



HOPA News

HOPA Salary Survey, November 2007

Prepared by:

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INTRODUCTION

The realm of cancer therapy is changing more dramatically than other areas of healthcare. New and expensive targeted drug therapies are providing improved outcomes; however, the cost is leading payers to develop more conservative usage policies and reimbursement rules. National safety concerns have also led to the development of new regulations pertaining to the safe handling, delivery, and disposal of cancer-related therapies. The added volumes, costs, and rules are stressing cancer delivery systems. It is plausible to speculate that pharmacy personnel involved with cancer care are likely to be more consistently involved with a wider variety of patient care issues than colleagues in general care practices. To address this issue, HOPA decided to develop a comprehensive survey to document the scope of oncology pharmacy-related services provided, document "who does what," establish salary and benefit benchmarks, and try to determine which variables (eg, institutional vs individual) have the greatest impact on salary.

The survey was sent to all HOPA members and was open for response from November 15, 2007 to November 30, 2007. A total of 96 responses were returned from 376 potential practice sites (25.5% response rate). For most questions there were at least 92 usable answers (eg, some questions were unanswered). The survey required selecting discrete increments within a range for reporting salary. Only 3 questions were answered outside the range provided (eg, 2 were less than, and 1 greater than), which validates the range values that were used.

Survey Monkey™ (Portland, OR), a commercial survey instrument, was used to collect and sort responses. Within each

range of answers weighted averages were used to determine an accurate overall average. Depending on the nature of the question, the reviewers used professional judgment to determine the most appropriate filter parameters. Filters were applied to allow the sorting of data based on responses, using basic "and," "or," and "if" logic. Multivariate regression analysis methodology was used to determine correlations between variables, for example "job tenure" and "salary." Survey Monkey™ utilizes logic that "rounds up" and, therefore, some data sets result in a total of slightly more than 100%. We believe this nuance does not significantly affect the data analysis.

RESPONDERS

The responders represented practices based in physician offices (20.2%), hospitals (75.5%), and other (5.3%). Of the responders, 63.8% were not-for-profit, 23.4% were for-profit, 7.4% were government/military, 3.2% represented a GPO or distributor, and 2.1% did not

complete that question. Additionally, 33% of responders were affiliated with an academic institution.

The geographic distribution of responders seemed overall representative: Northeast (15.4%), Southeast (25.3%), Northwest (12.1%), Southwest (18.7%), Midwest (22.0%), South Central (6.6%), and Canada (1.1%).

PRACTICE SITE DATA

Sixty-eight responders (71.6%) indicated that more than 80% of their patients are cancer patients, while 14.7% indicated that less than 20% were cancer patients; 14.8% reported that cancer patients were between 20% and 80% of their patients.

The average number of cancer patients treated varied widely. The mode was 21-40 patients per day (21.5%), and the breakdown was <20 (11.8%), 21-40 (21.5%), 41-60 (16.1%), 61-80 (12.9%), 81-100 (8.6%), 101-200 (15.1%), 201-400 (6.5%), and >400 (8.6%). In summary, 70.8% of responders

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**HOPA's 4th Annual Conference has combined
with ISOPP's 11th Annual Conference
for the HOPA/ISOPP 2008 Joint Conference,
June 18-21, 2008 in Anaheim, California**

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COMMITTEE UPDATES

Update From the Board

Amy Valley At-Large Board Member

In this issue of the newsletter, the results of a HOPA member survey on oncology pharmacy salaries is presented. Recently, you received an e-mail with the results of an additional survey regarding infusion center practices. This information is also available on the HOPA website, and there are also plans to submit the results of the infusion center survey for publication to a broader audience. The Board would like to thank all HOPA members who participated in these surveys; there was an excellent response rate! Toward the end of January, you should have also received a survey on clinical practices and membership needs related to Erythropoiesis-Stimulating Agents (ESAs). This survey stemmed from member interest and the Board's desire to understand how the organization can best serve its members related to this dynamic and controversial clinical area.

The collective information gleaned from these surveys provides invaluable information to the oncology pharmacy community. To date, the process within HOPA has been for the Board to approve all formal surveys that are intended for the HOPA membership. There have been several requests from oncology pharmacists to send surveys to our membership. While the information gathered from a well-designed survey is highly valuable, it can also take significant time to complete. However, sending out too many surveys can cause "survey fatigue," which can result in low response rates and member apathy. The Board is considering these factors as we plan additional surveys for the coming year. We are committed to ensuring that surveys are relevant and of interest to HOPA members, are well designed, and that results are reported back to the membership in as prompt a manner as possible. Please let your Board Members or Committee Chairs know if there are areas of interest that should be addressed. And thanks in advance for your continued participation!

HOPA's Strategic Plan for 2008-2010 has been completed and all of the committees have been charged with helping the organization to attain the objectives outlined in this plan. Both the Strategic Plan and all formal policies & procedures are now available on the HOPA website to members only; members can access these documents by logging into the "Members Only Area," which is located under the "Membership" tab on the home page. Some of the policies & procedures are also made available to the public and can be accessed from the subtab "HOPA Policies" located under the "About Us" tab on the home page.

ACPE Accreditation

Chair: LeAnn Kennedy

Co-chair: Janet Espirito

This past October, the CE Accreditation Committee submitted our follow up report to ACPE. We are anxiously awaiting word for full accreditation for the next 3 years. The committee is also undergoing training to understand the proper way to review the program for fair balance and ensuring that the program meets all the standards for ACPE accreditation. This is the quiet time for this committee but we will be busy once the 2008 meeting materials are received and ready for review.

HOPA/ISOPP 2008 CALL FOR ABSTRACTS

The January 14 Call for Abstracts for practitioners has expired.

The Trainee Abstract Deadline is Monday, MARCH 10, 2008 at 11:59 PST

Only residents, fellows, or students may use this deadline. Abstracts from non-trainees will not be accepted. Trainee abstracts may describe ongoing research (ie, abstracts do not have to contain results and conclusions). Accepted trainee abstracts will be published in the HOPA/ISOPP 2008 Meeting Program Book only.

Online Submission Process

Online abstract submission is at http://isopp.org/isopp_x_abstract_submission.php. Please note that abstracts must be 250 words or less. Questions or problems can be directed to the ISOPP Research Committee Chair, Judith Smith, at 001-713-500-6408.

Meeting Registration

Online registration is at <http://www.hoparx.org/registrationGrid.aspx>. Questions or problems regarding registration can be directed to Lisa Ragucci, HOPA Coordinator, at 001-609-524-2317 or lragucci@dwwrite.com.

—The HOPA/ISOPP 2008 Research Committee

BCOP Recertification

Chair: Mark Geraci

Co-chair: Casey Williams

The BCOP Recertification Committee identified lecture topics for the 2008 recertification cycle and has invited speakers for the 3 sessions this year: at the HOPA/ISOPP annual meeting, the ACCP annual meeting, and at the ASHP Midyear meeting. We continue to monitor the literature for new topics that come to the forefront of practice for future lectures. The committee will now embark on an improvement process for accepting and vetting questions used for recertification based on this year's lecture topics.

Education and Standards

Chair: Gary Yee

Co-chair: Sally Barbour

The HOPA Education and Standards Committee is making good progress toward planning the 2008 Conference. HOPA and ISOPP have selected topics for the concurrent clinical and technical sessions, workshops, and significant papers. The selected topics should be of interest to hematology/oncology pharmacists working in a wide variety of practice settings. We are now in the process of identifying possible speakers for the sessions. HOPA is also currently in the process of submitting many proposals for funding of best practices programs and corporate symposia. Depending on the outcome of these submissions, topics for the various sessions may change.

COMMITTEE UPDATES

(CONTINUED)

Finance

Chair: Steve D'Amato

Co-chair: David Gammon

The Finance Committee has completed the Request For Proposal (RFP) for HOPA ACPE Provider Project Management. After approval by the Board, the proposal was sent out to prospective vendors in an effort to obtain bids to provide ACPE project management services to HOPA. Responses have been received and are currently being reviewed. As stated previously, the goal of this proposal is to have an enduring educational platform that will support HOPA as a fully accredited provider of pharmacy education. Some of the key areas of responsibility for the selected vendor include: database development; a retrievable recordkeeping system; creation of certificate distribution, tracking, and storage mechanism; collation and generation of reports and program evaluations; and a process for creating program data. In addition, a process for creating speaker letters for faculty, needs assessments, and an evaluation mechanism has been requested. This will provide HOPA with a solid foundation for years to come.

Legislative Affairs

Chair: Tim Tyler

Co-chair: Niesha Griffith

The Legislative Affairs Committee has, as a core mission, the need to promote the pharmacist's worth in the oncology setting to key decision makers. We seek to do this in both worlds of provider-based regulations (hospital-based) and free-standing clinics and offices (private practice). Ultimately, we hope to make a difference in the lives of those we serve: our patients.

