INTRODUCTION

Administration of antineoplastic agents is a complex process fraught with the potential for patient harm. Challenges to patient safety grow as the number of chemotherapeutic regimens expands and oral chemotherapy drugs become commonplace. Despite safety risks, there are few national standards for safe administration—especially in the outpatient adult oncology setting. Providers of outpatient cancer care services are among the stakeholders seeking guidance to achieve the best, safest outcomes of therapy. To meet this need, the American Society of Clinical Oncology (ASCO) and the Oncology Nursing Society (ONS) initiated a collaborative project in 2008 to develop standards for the administration of chemotherapy to adult patients in the outpatient setting. At the close of a full-day structured workshop, 64 draft standards were proposed. After a formal process of electronic voting and conference calls, 29 draft standards were eliminated, resulting in a final list of 35 draft measures. The proposed set of standards was posted for 6 weeks of open public comment. Three hundred twenty-two comments were reviewed by the Steering Group and used as the basis for final editing to a final set of standards. The final list includes 31 standards encompassing seven domains, which include the following: review of clinical information and selection of a treatment regimen; treatment planning and informed consent; ordering of treatment; drug preparation; assessment of treatment compliance; administration and monitoring; assessment of response and toxicity monitoring. Adherence to ASCO and ONS standards for safe chemotherapy administration should be a goal of all providers of adult cancer care.
In addition, increased use of electronic medical record systems may lead to improvement in the safety and quality of outpatient chemotherapy administration. E-prescribing, for example, may prove to be a tool for reducing errors in chemotherapy ordering. Some electronic systems prompt clinicians in a practice to specify standard, evidence-based regimens to be used for specific diagnoses. Automated systems can reduce errors in regimen selection in a busy clinical setting.  

Oral chemotherapy agents pose new safety challenges. Adherence is a formidable issue in oral chemotherapy administration; poor adherence has been reported to have a substantial impact on the success of chemotherapy and patient safety. The National Comprehensive Cancer Network established a task force to explore the impact of increasing use of oral chemotherapy. They concluded that safety issues stem from a lack of checks and balances in administration, risk of patient noncompliance, lack of monitoring techniques, and a shift to patient management of oral chemotherapy. Despite the need for increased patient education regarding oral chemotherapy and processes to monitor adherence and adverse events, few standards regarding education or monitoring have been developed. 

This article reports on the ASCO/ONS development and consensus process and the resulting standards for safe chemotherapy administration in hematology/oncology ambulatory care settings.

**Methods**

With the goal of developing chemotherapy administration safety standards using a multidisciplinary, consensus-building process, an ASCO/ONS Steering Group of volunteer leaders and staff was assembled in the summer of 2008. The Steering Group chose to reach consensus of final standards by use of a structured workshop, open public comment period, and systematic review of collated data. Steering Group members further defined the scope of the project as pertains to the components of chemotherapy administration illustrated in Figure 1.

The Steering Group selected experts among diverse stakeholders for representation at the workshop, where standards were to be drafted. Appropriate experts were identified by Steering Group members, publications, and recommendations from professional societies. Before the workshop, Steering Group members conducted a literature review and prepared a synopsis of relevant published guidelines and recommendations, a reference list, and full text of key articles. These documents were distributed to workshop participants in advance of the meeting, along with introductory materials regarding the goals, scope, and common definitions. Workshop participants were informed that drafted standards should comply with the stated scope and meet specified criteria (Table 1).

The workshop was convened in December 2008, with 40 participants including medical oncologists, nurses, pharmacists, social workers, practice administrators, and patient advocates. A complete list of workshop participants is posted at http://www.asco.org/safety and http://www.ons.org/clinical/. Standards were discussed, reviewed, and revised by the workshop participants in small breakout sessions. Scribes recorded the standards, which then were presented to the full group of participants for further comment and discussion. The standards were assessed for redundancy and gaps. Finally, workshop participants were asked to vote on the draft standards within 1 week of the meeting. Voting results and subsequent review and editing by the Steering Group for redundancy resulted in the public comment standards draft.

