations should be broken to deliver a calculated dosage.

For drug products that are formulated as liquids for oral administration, dosages should be prescribed in metric units of volume that are rounded off to the nearest practical administration unit. Unless graduated measuring devices are provided to patients (eg, where a teaspoonful actually equals 5 mL), liquid drug formulations for oral use should not be prescribed in common household units of measure. For example, "LMN 7.5 mL orally every 12 hours for five days; start at 9:00 a.m. on November 13, 1997" is better than "LMN 1 ½ teaspoonfuls orally every 12 hours."

Whenever possible, include instructions about whether drugs should be administered (or taken) with food, as well as any dietary restrictions. For example, a treatment plan for a patient with a body surface area of 2 m² should be written as:

QRS 60 mg/m² orally, twice daily for 12 doses, starting on day 1 (total dose = 720 mg/m² over six days). Administer at least one hour before food ingestion.

A drug order for the same patient should be written as:

QRS 60 mg/m²/dose = 120 mg orally, at 10:00 a.m. and 6:00 p.m. for 12 doses, starting on day 1. Start on May 1, 1997 at 10:00 a.m. Administer at least one hour before food ingestion (total dose = 720 mg/m² over six days).

Product labels should be written as:

QRS 50-mg tablets. Take two tablets twice daily at 10:00 a.m. and 6:00 p.m. for 12 doses. Do not ingest food for at least one hour after taking medication. Start on May 1, 1997 at 10:00 a.m. Vial contains 24 tablets.

and

QRS 20-mg tablets. Take one tablet twice daily at 10:00 a.m. and 6:00 p.m. for 12 doses. Do not ingest food for at least one hour after taking medication. Start on May 1, 1997 at 10:00 a.m. Vial contains 12 tablets.

(Nota non that this patient would take oral medication from two different containers to complete his or her treatment regimen because the drug is available as tablets for oral administration in only 20- and 50-mg dosage strengths.)
CONCOMITANT MEDICATIONS

Supportive care and essential ancillary medications required by a treatment regimen should be clearly identified. Complete instructions including appropriate indication, dosage, route of administration, schedule, restrictions, and any other relevant data should be explicitly stated.

DISCUSSION

We have developed a set of standard rules for clearly, uniformly, and consistently describing chemotherapy drug regimens in treatment protocols, printed medication order forms, computer-based medication order templates, and pharmaceutical manufacturers’ product packaging and in the labeling of drug products dispensed for patient care. Our guidelines are intended to supplement and reinforce the ASHP, AMA, and ANA recommendations by giving specific examples of application in clinical oncology practice.

All protocols sponsored by the DCTD, NCI, are reviewed for scientific integrity and safety. Clinical research pharmacists at the Pharmaceutical Management Branch of the Cancer Therapy Evaluation Program, DCTD, NCI, use the guidelines to ensure that risks in clinical oncology research are minimized. Prospective investigators should note that DCTD-sponsored protocols are not approved unless they comply with the guidelines.

The guidelines are not uniquely applicable to oncology practice and may be useful for practitioners in other medical specialties. The guidelines address numerous treatment expression axioms employed in reducing medication errors. Many health care professionals will therefore be familiar with many of the guidelines’ tenets. We encourage clinicians, investigators, medical publishers, and the pharmaceutical industry to adopt the standards and apply them throughout all facets of drug development, including, but not limited to, letters of intent, protocol narratives, treatment schema and protocol abridgments, publications, medical notes, drug manufacturers’ product packaging, drug orders, and prescription labels.

CONCLUSION

A set of standard rules are proposed for describing chemotherapy regimens in all oncology practice settings.

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