With the final rule for this year reducing ASP reimbursement to 4.5% (rounded up to 5%) and forecasting ASP+3% for 2009 the committee's biggest push lies in the area of pharmacy overhead. No major payer, neither CMS nor commercial insurance, recognizes the need to compensate for all of the required mandates placed on pharmacists by the many regulatory bodies. While it is standard to pay for a nurse's time to administer chemotherapy, the erroneous assumption is that ASP+ is enough to cover the cost of maintaining pharmacists, supplies, and equipment. Most of HOPA's constituents argue that it is barely enough to cover drugs acquisition on average with no compensation for staff, supplies, and equipment. USP 797 is an example – it requires changes for all handling of sterile preparations regardless of site of service yet there is no compensation for the extra costs involved.

The Legislative Affairs work group meets by teleconference to draft strategy for HOPA and seeks to work with all interested parties to help raise awareness of the many issues affecting our various practices. You will see a survey or two and some requests for assistance to help education key decision makers as the year progresses, so we as a committee thank you in advance for helping HOPA in these important issues affecting our profession.

NEW WEBSITE FEATURES

HOPA members: Did you know that when you log on to the website as a member these new features are available to you?

- HOPA's Strategic Plan for future development
- An updated list of HOPA's new Internal Policies

Members can access these documents by logging into the "Members Only Area," which is located under the "Membership" tab on the home page.

Membership

Chair: Laura Boehnke Michaud

Co-chair: Alex Kardos

The HOPA Membership Committee has been very busy over the past few months and has been working diligently to address the needs of current and future HOPA members. A primary goal of the committee has been the development of the HOPA/ISOPP 2008 Joint Conference Travel Grant program, which is designed to provide financial support to trainees, pharmacy technicians, and other HOPA members who would benefit from attending the annual HOPA meeting but who may not otherwise be able to afford to attend. Awardees will be selected through a scoring process that includes assessment of needs and merit (based on abstract submission, although abstract submission is not required). Awardees will include 10 trainees, 5 technicians, and 5 nontrainee or technician HOPA members. Each grant will be for \$500 to offset the costs of travel and meeting registration.

Additionally, the committee has been working on creating a membership survey, organizing the renewal processes and procedures, and enhancing recruitment of new members. Methods being evaluated to enhance the recruitment of new members include the identification of oncology pharmacy Residency Directors and board certified oncology pharmacists (BCOPs) who are not currently HOPA members, as well as the creation of a "technician track" membership. The goal for membership growth in the coming year is 10% based on the strategic plan direction approved by the Executive Board.

Nominations and Awards

Chair: Mike Vozniak

Co-chair: Michelle Rockey

The Nominations and Awards Committee is bustling with activity! We met via teleconference on January 3 and welcomed our new members Karen Fancher, Jodi Grabinski, and Susanne Liewer and put them straight to work. We are currently reviewing and updating the HOPA Awards. Our goal is to make the nomination and submission process easier and to encourage more nominations this year. A call for nominations went out in February and the deadline for submission is March 30, 2008. Stay tuned for more details.

A call for nominations for the HOPA Executive Board went out on January 4. The deadline to nominate a new President-Elect,

COMMITTEE UPDATES

(CONTINUED)

Treasurer, and At-Large Board Member was February 15, 2008. Once the ballot is set, officer elections will be opened in mid-March and will be conducted using SurveyMonkey.

Professional Affairs

Chair: Andrew Skirvin

Co-chair: Christy Harris

The Professional Affairs Committee will be reviewing the strategic plan as set forth by the Board of Directors to focus the committee's efforts on the priorities of the organization. The committee has added several new members to bring a fresh perspective to the work of the committee.

Publications

Chair: Sheetal Sheth

Co-chair: Bob Ignoffo

The Publications Committee has been working diligently to improve how information is delivered to HOPA members. Committee members Amelia Chan and Kim Bergstrom established a HOPA e-alerts page (www.hoparx.org/ealerts.aspx), which allows HOPA members to access the latest updates in legislative affairs, FDA MedWatch alerts, clinical pearls, and more. Committee members Brooke Beavers and Damary Castanheira Torres have restructured the previous Resources Tab on the HOPA web page (www.hoparx.org/Resources.aspx) to include more useful links to popular reference sites necessary for all clinicians.

Throughout our newsletters we have been including a section titled Drug Updates. The current hematology/oncology residents are assisting in keeping the HOPA members continually informed of these new agents or old drugs with new indications.

Finally, co-chair Bob Ignoffo is coordinating the first virtual journal club. We encourage all HOPA members to please keep an eye out for it in the upcoming months. Through all these efforts, HOPA members will be better able to access important information more quickly and efficiently.

Research

Chair: Kelly Markey

Co-chair: Tim Brenner

The Research Committee has been hard at work this year fulfilling our goal to promote and support pharmacy research for our members. The Abstract and Poster program has been successful so far with our online submission format. We have received over 100 completed research abstracts to review. The deadline for resident/student/trainee abstracts is March 10, 2008. Thanks to those of you who are donating your time to review abstracts.

The Research Workshop will be held as a pre-meeting workshop this year on Wednesday, June 18, 2008. The goal of the workshop is to provide HOPA and ISOPP members a forum to learn about incorporating research into their practice. The structure of this workshop is a combination of lectures, panel discussions, and demonstrations from a faculty of pharmacy researchers from different areas of expertise from around the globe. Look for an announcement on how to register soon.

Our Research Grant Award program will be explained in detail at the Annual Meeting, but one element to look forward to next year is that the award will be open to the entire HOPA membership. This year's award winner will be selected in the next few of months and will be formally announced at the Annual Meeting.

DRUG UPDATES

ARSENIC TRIOXIDE

Class: Antineoplastic agent

Indication: Treatment of acute promyelocytic leukemia (APL) in patients who are refractory or have relapsed following retinoid and anthracycline chemotherapy

Dose: 0.15 mg/kg/day (induction)

Dose adjustments: Not established in renal/hepatic dysfunction

Adverse effects: APL differentiation syndrome, QT prolongation, tachycardia, hypokalemia, hypomagnesemia, nausea

Drug interactions: Agents that prolong QT, cause K⁺/Mg²⁺ wasting

DEFERASIROX (EXJADE®)

Class: Iron chelator

Indication: Transfusional hemosiderosis

Initial dose: 20 mg/kg orally once daily

Dose adjustments: Renal dysfunction

Common adverse effects: Fever, headache, gastrointestinal disturbances, cough, skin rash, elevations in serum creatinine

Acquisition: Information available at www.us.exjade/hcp/resources/epass.jsp

DRUG UPDATES

(CONTINUED)

ARSENIC TRIOXIDE (CONTINUED)

Arsenic Trioxide Therapy in Acute Promyelocytic Leukemia

Rebecca Young, PharmD

Oncology Pharmacy Resident, University of California, San Francisco

Acute promyelocytic leukemia (APL) is characterized by arrest of myeloid progenitor cell maturation at the promyelocytic stage. Cell cycle arrest is due to chromosomal translocations involving the retinoic acid receptor alpha (RAR α) gene on chromosome 17 and the promyelocytic leukemia (PML) gene on chromosome 15.¹ APL was traditionally treated with standard acute myelogenous (AML) chemotherapy—cytarabine plus an anthracycline (idarubicin or daunorubicin). Incorporation of all-trans retinoic acid (ATRA) and arsenic trioxide (ATO), non-cytotoxic differentiating agents, are paradigms of targeted therapy, dramatically revolutionizing the management and prognosis of APL.

Pharmacologic therapy should begin following APL suspicion, without awaiting genetic confirmation. Supportive care measures should be initiated immediately to prevent coagulopathy and hemorrhage complications, which display highest risk before therapy and during the first few days of induction.² Treatment induction in newly diagnosed patients typically consists of ATRA and anthracycline-based therapy, which has been shown to increase APL cure rates to 70%, up from 35% with chemotherapy alone.³ An alternative induction regimen that can be considered in elderly patients or those unable to tolerate anthracycline chemotherapy is ATRA + ATO. In 2004, Shen and colleagues demonstrated synergy between ATRA and ATO in newly diagnosed APL patients, compared to ATRA or ATO monotherapy.⁴ In 2006, Estey and colleagues combined ATRA and ATO as an induction regimen in 25 untreated low risk (initial WBC <10 x 10⁹/L) APL patients, resulting in a 96% complete remission (CR) rate.⁵

Despite high remission rates, approximately 20% of APL patients will relapse. Currently, ATO is the most effective therapy for relapsed APL.³ In the United States Multicenter Trial, ATO was used to treat APL patients during their first or second relapse. Results demonstrated an 85% CR rate, of which 91% with CR achieved t(15;17) negativity.⁶ The median time to achieve bone marrow remission was 35 days, which is similar to that reported with ATRA induction in newly diagnosed APL patients.⁶ Gemtuzumab ozogamicin has also shown significant activity in relapsed APL patients. In patients who continue to experience induction failure, hematopoietic stem cell transplantation is an option.