**Table 1. Requirements for ASCO/ONS Chemotherapy Administration Standards**

<table>
<thead>
<tr>
<th>Criteria</th>
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<tbody>
<tr>
<td>1) Applicable to diverse outpatient hematology/oncology practice settings</td>
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<tr>
<td>2) Understandable and clinically intuitive</td>
</tr>
<tr>
<td>3) Realistic to achieve with existing or reasonable resources expectations</td>
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<tr>
<td>4) Valid, based on scientific evidence or strong expert consensus</td>
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<tr>
<td>5) Reliable, allowing consistent implementation and assessment over time and across sites</td>
</tr>
<tr>
<td>6) Measurable, allowing performance according to the standard to be assessed for both internal quality assessment and external quality monitoring</td>
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<tr>
<td>7) Actionable, informing practice processes, policies, or procedures</td>
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Abbreviations: ASCO, American Society of Clinical Oncology; ONS, Oncology Nursing Society.
Public comment was accomplished using a Web-based survey, Zarca (Zarca Interactive, Inc, Herndon, VA). After introductory text that provided common definitions for all standards, each standard was listed separately for voting. The survey tool collected two demographic characteristics of the respondents, primary profession and primary practice setting. For each of the draft standards, respondents voted (yes/no) for inclusion in the final set and provided relevant comments.

The public comment period was 6 weeks (January 29 to March 13, 2009). ASCO and ONS members were notified of the opportunity for public comment via existing member communications and targeted e-mails to relevant groups and committees. Workshop participants were asked to advertise the public comment using their own Web sites and/or communication tools.

After close of the public comment, the Steering Group reviewed voting results and all open text comments. The Steering Group members developed a public comment document comprising 35 public comment draft standards. The common definitions developed to apply to all standards are listed in Table 2.

Three hundred twenty-two responses were received after the request for public comment over the 6-week period. The online survey netted 312 responses, and 10 additional responses were made directly to ASCO or ONS. Table 3 lists the primary profession and practice setting of the survey respondents.

The online survey presented each proposed standard with the question, “Should this standard be included in the final set?” Response options were “Yes” or “No.” The results were recorded as frequencies and percentages of yes and no votes. Most standards received yes votes from the majority of respondents, with a range of 82% to 96%. Comments about each standard were also recorded. The number of comments varied from eight to 76 on individual standards. Many comments were requests for clarification or suggestions for rewording, whereas others were statements for or against individual proposed standards.

The Steering Group reviewed all of the survey data, including the comments, both individually and collectively. The final standards were evaluated for redundancy, revised, and agreed on by the Steering Group in April 2009. Table 4 lists the final 31 standards.

**Results**

Workshop participants defined 64 draft standards during the 1-day meeting. On the basis of results of workshop participants’ voting and comments, Steering Group members developed a public comment document comprising 35 public comment draft standards. The common definitions developed to apply to all standards are listed in Table 2.

### Table 2. Common Definitions for ASCO/ONS Chemotherapy Administration Safety Standards

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Chemotherapy</td>
<td>All antineoplastic agents used to treat cancer, given through oral and parenteral routes or other routes as specified in the standard. Types include targeted agents, alkylating agents, antimetabolites, plant alkaloids and terpenoids, topoisomerase inhibitors, antitumor antibiotics, monoclonal antibodies, and biologics and related agents. Hormonal therapies are not included in the definition of chemotherapy for the standards.</td>
</tr>
<tr>
<td>Chemotherapy regimen</td>
<td>One or more chemotherapeutic agents used alone or in combination in a well-defined protocol, generally administered cyclically</td>
</tr>
<tr>
<td>Practitioner</td>
<td>Licensed independent practitioner, including physicians, advanced practice nurses (nurse practitioner or clinical nurse specialist), and/or physician assistants, as determined by state law</td>
</tr>
<tr>
<td>Outpatient chemotherapy setting (site)</td>
<td>Any non-inpatient treatment setting, with the exclusion of home infusion services</td>
</tr>
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</table>