ATO was approved by the Food and Drug Administration (FDA) in 2000 for treatment of refractory or relapsed APL following retinoid and anthracycline chemotherapy. The antileukemic mechanism of ATO is two-fold—induction of APL cell apoptosis and degradation of the PML-RAR α fusion gene, promoting promyelocyte differentiation. When used as induction therapy, ATO is dosed at 0.15 mg/kg/d until bone marrow remission, or for a maximum of 60 doses. ATO consolidation therapy usually begins

DEFERASIROX (EXJADE®) (CONTINUED)

Deferasirox

Katharine McGrath, PharmD

Oncology Pharmacy Resident, University of Washington Medical Center/Seattle Cancer Care Alliance

Deferasirox (Exjade®) was approved by the FDA in November of 2005 for the treatment of transfusional hemosiderosis in patients 2 years of age or older. Deferasirox is a tridentate chelator with a high affinity for iron (as Fe³⁺). It is approved for oral administration once daily at an initial dose of 20 mg/kg of total body weight. Therapy should be initiated when signs of chronic iron overload appear (transfusion of ~100 mL RBC/kg). The dose may be titrated in increments of 5 or 10 mg/kg every 3 to 6 months based on serum ferritin trends, with a maximum daily dose of 30 mg/kg.

A phase III trial comparing deferasirox to deferoxamine was completed and resulted in the approval of deferasirox. This was a 1-year, multinational, randomized, open-label, noninferiority study. Patients greater than 2 years (stratified by age group), with B-thalassemia-associated transfusional iron overload were eligible for inclusion in the study. Two hundred and ninety-six patients received deferasirox and 290 received deferoxamine. Ninety-seven percent of patients had received prior chelation therapy. Baseline characteristics were similar between the groups, as was the number of blood transfusions during the study period. Deferasirox was administered at 5, 10, 20, or 30 mg/kg once daily, depending on baseline liver iron concentration (LIC). Deferoxamine was administered at 20-60 mg/kg as a subcutaneous infusion 5 days/week. However, patients who were receiving deferoxamine prior to study entry at doses higher than indicated by the study protocol were continued on the same dose. The primary endpoint was the percentage of patients maintaining or achieving a specified decrease in LIC at 1 year. Patients with a baseline LIC <10 were to achieve an LIC between 1 and 7 mg Fe/g dosing weight (dw) and those with an LIC \geq 10, a decrease of \geq 3 mg Fe/g dw was targeted. Success rates for deferasirox and deferoxamine were 52.9% and 66.4%, respectively, and did not meet predefined criteria for noninferiority. However, subgroup analysis of patients with a baseline LIC \geq 7 mg iron/g dosing weight showed that deferasirox had similar efficacy to deferoxamine when used at doses of 20 and 30 mg/kg. Success rates were 58.6% for deferasirox and 58.9% for patients receiving deferoxamine. The rate of study drug discontinuation was 5.7% with deferasirox and 4.1% with deferoxamine. In conclusion, patients who are unable to tolerate deferoxamine or who are poorly compliant with the prolonged infusion necessary for administration may consider deferasirox as a viable alternative for the treatment of chronic iron overload.¹

The adverse events most commonly associated with deferasirox in clinical trials were fever, headache, abdominal pain, cough,

DRUG UPDATES

(CONTINUED)

ARSENIC TRIOXIDE (CONTINUED)

3-6 weeks following induction, and is dosed at 0.15 mg/kg/d for 25 doses over a 5-week period.

ATO is generally well tolerated compared to traditional chemotherapy; however, significant adverse reactions include hyperleukocytosis, differentiation syndrome, and QT prolongation. Differentiation syndrome seen with ATO therapy (characterized by dyspnea, fever, peripheral edema, and pulmonary infiltrates) is similar to that seen with ATRA, and is usually associated with leukocytosis. Dexamethasone 10 mg BID for 3-5 days can be used to treat APL differentiation syndrome. Other possible side effects of ATO include hyperglycemia, nausea/vomiting, fatigue, tachycardia and rarely peripheral neuropathy. In contrast to conventional chemotherapy, ATO does not cause myelosuppression.

Before starting ATO therapy, baseline electrolytes and ECG should be obtained. ATO should be held if QTc increases >500 ms or the patient experiences syncope or palpitations. Additionally, serum potassium and magnesium levels should be maintained above 4 mEq/dL and 1.8 mg/dL respectively.⁷ If possible, medications that can cause QT prolongation (eg, fluoroquinolones, haloperidol, fluconazole) or cause potassium and magnesium wasting (eg, certain diuretics, amphotericin B) should be discontinued.

Of all the AML subtypes, APL (M3 subtype) has the most favorable outcome. With current therapy options, CR rate is as high as 90% and an overall survival rate reaches 80%.⁸ ATO is highly effective in treating relapsed APL. Additionally, elderly patients or those with contraindications to intense chemotherapy (eg, cardiac comorbidities, severe organ dysfunction) are candidates for alternative frontline therapy with ATO + ATRA. Small studies have recently reported promising results using upfront ATO therapy, further warranting larger randomized clinical trials to better understand the role of ATO in APL treatment.

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DEFERASIROX (EXJADE®) (CONTINUED)

diarrhea, skin rash, and elevations in serum creatinine. Less common side effects included ocular and auditory disturbances, but these side effects can be irreversible, and baseline ophthalmic and auditory testing should be completed prior to initiating therapy. Novartis released updated information in May and December 2007 to reflect postmarketing reports of cytopenias and renal and hepatic failure in patients receiving deferasirox. Dose adjustments should be made for patients who experience increases in serum creatinine of >33% or greater than the age appropriate upper limit of normal on two consecutive visits. Doses should be decreased by increments of 10 mg/kg. Patients who experience intolerable skin reactions may hold therapy and restart at a lower dose.²

Deferasirox is primarily glucuronidated and undergoes minimal oxidative metabolism through the CYP-450 system. Due to the possibility of these agents binding in the gastrointestinal tract, deferasirox should not be administered simultaneously with aluminum-containing antacids.²

Deferasirox is available as 125, 250, and 500 mg tablets, and the dose is rounded to the nearest whole tablet. Tablets should be taken on an empty stomach, and should not be chewed or swallowed whole. Tablets should be stirred into a small amount of water, orange juice, or apple juice until a fine suspension forms. Doses <1 g should be suspended in 3.5 ounces and doses >1 g in 7 ounces. Once taken, any residue should be resuspended in a small amount of liquid and swallowed.²

Deferasirox must be obtained through a patient support program called Exjade Patient Assistance and Support Services (EPASS) Complete Care. The program reviews insurance benefits and supplies deferasirox to the patient from one of three specialty pharmacies. For more information, call 1-888-903-7277 or go to www.us.exjade.com/hcp/resources/epass.jsp.²

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DRUG UPDATES

(CONTINUED)

NILTONIB (TASIGNA®)

Class: BCR-ABL tyrosine kinase receptor inhibitor

Indication: Treatment of chronic phase or accelerated phase Philadelphia chromosome positive CML resistant or intolerant to prior treatment including imatinib

Dose: 400 mg twice daily

Dose adjustments: Low ANC and/or platelets; hepatic dysfunction; elevated amylase, lipase

Adverse effects: Myelosuppression, nausea, vomiting, hepatotoxicity, increased QTc, electrolyte abnormalities

Drug interactions: CYP450 3A4 inducers and inhibitors, CYP450 3A4, 2C8, 2C9, 2D6, UGT1A1, P-glycoprotein substrates

Common adverse effects: Peripheral sensory neuropathy, myelosuppression, fatigue, myalgia, nausea, vomiting, stomatitis

Drug Interactions: Inhibitors and inducers of CYP3A4

Nilotinib

Shawna VanDeKoppel, PharmD

Oncology Pharmacy Resident, University of Michigan Health Center

Nilotinib (Tasigna®, Novartis) was recently approved at the end of October 2007 for the treatment of chronic phase or accelerated phase Philadelphia chromosome positive (Ph+) chronic myelogenous leukemia (CML) that is resistant or intolerant to prior treatment that includes imatinib.¹ Activation of BCR-ABL results in activation of multiple downstream signals which regulate cell proliferation and apoptosis. It also causes increased cell dependence on external growth factors and alters the cell adhesion properties. The kinase also can decrease the DNA repair response, which may allow for further chromosomal alterations and mutations involved in the progression of the disease.² Nilotinib is the third tyrosine kinase receptor inhibitor that affects BCR-ABL and also has effects at two other tyrosine kinases: Kit and PDGFR.

The first of two phase II trials to achieve nilotinib's indication for CML studied 280 patients with chronic phase CML after imatinib failure or intolerance. The dose was 400 mg orally twice daily with follow up at 6 months for hematologic and cytogenetic responses. At 6 months, 74% [95% CI, 67.1%-80.2%] of patients achieved a complete hematologic response. There was 48% [95% CI, 41.9%-53.9%] that obtained a major cytogenetic response with 31% [95% CI, 26.0%-37.2%] having a complete cytogenetic response.³ The second phase II trial was in patients with accelerated phase CML. This study analyzed 119 patients who were imatinib-resistant or -intolerant with accelerated phase CML. Patients were given nilotinib 400 mg orally twice daily. However, dose could be increased to 600 mg twice daily if toxicities

IXABEPILONE (IXEMPRA™)

Class: Epothilone B analog, microtubule-stabilizing agent

Indication: Alone or in combination with capecitabine for the treatment of locally advanced or metastatic breast cancer (MBC)

Contraindication: (1) Hypersensitivity to drugs formulated with Cremophor™ EL; (2) baseline neutrophil count <1500 cells/mm³ or platelet count <100,000 cell/mm³; (3) AST or ALT >2.5 x ULN or bilirubin >1 x ULN in combination therapy

Dose: 40 mg/m² IV over 3 hours once every 3 weeks

Dose adjustment: Hepatic dysfunction, hematologic toxicity (platelets and neutrophils), non-hematologic toxicity (neuropathy), and concomitant use of potent CYP3A4 inhibitors

Common adverse effects: Peripheral sensory neuropathy, myelosuppression, fatigue, myalgia, nausea, vomiting, stomatitis

Drug interactions: Inhibitors and inducers of CYP3A4

Ixabepilone

Lan P. Tran, Pharm.D.

Oncology Pharmacy Resident, Hospital of the University of Pennsylvania

Ixabepilone (Ixempra™, Bristol-Myers Squibb) is the first epothilone B analog approved by the Food and Drug Administration in October 2007 for the following indications: (1) in combination with capecitabine for the treatment of locally advanced or metastatic breast cancer (MBC) that is resistant to treatment with an anthracycline and a taxane, or cancer that is resistant to taxanes and further anthracycline therapy is contraindicated; (2) monotherapy for the treatment of locally advanced or MBC that is resistant or refractory to anthracyclines, taxanes, and capecitabine.¹

Ixabepilone is a semi-synthetic analog of epothilone B, a naturally occurring macrolide isolated from myxobacterium *Sorangium cellulosum*.² Similar to taxanes, ixabepilone is a microtubule-stabilizing agent. It binds directly to β -tubulin subunits on the microtubules, suppresses the dynamic instability of $\alpha\beta$ -II and $\alpha\beta$ -III microtubules, induces microtubule bundling, leads to formation of multipolar spindles and mitotic arrest.^{1,3,4} It is active against both taxane-sensitive and taxane-resistant tumors in vitro as well as in vivo studies. With the distinctive and flexible molecular structure, ixabepilone possesses a low susceptibility to multidrug-resistant tumors, including tumors with the highly resistant MRP-1 and P-glycoprotein over-expression.^{3,4} Furthermore, preclinical studies indicate that epothilones are more cytotoxic than taxanes and are highly active against a broad spectrum of malignancies – including breast, lung, head and neck, colon, ovarian, as well as Kaposi's sarcoma.^{2,4}

The pivotal study for ixabepilone plus capecitabine combination therapy was a multicenter, randomized, open label, phase III study conducted by Thomas and colleagues.⁵ It compared the combination

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NILTONIB (TASIGNA®) (CONTINUED)

were not seen. Hematologic reponse was achieved in 47% [95% CI, 38%-56%] of patients. A major cytogenetic reponse was obtained in 29% [95% CI, 21%-39%] of patients. At 12 months, overall survival was 79% [95% CI, 70%-87%].⁴

There are also two phase II studies presented at 2007 ASH Annual Meeting demonstrating potential efficacy in patients with blast phase CML or a specific subset of Philadelphia chromosome positive acute lymphoblastic leukemia (ALL) patients who are resistant or intolerant to imatinib, although nilotinib is not currently FDA approved for either indication.^{5,6}

Nilotinib's approved dose is 400 mg orally twice daily. Dose should be adjusted or held for a QTc on EKG that is >480 msec, ANC <1 x 10⁹/L and/or platelets <50 x 10⁹/L, or elevated serum amylase, lipase, bilirubin or hepatic transaminases. Nilotinib is a CYP450 3A4 substrate so caution must be used when given concomitantly with CYP450 3A4 inducers or inhibitors. Nilotinib is also a potent inhibitor of CYP450 3A4, 2C8, 2C9, 2D6, UGT1A1, and P-glycoprotein.¹

The most common adverse effects reported with nilotinib are rash, pruritis, nausea, vomiting, constipation, diarrhea, headache, and fatigue. It can also cause myelosuppression, elevated amylase and lipase, hepatotoxicity, and electrolyte abnormalities (hypophosphatemia, hyper/hypokalemia, hyponatremia, hypocalcemia). Nilotinib contains a boxed warning for QTc prolongation.¹

Nilotinib has shown hematologic and cytogenetic efficacy in patients with Ph+ chronic phase and accelerated phase CML. There are also ongoing trials examining its effect in blast phase CML and Ph+ ALL.

References

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IXABEPILONE (IXEMPRA™) (CONTINUED)

of ixabepilone (40 mg/m² IV over 3 hours on day 1) plus capecitabine (2,000 mg/m² orally in 2 divided doses daily on day 1 to 14 every 21 days) with capecitabine alone (2,500 mg/m² orally in 2 divided doses daily on day 1 to 14 every 21 days) in 752 patients with anthracycline-pretreated or -resistant and taxane-resistant locally advanced or MBC. Ixabepilone plus capecitabine was statistically superior to capecitabine alone for the primary endpoint of progression-free survival, 5.8 months vs. 4.2 months (p=0.0003), respectively. Similarly, objective response rate was also statistically significant favoring ixabepilone plus capecitabine, 35% vs. 14% (p<0.0001). Median response duration was 6.4 months (95% CI, 5.6 to 7.1) for ixabepilone plus capecitabine, and 5.6 months (95% CI, 4.2 to 7.5) for capecitabine alone. Time to response was similar for both groups, 11.7 and 12 weeks.

The pivotal study for ixabepilone monotherapy was a multicenter, open label, phase II study conducted by Perez and colleagues.⁶ A total of 126 patients with MBC resistant to anthracycline, taxanes, and capecitabine were enrolled and received ixabepilone 40 mg/m² over 3 hours on day 1 of a 21-day cycle. Objective response rate was 11.1% (95% CI, 6.2 to 17.9). Median time to response was 6.1 weeks (range, 5 to 19), and median duration of response was 5.7 months (95% CI, 4.4 to 7.3).

The most common adverse events (AEs) included myelosuppression, peripheral sensory neuropathy, fatigue, myalgia, alopecia, nausea, vomiting, stomatitis/mucositis, diarrhea, and musculoskeletal pain.^{1,6} Additional common AEs in combination therapy included palmar-plantar erythrodysesthesia syndrome, anorexia, abdominal pain, nail disorder, and constipation.^{1,5} Of those, peripheral neuropathy and myelosuppression were the dose-limiting AEs that required dose reduction, delay, or discontinuation. Neuropathy often occurred early during treatment (median number of cycles to onset, 4) and improved to baseline or grade 1 in approximately 4.6 to 6 weeks.¹ Risk of developing severe neuropathy might be increased in patients with diabetes mellitus or existing moderate to severe neuropathy. Similarly, risk of developing toxicity and neutropenia-related death were also increased in patients with moderate to severe hepatic impairment receiving combination therapy. Thus, ixabepilone alone required dose reduction in patient with hepatic impairment.¹ Ixabepilone in combination with capecitabine was contraindicated in patients with ALT or AST >2.5 x ULN or bilirubin >1.5 x ULN.¹

Ixabepilone is extensively metabolized by the liver via CYP3A4.¹ In vitro studies indicate that ixabepilone is neither an inhibitor nor an inducer of cytochrome P450, including CYP3A4.¹ Therefore, plasma level of ixabepilone is greatly influenced by CYP3A4 inhibitors or inducers. The manufacturer recommends that ixabepilone should not be used concomitantly with strong CYP3A4 inhibitors (eg, voriconazole, ketoconazole, itraconazole, clarithromycin, telithromycin, nefazodone, atazanavir, saquinavir, ritonavir, amprenavir, indinavir, nelfinavir, and delavirdine).¹ If concomitant

DRUG UPDATES

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IXABEPILONE (IXEMPRA™) (CONTINUED)

treatment is necessary, a dose reduction of ixabepilone to 20 mg/m² may be considered based on pharmacokinetic studies.¹

The recommended dose of ixabepilone is 40 mg/m² infused intravenously over 3 hours every 21 days. Premedications with an H₁ antagonist (eg, diphenhydramine 50 mg PO) and H₂ antagonist (eg, ranitidine 150 mg PO) are required in all patients to minimize the risk of hypersensitivity. In addition, premedication with corticosteroid (eg, dexamethasone 20 mg IV) is required in patients who experienced a hypersensitivity reaction to ixabepilone. However, if the patient experienced severe hypersensitivity to drugs formulated with Cremophor™ EL (eg, paclitaxel), ixabepilone is absolutely contraindicated.

Ixabepilone is available in 15 mg and 45 mg Ixemptra™Kit, which contains one vial of ixabepilone powder for injection and one vial of diluent. Ixabepilone must be stored in refrigerator and protected

from light. Concentration of constituted solution is 2 mg/mL, which requires further dilution with Lactated Ringer's Injection and supplied in a DEHP-free container. Final concentration for infusion must be between 0.2 and 0.6 mg/mL. In-line filter is also required for administration.¹

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treated less than 100 patients per day, and 30.2% treat more than 100 patients.