**Abbreviations: ASCO, American Society of Clinical Oncology; ONS, Oncology Nursing Society**

### Table 3. Public Comment Respondents’ Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. of Respondents (N = 312)</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td><strong>Primary profession</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>35</td>
<td>11</td>
</tr>
<tr>
<td>Registered nurse</td>
<td>173</td>
<td>56</td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Clinical nurse specialist</td>
<td>46</td>
<td>15</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Social worker</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Patient advocate</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>No answer</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Primary practice setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic medical center</td>
<td>56</td>
<td>18</td>
</tr>
<tr>
<td>Community practice</td>
<td>63</td>
<td>20</td>
</tr>
<tr>
<td>Hospital</td>
<td>84</td>
<td>27</td>
</tr>
<tr>
<td>Ambulatory clinic</td>
<td>82</td>
<td>27</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>No answer</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>
**Table 4. ASCO/ONS Chemotherapy Administration Safety Standards**

### Staffing-Related Standards

1. The practice has policies, procedures, and/or guidelines for verification of training and continuing education for clinical staff.
   - A. Orders for parenteral and oral chemotherapy are written and signed by licensed independent practitioners who are determined to be qualified by the practice according to the practice’s policies, procedures, and/or guidelines.
   - B. Chemotherapy drugs (oral or parenteral) are prepared by a pharmacist, pharmacy technicain, or nurse determined to be qualified according to the practice’s policies, procedures, and/or guidelines.
   - C. Only qualified physicians, physician assistants, advanced practice nurses, or registered nurses administer chemotherapy.
   - D. The practice has a comprehensive educational program for new staff administering chemotherapy, including a competency assessment, or the practice uses an off-site educational program regarding chemotherapy administration that ends in competency assessment.
     - Chemotherapy administration education must include all routes of administration used in the practice site (e.g., parenteral, oral, intrathecal, intraperitoneal, intravesicular).
     - An example of an off-site educational program is the ONS Chemotherapy and Biotherapy Course.
   - E. The practice has a standard mechanism for monitoring chemotherapy administration competency at specified intervals. Annual competency reassessment is recommended.
   - F. All clinical staff maintains current certification in basic life support.

### Chemotherapy Planning: Chart Documentation Standards

2. Prior to prescribing a new chemotherapy regimen, chart documentation available to the prescriber includes:
   - A. Pathologic confirmation or verification of initial diagnosis
     - If original pathology report is unobtainable, note of explanation is in chart.
     - This standard does not imply the need to rebiopsy if not clinically necessary.
   - B. Initial cancer stage or current cancer status
     - Cancer stage is defined at diagnosis. Cancer status includes a current description of the patient’s disease since diagnosis/staging, if relevant (e.g., recurrence, metastases).
   - C. Complete medical history and physical examination that includes, at minimum, height, weight, and assessment of organ-specific function as appropriate for the planned regimen
     - Example of assessment of organ-specific function as appropriate for the planned regimen: patient plan for cisplatin requires pretreatment assessment of kidney function
   - D. Presence or absence of allergies and history of other hypersensitivity reactions
   - E. Documentation of patient’s comprehension regarding medication regimens, including information regarding disease and self-care
   - F. Assessment regarding psychosocial concerns and need for support
     - Documentation of psychosocial concerns may include: copy of distress, depression, or anxiety screening form in the chart; patient self-report of distress, depression, or anxiety; or chart documentation regarding patient coping, adjustment, depression, distress, anxiety, emotional status, family support and care giving, coping style, cultural background, and socioeconomic status.
   - G. The chemotherapy treatment plan, including, at minimum, chemotherapy drugs, doses, duration, and goals of therapy
   - H. For oral chemotherapy, the frequency of office visits and monitoring that is appropriate to the agent and is defined in the treatment plan

### General Chemotherapy Practice Standards

3. The practice:
   - A. Defines standard chemotherapy regimens by diagnosis with references readily available, and/or
   - B. Identifies source(s) for chemotherapy regimens, including local or centralized IRB-approved clinical research protocols or guidelines

4. For orders that vary from standard regimens, practitioners provide a supporting reference. Reasons for dose modification or exception orders are documented.