The average number of chemotherapy preparations administered per day was in similar proportion to the number of cancer patients with 21-40 preparations per day being the mode (22.8%), followed by 41-60 (19.6%), less than 20 (15.2%), 101-200 (12.0%), 61-80 (10.9%), 81-100 (9.8%), 201-400 (6.5%), and more than 400 (4.3%). In summary, 79.5% prepared less than 100 chemotherapy doses per day, and 20.8% prepared more than 100 doses.

Of 90 responders, 54.4% stated that cancer-related drugs represent more than 80% of their drug budget, while 23.4% indicated that cancer drugs represented less than 40% of the budget.

SALARY AND JOB RESPONSIBILITIES - TECHNICIAN DATA

Employment, Turnover, and Job Vacancy Rates

The average responding site employs 10.8 technician full time equivalents (FTEs) (n=60, range=1-116). By eliminating the 3 largest employers (316 FTEs), the average

drops to 5.8 FTEs, whereas by eliminating the 9 largest employers (496 FTEs), the average drops to 3.0 FTEs. At 50% of the sites, more than 60% of technicians prepare chemotherapy whereas at 31.1% of the sites, less than 20% of their technicians prepare chemotherapy.

Job turnover and vacancies were also evaluated by the survey. Less than 10% turnover per year was reported by 50.7% of responders (n=69), and the average yearly turnover rate was 13.9%. The average site has 2.2 positions currently vacant (n=56), taking approximately 4 months to fill a position (n=65).

Eight responders (n=69) report that on average 35% of their positions are filled with students (type of student, such as pharmacy, nursing, etc, not specified in survey). Those sites also report higher turnover, which is to be expected.

Salaries and Salary Grades

The survey contained a question that asked how many job (salary or grade) levels does your institution provide and 70 responses were recorded (Table 1). However, 96 responders provided actual salary information; therefore, this information was also included in the results. For each job level, we asked for the

Table 1. Technician Salary Based on Grade Level

Salary Grade Level	Percentage of Responders Offering This Salary Grade as Highest Level (n=70)	Average Starting Salary (\$/hr)	Lowest Salary in Range (\$/hr)	Average Salary (\$/hr)	Highest Salary in Range (\$/hr)
1	44.3	13.64	8.00	15.19	27.00
2	30.0	13.18	9.00	14.94	25.00
3	14.3	15.50	11.00	16.71	23.00
4	11.4	17.00	15.00	18.14	21.00
Overall		14.02	8.00	15.70	27.00

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Table 2. Technician Salary Based on Predefined Data Filters

Data Filters	Number of Responders	Average Salary All (\$/hr)	Level 1 Average	Level 2 Average	Level 3 Average	Level 4 Average
All responders, no filters	96	15.70	15.19	14.94	16.71	18.14
Site offers levels 3 or 4	17	16.27	13.85	14.76	18.60	18.87
Organizational size (>200 patients per day)	10	15.01	11.68	13.68	19.68	None Reported
Organizational size (<80 patients per day)	62	15.47	15.03	15.58	16.81	15.52
Oncology focus (>80% of patients are cancer patients)	67	15.52	15.07	14.51	16.71	17.94
Physician office practice	19	15.22	13.83	15.44	15.45	18.20
Techs prepare most or all chemotherapy	73	15.64	15.15	15.28	16.05	17.91
Tenure >6 years	69	15.43	14.73	14.61	17.44	17.72
Tenure 11 to >20 years	13	16.28	15.07	16.40	20.80	17.80
Pharmacy technician certification board (PTCB) certification	42	15.22	14.42	15.29	17.38	15.02

current starting salary, the average salary, the highest actual salary (in dollars/hour), and the percent of people at each level. The data were filtered to determine trends (Table 2).

Employment-Related Issues

Survey participants were asked an open-ended question regarding the most significant employment-related issues. Twenty-three responders offered the following issues (n):

1. Salary is insufficient to attract high-quality people and to retain staff once they acquire higher-level skills. (7)
2. Work ethics related to willingness to learn and work hard, or to know when to defer to pharmacists. (6)
3. Retention and turnover related to salary or no career path options. (3)
4. Lack of experience in hiring and insufficient salary to attract experience. (3)
5. Increased workload due to new regulations or volume, with no additional staff. (3)
6. Insufficient time and resources for proper training. (2)
7. Institution doesn't support/reward certification. (1)

Technician Job Function Distribution ("Who Does What")

The unfiltered listing of job functions performed at each grade level is listed in Table 3 follows. Three plateaus emerged;

the first plateau with routine dispensing and prescription filling, functions that do not involve cancer-related care. The second plateau includes the kinds of activities that are unique to cancer care, such as financial/reimbursement or chemotherapy preparation. The third plateau relates to specialized functions that require specialized training or more authority. Attempts to find correlations with salary led to no statistically significant trends. However, the data are interesting and hopefully will serve to expand the job responsibilities for technicians at some employment sites.

Table 3. Technician Job Function Distribution

Function Performed	Grade Level 1 (Lowest)	Grade Level 2	Grade Level 3	Grade Level 4 (Highest)	Response Count (n=49)
Routine Dispensing	94.7% (36)	47.4% (18)	23.7% (9)	18.4% (7)	38
Prescription Filling	94.4% (34)	52.8% (19)	30.6% (11)	19.4% (7)	36
Billing	70.0% (21)	50.0% (15)	26.7% (8)	23.3% (7)	30
Financial/Reimbursement	53.8% (14)	53.8% (14)	38.5% (10)	30.8% (8)	26
Inventory/Purchasing	68.1% (32)	51.1% (24)	29.8% (14)	25.5% (12)	47
Intravenous (IV) Prep	87.5% (42)	47.9% (23)	25.0% (12)	20.8% (10)	48
Chemo Prep	71.7% (33)	52.2% (24)	28.3% (13)	23.9% (11)	46
Order Entry	75.0% (18)	58.3% (14)	41.7% (10)	33.3% (8)	24
Chemo Order Entry	66.7% (12)	55.6% (10)	44.4% (8)	33.3% (6)	18
Clinical Data Collection	38.9% (7)	55.6% (10)	27.8% (5)	44.4% (8)	18
Trainer	46.3% (19)	48.8% (20)	31.7% (13)	29.3% (12)	41
Investigational Drug Service	54.2% (13)	37.5% (9)	37.5% (9)	33.3% (8)	24
Informatics/Automation (eg, maintenance, analysis)	39.1% (9)	47.8% (11)	26.1% (6)	34.8% (8)	23
Supervisor	5.6% (1)	50.0% (9)	22.2% (4)	38.9% (7)	18

Innovative Practices

The survey also asked the open-ended question, "What innovative things are technicians doing at your practice site?" Seven responders listed the following:

1. Making clinical interventions using standardized protocol for tasks, such as checking labs, body surface area, etc.
2. Developing competency for tech-check-tech system.
3. Creating a newsletter for staff.
4. Building websites.
5. Consulting for recruitment and retention.
6. Developing productivity and workload standards.
7. Managing accounting software regarding purchases.
8. Patient assistance program support.
9. Quality assurance responsibilities.

Analysis of Technician Data

Based on all responses, it was determined that the average salary for all technicians was \$15.70/hour, which when multiplied by a 2,080 hour work year, is equivalent to \$32,656/year. The average starting salary was \$14.02/hour for all levels. If you consider Grade Level 1 to be representative of an entry-level position, then the average entry level starting salary is \$13.64/hour.

However, determining solid trends is difficult because the majority (74.3%) of sites offer only 1 or 2 salary grades and

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both entry-level and seasoned veterans must fit into that structure.

Physician office practices that responded tended to represent large systems that offer several levels of job responsibility. These sites appear to start at a lower salary, but reward advanced practices that have financial or supervisory responsibilities.

PTCB (pharmacy technician certification board) certification may make a difference in some settings, but on average has no impact on salary, especially at higher-grade levels where traditional job expectations are less likely to be required.

When the results are sorted by “site offers 3 or 4 job levels” we can see that those sites use Level 1 as a starting position and the average salary for their Level 1 is similar to other responders. Level 3 and 4 sites probably reward jobs with higher levels of responsibility such as trainer, informatics, investigational drug, clinical data collection, and supervision. Sites that offer only 1 or 2 job levels may also reward higher-level technicians in a similar manner, but it was not possible to statistically determine differences based on how the survey was structured. However, it is logical to assume that sites that offer only 1 level may proportionately skew average overall salary for all levels.

When the results are sorted by “technician tenure from 11 to >20 years,” it is clear that job longevity is the highest correlation with higher salary. Those institutions (n=13) are predominately located in the Midwest (53.8%), are inpatient settings (61.5%), and have low turnover. Their size varies from large to small, and they offer from 1 to 4 job levels in fairly equal proportion. However, the employees with high tenure also tend to have higher-level job responsibilities such as trainer, informatics, investigational drug, clinical data collection, and supervision. Whether tenure is related to job responsibility, or vice versa was not determined, but it is reasonable that an organization will recognize a high potential employee and reward them with both responsibility and salary in an effort to retain their services.

Interestingly, the 10 institutions that treat more than 200 patients per day have a significantly lower average Level 1 salary of \$11,688. Those sites are closely split between for-profit (42%) and not-for-profit (58%) organizations, and are fairly equally spread geographically, with the Northeast representing the largest response (25%). For 70% of those responders, more than 80% of their patients are cancer patients, and the remaining 30% of responders have less than 40% of their patients as cancer patients. The number of job levels is also fairly equally mixed with 3 and 4 levels representing 64.7% of the sites. The majority of sites (70.6%) require PTCB certification beginning at Level 2, and Level 1 responsibilities are restricted to routing dispensing and prescription filling and do not include intravenous (IV) or chemotherapy admixture. The most plausible explanation, confirmed by responders, is that these large institutions use Level 1 to hire untrained staff, some through career advancement programs from other less skilled departments. It is also probable that smaller sites must rely on hiring technician staff that has some level of training.

Salary is complex, and a reasonable speculation may be that in many cases salary is related more to a competitive market environment than job function. Clearly higher wages tend to correlate with high tenure and high levels of job responsibility. However, that is not always the case. It is well known that Human Resource departments subscribe to salary survey services that look at geographic trends and job responsibility. How much influence those survey results have on actual compensation is unclear, but from experience market competition can, at many (if not most) institutions be the

primary determining factor. This begs the question of whether pharmacy has done a sufficient job in differentiating and documenting the value of higher-level job responsibility and performance.

SALARY AND JOB RESPONSIBILITIES - PHARMACIST DATA**Employment, Turnover, and Job Vacancy Rates**

The average responding site employs 11.8 pharmacist FTEs (n=81, range=1-250). If you eliminate the two largest employers (475 FTEs), the average drops to 6.1 FTEs and if you eliminate the five largest employers (631 FTEs) the average drops to 4.3 FTEs. At 69.4% of the sites responding (n=85), less than 20% of pharmacists prepare chemotherapy, and at 17.6% of the sites more than 80% of pharmacists prepare chemotherapy. This trend is consistent with technician data, indicating that at most practice sites technicians have the primary responsibility for chemotherapy preparation.

The survey asked about job turnover and vacancies, with 50.7% of responders (n=69) reporting less than 10% turnover per year and an average yearly turnover rate of 13.9%. The average site has 2.2 positions currently vacant (n=56), taking approximately 4 months to fill a position (n=65). Eight responders report that on average 35% of their positions are filled with students (eg, licensed pharmacists enrolled in an advanced program but working part-time in pharmacy or unlicensed pharmacists and working under direct supervision of pharmacist). Those sites also report higher turnover, which is to be expected.

Table 4. Pharmacist Salaries Based on Grade Level

Salary Grade Level	Percentage of Responders Offering This Level as the Highest Level (n=82)	Average Starting Salary (\$/yr)	Lowest Salary in Range (\$/yr)	Average Salary (\$/yr)	Highest Salary in Range (\$/yr)
1	43.9	91,447	77,500	99,853	152,500
2	19.5	96,121	77,500	102,261	137,500
3	22.2	101,974	77,500	111,930	147,500
4	14.4	102,045	87,500	107,462	147,500
Overall	100.0	95,345	77,500	103,113	152,500

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Salaries and Salary Grades

The survey contained a question that asked how many job (salary or grade) levels does your institution provide, and 82 responses were recorded (**Table 4**). However, 96 responders provided actual salary information; therefore, this information was also included in the results. For each job level, we asked for the current starting salary, the average salary, the highest actual salary (\$/year), and the percent of people at each level. The data were filtered to determine trends (**Table 5**).

Clinical Services Provided

The survey asked what percentage of pharmacists provides clinical services. The distribution is in **Table 6** (n=84). It is encouraging that most pharmacists have some clinical involvement and for many it is the primary part of their job.

Pharmacist Job Function Distribution (“Who Does What”)

The unfiltered listing of job functions performed at each grade level are listed in **Table 7**. Two plateaus emerged: the first plateau includes routine distribution and basic clinical functions. The second plateau includes more independent clinical practice and supervision.

Innovative Practices

Eight (8) responders listed the following in response to the open-ended question, “What innovative things are pharmacists doing at your practice site?”

1. Finding ways to make one-day/week clinic mixing/treatment areas meet the standards of our central facility.
2. Making Pharmacy & Therapeutics Committee practical for private-practice physicians.
3. Evaluating nasogastric tube absorption of newer oral chemotherapy agents.
4. Developing anemia clinic.
5. Building cost avoidance programs.
6. Medication therapy management (MTM) billing.
7. Clinical ladder training (leadership training).
8. Continual professional development program.
9. Evaluating workload associated with processing chemotherapy orders.
10. Pain practice with prescriptive authority.
11. Developing chemotherapy order forms.
12. Quality Improvement projects.

Table 5. Pharmacist Salaries Based on Predefined Data Filters

Data Filters	Number of Responders	Average Salary All (\$/yr)	Level 1 Average	Level 2 Average	Level 3 Average	Level 4 Average
All responders, no filters	96	103,113	99,853	102,261	111,930	107,462
Tenure (11 to >20 years)	28	99,971	96,119	100,159	104,000	105,958
Organizational size (>200 patients per day)	10	108,911	102,262	108,000	115,167	115,950
Organizational size (<80 patients per day)	62	102,739	100,663	104,217	104,014	107,125
Oncology focus (>80% of patients are cancer patients)	62	103,316	99,774	102,655	110,950	109,263
Physician office practice	19	104,161	100,204	103,667	109,014	111,500
Site offers level 3 or 4	29	101,384	96,309	100,967	103,627	106,409
Advanced practice (participate in multidisciplinary rounds, pharmacotherapy clinic, or investigational drug service)	63	99,052	95,764	101,368	101,750	105,336
BCOP certification (>60% of staff)	9	109,160	108,952	113,000	110,000	105,167

BCOP, board certification in oncology pharmacy.

Table 6. Percentage of Clinical Services Provided by Pharmacists

Percentage of Staff	Clinical Service as Part of Job	Clinical Service as Primary Job
0%-20%	16.7%	57.8%
21%-40%	21.4%	12.0%
41%-60%	8.3%	10.8%
61%-80%	19.0%	8.4%
81%-100%	35.7%	12.0%

Table 7. Pharmacist Job Function Distribution

Function Performed	Level 1 (Lowest)	Level 2	Level 3	Level 4 (Highest)	Response Count (n=64)
Routine Order Processing and Dispensing	100.0% (62)	46.8% (29)	29.0% (18)	19.4% (12)	62
Prescription Filling	98.1% (53)	44.4% (24)	31.5% (17)	18.5% (10)	54
Routine Computer Order Entry	100.0% (61)	50.8% (31)	31.1% (19)	23.0% (14)	61
Chemotherapy Order Entry	90.2% (55)	54.1% (33)	31.1% (19)	21.3% (13)	61
Inventory/Purchasing	86.0% (37)	48.8% (21)	39.5% (17)	32.6% (14)	43
IV Prep	97.9% (46)	38.3% (18)	27.7% (13)	25.5% (12)	47
Chemo Prep	94.0% (47)	42.0% (21)	28.0% (14)	24.0% (12)	50
Clinical Order Review	87.3% (55)	54.0% (34)	38.1% (24)	25.4% (16)	63
Patient Interaction: medication history, review of symptoms, education, discharge planning	83.6% (46)	50.9% (28)	36.4% (20)	21.8% (12)	55
Clinical Rounding by self	62.8% (27)	44.2% (19)	46.5% (20)	27.9% (12)	43
Clinical Rounding with multidisciplinary team	53.3% (24)	46.7% (21)	35.6% (16)	22.2% (10)	45
Pharmacist Pharmacotherapy Clinic	47.1% (16)	41.2% (14)	47.1% (16)	20.6% (7)	34
Investigational Drug Service	63.2% (36)	47.4% (27)	35.1% (20)	22.8% (13)	57
Student/Resident precepting	71.7% (38)	52.8% (28)	37.7% (20)	24.5% (13)	53
Supervisor	40.4% (19)	42.6% (20)	40.4% (19)	34.0% (16)	47

Recruitment and Retention

Note that under the section “Pharmacy Job and Salary” the same questions were repeated; however, the number of

responders was different in each section, causing small differences in percentages reported in each section. The survey asked about turnover and recruitment and found

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that 59.3% of responders (n=48) reported less than 10% turnover per year, and the average yearly turnover was 11.2% for all reporting (n=81). The average site has 2.75 positions currently vacant (n=67). It takes from 3 to 9 months (average=5 months) to fill a position (n=80), with 12.5% of the responders indicating that it takes more than a year to fill a position. Eight responders (n=69) report that on average 35% of their positions are filled with students.

With respect to training, 26.5% of all pharmacists have completed a postgraduate year 1 (PGY1) residency and 14.5% have completed a postgraduate year 2 (PGY2) residency (n=82). Board of Pharmaceutical Specialties (BPS) certification (eg, BCOP, BCPS, BCNS) is reported for 20.8% of responders (n=86).