5. The practice maintains written statements that determine the appropriate time interval for regimen-specific laboratory tests that are:
   - A. Evidence-based when national guidelines exist (e.g., ASCO or NCCN guidelines), or
   - B. Determined by practitioners at the site

6. The practice maintains a policy for how informed consent is obtained and documented for chemotherapy.

7. If the practice site administers chemotherapy that is prepared (mixed) off-site, the practice site maintains a policy for quality control of that chemotherapy.

### Chemotherapy Order Standards

8. The practice does not allow verbal orders except to hold or stop chemotherapy administration. New orders or changes to orders must be made in writing.

9. The practice maintains and uses standardized, regimen-level, preprinted or electronic forms for chemotherapy prescription writing (oral and parenteral).

10. Order forms inclusively list all chemotherapy agents in the regimen and their individual dosing parameters. All medications within the order set are listed using full generic names and follow Joint Commission standards regarding abbreviations.

   - Brand names should be included in orders only where there are multiple products or when including the brand name otherwise assists in identifying a unique drug formulation.

Complete orders must include:
- A. Patient’s full name and a second patient identifier (e.g., medical record number, DOB)

(Continued on next page)
**Table 4. ASCO/ONS Chemotherapy Administration Safety Standards (Continued)**

| B. Date | G. Date and time of preparation and expiration<sup>1,3</sup> |
| C. Diagnosis | • Practices are not expected to be in full compliance with this standard if they currently have electronic systems that are unable to meet these labeling requirements. Appropriate changes should be implemented as soon as possible to ensure that electronic labels integrate all of these elements.* |
| D. Regimen name and cycle number | 14. Practices that administer intrathecal medication maintain policies specifying that intrathecal medication will: |
| E. Protocol name and number (if applicable) | A. Not be prepared during preparation of any other agents |
| F. Appropriate criteria to treat (e.g., based on relevant laboratory results and toxicities) | B. Be stored, once prepared, in an isolated container or location with a uniquely identifiable intrathecal medication label |
| G. Allergies | C. Be delivered to the patient only with other medication intended for administration into the CNS<sup>1</sup> |
| H. Reference to the methodology of the dose calculation or standard practice equations (e.g., calculation of creatinine clearance) |  |
| I. Height, weight, and any other variables used to calculate the dose | **Patient Consent and Education** |
| J. Dosage | 15. Before initiation of chemotherapy, each patient is given written documentation, including, at minimum: |
| • Doses do not include trailing zeros; use a leading zero for doses < 1 mg. | A. Information regarding his/her diagnosis |
| K. Route and rate (if applicable) of administration | B. Goals of therapy |
| L. Schedule | C. Planned duration of chemotherapy, drugs, and schedule |
| M. Duration | D. Information on possible short- and long-term side effects |
| N. Cumulative lifetime dose (if applicable) | E. Regimen- or drug-specific risks or symptoms that require notification and emergency contact information, including: |
| O. Supportive care treatments appropriate for the regimen (including premedications, hydration, growth factors, and hypersensitivity medications) | • How to use practice call system |
| P. Sequence of drug administration (if applicable)<sup>2,3,14,15,27,29</sup> | • Symptoms that should trigger a call |
| • Practices are not expected to be in full compliance with this standard if they currently have electronic ordering systems that prevent compliance. Appropriate changes should be implemented as soon as possible to ensure that electronic ordering systems integrate all of these elements. If the information cannot be captured in the electronic system, it should be documented within the patient record.* | • Who should be called in specific circumstances (oncologist or other provider) |
| | F. Plan for monitoring and follow-up<sup>1,3,18,19,28</sup> |
| | Patient education materials should be appropriate for the patient’s reading level/literacy, patient/caregiver understanding. |
| | 16. Informed consent for chemotherapy must be documented by a physician in the practice prior to chemotherapy administration.<sup>2,3</sup> The consent process should follow appropriate professional and legal guidelines. (For more information and sample forms, see http://www.asco.org/consent). |
| | 17. All patients who are prescribed oral chemotherapy are provided written or electronic patient education materials about the oral chemotherapy before or at the time of prescription. |
| | A. Patient education includes the preparation, administration, and disposal of oral chemotherapy. |
| | B. The education plan includes family, caregivers, or others based on the patient’s ability to assume responsibility for managing therapy.<sup>2,3</sup> Cardiologic conditions that require additional support (e.g., cancer patient, caregiver, provider) |
| | Patient education materials should be appropriate for the patient’s reading level/literacy, patient/caregiver understanding. |