Employment-Related Issues

Survey participants were asked an open-ended question regarding the most significant employment related issues. Twenty-seven responders offered the following (n):

1. Lack of oncology experience, competency, or interest in applicant pool. (8)
2. Overwhelming number of responsibilities, rapidly growing, with no additional compensation or help. (6)
3. No salary recognition for certification or advanced training, and no funding to support certification and advanced training. (5)
4. National work force shortage. (5)
5. Recruitment and retention (5)
6. Resistance of staff to assume new (clinical) responsibilities. (1)
7. Must do technician work due to lack of technicians. (1)
8. No support from upper management (1)

Medication Therapy Management Service (Table 8)

Formal MTM services are not new, but the concept of billing for them has recently been opened by the Centers for Medicare & Medicaid Services (CMS). Thirty-six of 93 responders (38.7%) practice in a setting where they evaluate and/or manage the patient independent of another discipline. Of those, 96.6% of responders indicated that their practice was "general oncology." Of 87 responders, 5.7% bill commercial

Table 8. Independent Pharmacist-Run Patient Management Services^a

Service Provided (n=24)	Number of Responses
Hematology/Anticoagulation management	11
Symptom/Toxicity monitoring and supportive care drug management	10
Pain management	7
Chemotherapy dose verification/adjustment/management	6
Patient education/counseling	5
Pharmacokinetics/Antibiotic management	3
CMS drug therapy management	3
Reimbursement and patient assistance programs	2
Immunosuppressant management	2
Tumor board	1
Clinical trials/investigational drugs	1
Develop order sets	1

^aPosed as an open-ended question.

CMS, Centers for Medicare & Medicaid Services.

Table 9. Types of Students/Residents Trained by Pharmacists

Type Trained	Number of Responders	Percentage of Total Responders
Pharmacy student	72	76.6%
PGY 1	41	43.6%
PGY 2	31	33.0%
Technician student	24	25.5%
Other student	12	12.8%

PGY 1, postgraduate year 1; PGY 2, postgraduate year 2.

payers for their professional services, 4.6% bill CMS, and 90.8% do not bill. Collaborative practice agreements for prescribing authority exist with 27.7% of 94 responders, while such agreements are not established for 73.4%.

Student and Resident Responsibilities

Of 94 responders, the majority train students and residents, as shown in **Table 9**.

Documentation of Pharmacist/Pharmacy Services

Several studies have documented the impact that pharmacy services have on cost savings, improved patient safety, improved patient care, and decreasing physician workload. This survey sought only to determine if the responders themselves document an impact, and if so, how it is documented. Determination of actual impact would have changed the scope and expanded the length of the survey beyond what we thought was reasonable. Of 91 responders, 61.5% document cost savings, 66.3% document

improved patient safety, 53.9% document improved patient care, and 25.3% document positive impact on physician workload. The responses of those who provide answers to the open-ended question "how do you do it" are shown in **Table 10**.

Analysis of Pharmacist Data

Based on all responses, it was determined that the average salary for all pharmacists was \$103,110/year which, when divided by a 2,080 hour work year, is equivalent to \$49.57/hour. The average starting salary was \$95,345/year (\$45.84/hour) for all levels. If you consider Grade Level 1 to be the entry level, then the average starting entry-level salary is \$91,447/year.

The filtered data provided different results for pharmacists than for technicians. As with the technicians, the fact that 43.9% of all responders offer pharmacists only one salary grade and fit all performers into that salary range will skew some of the results related to salary grade/levels. Sites that offer 3 or 4 job levels clearly pay those

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Table 10. Documentation of Pharmacy Services

How Is Cost Savings Documented? (n=34)	Number of Responses
Drug-specific programs (eg, drugs on cost-avoidance list)	10
Pharmacy activity/intervention log/database	9
Internal focused audits, PI projects, MUE reports	6
Commercial programs (eg, Pharmacy One Source, Health Pro Link)	5
Waste management log	2
Contract compliance monitoring	1
Cost to revenue ratio monitoring	1
Patient assistance program enrollment	1
Timely update of charge codes	1
How Is Improved Patient Safety Documented?	Number of Responses
Pharmacy activity/intervention log/database	13
Occurrence/Error and ADR report (computer)	8
Specific PI/QI projects (focused studies and reports)	7
EMR chart note review	2
Patient assistance programs	1
EMR Template for investigational drug management	1
How Is Improved Patient Care Documented?	Number of Responses
Pharmacy activity/intervention log/database	11
Implement/compliance to guidelines documented	8
EMR pharmacy chart note	5
Patient education/consultation note	3
Patient quality of life/satisfaction surveys	3
Specific PI/QI projects (focused studies and reports)	2
Nursing inservices	2
Network benchmarking studies	1
How Is Positive Impact on Physician Workload Documented?	Number of Responses
Pharmacy activity/intervention log/database	16
EMR pharmacy chart note	3
Specific PI/QI projects (focused studies and reports)	3
Develop/Implement/compliance to guidelines documented	2
Patient quality of life/satisfaction surveys	2
Education/inservices documented	2
Medication therapy management documented	1
Network benchmarking studies	1

ADR, adverse drug reaction; EMR, electronic medical record; MUE, medication use evaluation; PI, process improvement; QI, quality improvement.

pharmacists at a higher average salary, and the practice has higher-level practice responsibilities. Physician office practices in particular have a slightly higher overall average salary and pay more for those practicing at higher levels.

The largest sites (>200 patients per day) have the highest starting salary, overall average, and top end salaries based on organizational size. This same group had the lowest starting salary for technicians

because they hire untrained people and develop them on site. Clearly they have a different philosophy for pharmacists and tend to hire more advanced trained staff, many whom are Board Certified Oncology Pharmacists (BCOP). The highest average and starting salaries overall (ie, any grade level) are paid to pharmacists who are BCOPs.

The data filtered for “tenure from 11 to >20 years,” and also the data filtered

for participating in advanced clinical practice (multidisciplinary rounds, pharmacotherapy clinics, investigational drug service) surprisingly resulted in the second lowest average salary, lowest starting salary, and lowest “top of range”. Data on advanced clinical practice was not significantly different from all responders. However, the data sorted for long tenure was skewed toward hospitals (71.4%), Northeastern US (23%) and “independent practice” (55.6% vs 38.7% average). The high tenure group also was significantly higher in participation in multidisciplinary team rounding (50% higher than all responders), and 20% higher than all responders for working in pharmacotherapy clinics, precepting students, and having supervisory duties. A possible explanation is that people with high tenure are comfortable in their practice, regardless of their salary. This high tenure group could also skew the responses to the advanced clinical practice average downward.

As with the technicians, salary is complex and a reasonable speculation may be that in many cases salary is related more to a competitive market environment than job function.

SALARY INCENTIVES

Almost every institution pays both pharmacists and technicians some incentive for working undesirable shifts and overtime. No clear trends emerged from the results of this survey question. The following are the unfiltered data (Tables 11-12). Respondents were asked to answer these questions:

Q: What do you pay pharmacists for salary differential for the following? (Use the column that is most appropriate for your setting)

Q: What do you pay technicians for salary differential for the following? (Use the column that is most appropriate for your setting)

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Pharmacist Incentives (n=44)**Table 11A. Pharmacist Incentives — Paid in \$ per Shift**

	\$0	≤\$16	\$17-\$39	\$40-\$79	\$80-\$119	\$120-\$159	>\$160	Response Count
Evening shift	57.1% (12)	9.5% (2)	19.0% (4)	9.5% (2)	0.0% (0)	0.0% (0)	4.8% (1)	21
Night shift	55.6% (10)	16.7% (3)	5.6% (1)	11.1% (2)	0.0% (0)	5.6% (1)	5.6% (1)	18
Weekends	63.2% (12)	10.5% (2)	5.3% (1)	5.3% (1)	10.5% (2)	0.0% (0)	5.3% (1)	19
Holidays	64.7% (11)	11.8% (2)	0.0% (0)	5.9% (1)	0.0% (0)	5.9% (1)	11.8% (2)	17
On-call	68.4% (13)	10.5% (2)	5.3% (1)	10.5% (2)	0.0% (0)	0.0% (0)	5.3% (1)	19
Chemo preparation	94.7% (18)	0.0% (0)	0.0% (0)	5.3% (1)	0.0% (0)	0.0% (0)	0.0% (0)	19

Table 11B. Pharmacist Incentives — Paid in \$ per Hour

	\$0	up to \$2	\$3-\$4	\$5-\$9	\$10-\$14	\$15-\$20	>\$20	Response Count
Evening shift	24.0% (6)	44.0% (11)	20.0% (5)	4.0% (1)	0.0% (0)	0.0% (0)	8.0% (2)	25
Night shift	27.3% (6)	9.1% (2)	13.6% (3)	36.4% (8)	9.1% (2)	0.0% (0)	4.5% (1)	22
Weekends	47.8% (11)	26.1% (6)	8.7% (2)	4.3% (1)	4.3% (1)	0.0% (0)	8.7% (2)	23
Holidays	52.9% (9)	0.0% (0)	0.0% (0)	5.9% (1)	5.9% (1)	5.9% (1)	29.4% (5)	17
On-call	40.9% (9)	27.3% (6)	9.1% (2)	4.5% (1)	0.0% (0)	0.0% (0)	18.2% (4)	22
Chemo preparation	94.4% (17)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	5.6% (1)	18