**Drug Preparation**

| 12. A second person (a practitioner or other personnel approved by the practice to prepare or administer chemotherapy) independently verifies each order for chemotherapy prior to preparation, including confirming: | **Chemotherapy Administration** |
| A. Two patient identifiers | 18. Before administration, at least two practitioners or personnel approved by the practice to prepare or administer chemotherapy: |
| B. Drug names | A. Verify patient identification using at least two identifiers (e.g., medical record number, DOB) |
| C. Drug dose | B. Confirm with the patient his/her planned treatment, drug route, and symptom management |
| D. Drug volume | C. Verify the accuracy of: |
| E. Rate of administration | • Drug name |
| F. Route of administration | • Drug dose |
| G. The calculation for dosing (including the variables used in this calculation)<sup>2,3,10,26,29</sup> | • Drug volume |
| 13. Chemotherapy drugs are labeled immediately upon preparation, including, at minimum: | • Rate of administration |
| A. Patient’s full name and a second patient identifier (e.g., medical record number, DOB) | • Route of administration |
| B. Full generic drug name | • Expiration dates/times |
| C. Drug administration route | • Appearance and physical integrity of the drugs |
| D. Total dose to be given | (Continued on next page) |
| E. Total volume required to administer this dosage | (Continued on next page) |
| F. Date of administration | (Continued on next page) |
Monitoring and Assessment

21. Practice maintains protocols for response to life-threatening emergencies, including escalation of patient support beyond basic life support.1,29

It is recommended that emergency protocols are reviewed annually.

22. On each clinical visit during chemotherapy administration, practice staff assess and document in the medical record:

A. Changes in clinical status, weight
B. Changes in performance status
C. Allergies, previous reactions, and treatment-related toxicities
D. Patient psychosocial concerns and need for support30

This standard applies to all clinical encounters (practitioner visits, chemotherapy administration visits, but not laboratory or administrative visits).

23. At each clinical visit during chemotherapy administration, practice staff assess and document the patient’s current medications, including over-the-counter medications and complementary and alternative therapies. Any changes in the patient’s medications are reviewed by a practitioner during the same visit.29

This standard applies to all clinical encounters (practitioner visits, chemotherapy administration visits, but not laboratory or administrative visits).

D. Sign (in record or electronically) to indicate verification was done28,27

19. Extravasation management procedures are defined; antidote order sets and antidotes are accessible.2,28

20. A licensed independent practitioner is on site and immediately available during all chemotherapy administration.1,3

Note. Explanatory notes or examples are provided in italics, when applicable. Disclaimer: These standards related to patient safety for chemotherapy administration in the ambulatory/outpatient setting were developed jointly by ONS and ASCO using a consensus process. The standards are intended to reflect current thinking on best practices but are not comprehensive and do not account for individual patient variation. It is the responsibility of each administering agent to determine the best methods for chemotherapy administration for each patient. The standards are not medical advice or legal advice. To the extent that the standards conflict with applicable federal, state, or local legal requirements, practitioners should comply with those requirements. The administering agent is solely responsible for, and assumes all liability with respect to the standards and the execution of the standards by any party.

Abbreviations: ASCO, American Society of Clinical Oncology; DOB, date of birth; IRB, institutional review board; NCCN, National Comprehensive Cancer Network; ONS, Oncology Nursing Society; NCI, National Cancer Institute.

* Implementation exception.

decision support tools, and performance measurement, common practices and procedures must be standardized if care is to be as safe and efficient as possible. Uniform approaches to diagnosis and treatment have become commonplace in many medical specialties. For example, adherence to the use of a simple checklist prior to the placement of a central catheter in the critical care setting results in improved outcomes.28 Because of the complexity of chemotherapy administration and the risk of severe adverse effects, standardizing care in settings where chemotherapy is delivered is essential.

The current article represents a successful collaboration between ASCO and ONS and provides a series of consensus-derived safety standards that are intended to provide a basis for the safe administration of outpatient chemotherapy to adult cancer patients. Standards were defined based on a structured and iterative process that included an open public comment period. We defined a standard as an expectation of care based on well-defined criteria (Table 1). Nearly half of the draft standards were eliminated during the review process either because they were duplicative or did not meet all of the required criteria. The final set of standards is applicable to all outpatient oncology settings; however, it is known that not all practices will be able to achieve all standards immediately on publication.

Development by consensus with public comment was a new process for ASCO and ONS. Both organizations used existing member and public communication mechanisms to publicize the call for public comments, as well as targeted outreach. Additionally, development workshop participants were asked to advertise the public comment using their Web sites/communication tools. There are limitations to the public comment approach. It is unknown how representative the survey respondents are of the membership of ASCO or ONS or
of the population of medical oncologists and oncology nurses in the United States in general. In addition, the number of respondents was small compared with the entire membership of either organization. ONS has approximately 37,000 members, and ASCO has more than 27,000. Physicians were under-represented in public comment; however, ASCO/ONS Steering Group members learned that physicians often delegated response to the survey to nurses or others on staff. Ultimately, the comments received reflected many of the diverse professionals involved in chemotherapy administration, as well as patient advocacy groups.

During public comment period, the ASCO/ONS Steering Group learned of the newly published Guidelines for the Safe Prescribing, Dispensing and Administration of Cancer Chemotherapy from the Clinical Oncological Society of Australia. Although the two efforts had different goals and reflect different systems of care, there is significant overlap, and each validates the other.

How should the ASCO/ONS chemotherapy administration safety standards be used? Of importance, the standards are voluntary but represent consensus across a broad range of stakeholders. We suggest that medical oncology practice staff assess their own compliance with each of the standards. For areas requiring improvement, practice members should prioritize time and resources and set achievable goals. To help practices rapidly comply with the standards, ASCO and ONS will provide tools and resources to assist in practice implementation (http://www.asco.org/safety and http://www.ons.org/clinical/). Once compliance has been maximized, practices should create a mechanism for periodic surveillance.

Regulators, payers, and patient advocacy groups have growing influence on the provision of cancer care. Oncology specialty societies are well positioned to respond to these groups by defining and disseminating best practices and standards of care, helping to create an environment of transparency, and creating tools for measuring the components of care. The ASCO/ONS chemotherapy administration safety standards are the result of a successful collaboration led by oncology providers, with broad input from diverse stakeholders. Regular review of these standards will be needed as the practice of medical oncology continues to evolve rapidly.

We acknowledge all of the workshop participants, who volunteered their time and expertise to developing the initial draft standards (for a full list, go to http://www.asco.org/safety). We also acknowledge the hundreds of reviewers and commenters who contributed during the public comment period.

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ASCO/ONS Standards for Safe Chemotherapy Administration
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References