Table 11C. Pharmacist Incentives — Paid in % of Salary

	\$0	up to 2%	3%-4%	5%-9%	10%-14%	15%-20%	>20%	Response Count
Evening shift	30.8% (4)	15.4% (2)	30.8% (4)	7.7% (1)	15.4% (2)	0.0% (0)	0.0% (0)	13
Night shift	30.8% (4)	15.4% (2)	0.0% (0)	15.4% (2)	23.1% (3)	15.4% (2)	0.0% (0)	13
Weekends	75.0% (9)	16.7% (2)	0.0% (0)	0.0% (0)	8.3% (1)	0.0% (0)	0.0% (0)	12
Holidays	33.3% (6)	5.6% (1)	5.6% (1)	0.0% (0)	0.0% (0)	5.6% (1)	50.0% (9)	18
On-call	60.0% (6)	10.0% (1)	20.0% (2)	0.0% (0)	0.0% (0)	0.0% (0)	10.0% (1)	10
Chemo preparation	90.9% (10)	0.0% (0)	9.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	11

Technician Incentives (n=30)**Table 12A. Technician Incentives — Paid in \$ per Shift**

	\$0	≤\$16	\$17-\$39	\$40-\$79	\$80-\$119	\$120-\$159	>\$160	Response Count
Evening shift	54.5% (6)	27.3% (3)	9.1% (1)	9.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	11
Night shift	63.6% (7)	18.2% (2)	9.1% (1)	0.0% (0)	9.1% (1)	0.0% (0)	0.0% (0)	11
Weekends	72.7% (8)	9.1% (1)	9.1% (1)	0.0% (0)	9.1% (1)	0.0% (0)	0.0% (0)	11
Holidays	70.0% (7)	10.0% (1)	10.0% (1)	0.0% (0)	0.0% (0)	10.0% (1)	0.0% (0)	10
On-call	72.7% (8)	27.3% (3)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	11
Chemo preparation	72.7% (8)	18.2% (2)	0.0% (0)	9.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	11

Table 12B. Technician Incentives — Paid in \$ per Hour

	\$0	up to \$2	\$3-\$4	\$5-\$9	\$10-\$14	\$15-\$20	>\$20	Response Count
Evening shift	15.8% (3)	73.7% (14)	10.5% (2)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	19
Night shift	17.6% (3)	41.2% (7)	35.3% (6)	5.9% (1)	0.0% (0)	0.0% (0)	0.0% (0)	17
Weekends	44.4% (8)	27.8% (5)	11.1% (2)	16.7% (3)	0.0% (0)	0.0% (0)	0.0% (0)	18
Holidays	21.4% (3)	14.3% (2)	14.3% (2)	28.6% (4)	7.1% (1)	7.1% (1)	7.1% (1)	14
On-call	46.7% (7)	40.0% (6)	6.7% (1)	0.0% (0)	6.7% (1)	0.0% (0)	0.0% (0)	15
Chemo preparation	78.6% (11)	14.3% (2)	0.0% (0)	0.0% (0)	0.0% (0)	7.1% (1)	0.0% (0)	14

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Table 12C. Technician Incentives — Paid in % of Salary

	\$0	up to 2%	3%-4%	5%-9%	10%-14%	15%-20%	>20%	Response Count
Evening shift	50.0% (4)	12.5% (1)	25.0% (2)	0.0% (0)	12.5% (1)	0.0% (0)	0.0% (0)	8
Night shift	50.0% (4)	12.5% (1)	0.0% (0)	12.5% (1)	12.5% (1)	0.0% (0)	12.5% (1)	8
Weekends	87.5% (7)	12.5% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	8
Holidays	33.3% (5)	6.7% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	60.0% (9)	15
On-call	57.1% (4)	28.6% (2)	14.3% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	7
Chemo preparation	75.0% (6)	12.5% (1)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	12.5% (1)	8

CHEMOTHERAPY PREPARATION AND CERTIFICATION**Chemotherapy Preparation**

The survey explored who prepares chemotherapy and other related issues (Tables 13 & 14). Only 4.7% (n=86) of responders use syringe pumps, and 3.5% use robotic compounders for chemotherapy preparation. In a majority of the settings PTCB-certified technicians prepare most of the chemotherapy; however, in some settings that employ both pharmacists and technicians, pharmacists prepare the chemotherapy. The survey sought to determine if technicians are compensated for chemotherapy preparation because it is considered an advanced practice. The answer from previous salary data is unclear, but in most cases it does not appear that chemotherapy preparation makes a significant difference, except in practice settings that offer 3 or 4 salary levels and level 1 is reserved for training.

Table 13. Staff Responsible for Chemotherapy Preparation (n=88)

	All of the Chemo	Most of the Chemo	Some of the Chemo	None of the Chemo	Response Count (n=88)
Certified pharmacist	16.1% (10)	9.7% (6)	59.7% (37)	14.5% (9)	62
Any pharmacist	10.5% (6)	3.5% (2)	56.1% (32)	29.8% (17)	57
Certified technician	54.4% (43)	39.2% (31)	5.1% (4)	1.3% (1)	79
Any technician	17.8% (8)	11.1% (5)	17.8% (8)	53.3% (24)	45
Nurse	4.4% (2)	0.0% (0)	8.9% (4)	86.7% (39)	45
Outsource	0.0% (0)	0.0% (0)	5.1% (2)	94.9% (37)	39

Table 14. Overtime Rates (n=71)

	Pharmacists	Technicians	Response Count (n=71)
Don't pay overtime	100.0% (32)	12.5% (4)	32
Full salary	57.1% (4)	42.9% (3)	7
Less than 1.5 x salary	50.0% (16)	90.6% (29)	32
Less than 2 x salary	50.0% (12)	95.8% (23)	24
Greater than or equal to 2 x salary	0.0% (0)	0.0% (0)	0
Fixed rate for all staff	100.0% (8)	12.5% (1)	8

Table 15. Method of Staff Chemotherapy Preparation Certification (n=83)^a

	Response %	Response Count
Require PTCB (ASHP) certification for technicians	34.9%	29
Internal certification using published criteria	39.8%	33
Internal certification using own criteria	61.4%	51
Outside certification	8.4%	7
Observation of technique	71.1%	59
Oral exam	15.7%	13
Manipulation of culture media	54.2%	45
Written procedure/policy exam	49.4%	41
Written math exam	33.7%	28
No formal certification process	10.8%	9

^aResponders asked to check all that apply.

ASHP, American Society of Health-Systems Pharmacists; PTCB, pharmacy technician certification board.

Chemotherapy Certification

The survey also asked about chemotherapy certification. Most sites (n=88) require certification before being allowed to prepare or administer chemotherapy. Certification is required for technicians, pharmacists, and nurses by 81.4%, 68.5%, and 56.4% of responders, respectively. Clearly room for improvement is present. The method of certification and frequency are presented in Tables 15-17.

STUDY LIMITATIONS

The results of this survey reflect the practice of the responders who are all affiliated with HOPA and, therefore, are focused on cancer care. Thus, there are limitations within this data. While the core questions were answered by more than 95% of responders, fewer than 60% answered some questions that were needed for accurate explanation of some trends. It is also clear from the

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Table 16. Frequency of Staff Chemotherapy Preparation Certification (n=84)^a

	Response %	Response Count
Upon hire/orientation	56.0%	47
Upon advancement to next grade level	7.1%	6
More frequent than annual	2.4%	2
Annual	63.1%	53
Less frequent than annual	6.0%	5
No formal process or requirement	14.3%	12

^aResponders asked to check all that apply.**Table 17. Differing Staff Chemotherapy Preparation Certification**

	Response %	Response Count
Certify both	60.3%	47
Certify techs but not pharmacists	19.2%	15
Certify techs more frequently than pharmacists	7.7%	6
No formal certification criteria for either	15.4%	12

data that some responders provided precise information while others provided approximate information, however, this probably did not significantly affect the outcomes. Finally, the complexity of some of the questions may have led to confusion on the part of some responders resulting in failure to respond.

DISCUSSION

Overall this survey provides benchmarks for salary, incentives, and scope of service for cancer center practices, which meets the original intent of the survey.

To place things in perspective, 5 previous national pharmacy salary surveys were reviewed (4 completed in 2007 and 1 in 2005). The 2005 survey results were within the range of the other 4 surveys, therefore, the data was considered viable for comparison. The average pharmacy technician salary was \$13.66/hour (range = 12.31-15.34/hour) compared with the HOPA 2007 survey average of \$15.70/hour. The average pharmacist salary was \$95,730/year (range=89,914-100,720/year) compared with the HOPA 2007 survey average of \$103,113/year.

Through statistical processes, we were able to filter/sort data for a variety of variables that could have a significant affect on salary. Several interesting results were observed. The results for large practices (>200 cancer patients per day) resulted in the lowest technician average salary (\$15.01/hour)

and the highest pharmacist average salary (\$108,911/year). We speculate that this difference is because large institutions hire untrained technicians at a low salary, which skews the average salary for this group downward. We also speculate that this group prefers to hire skilled and certified pharmacists, which skews the average for this group upward.

The number of salary levels offered is based on the philosophy of the practice site. For purposes of this study, the salary levels provided significant challenges when sorting data. Most sites offer only one level (44.3% for technicians, 43.9% for pharmacists), which must accommodate all performance and tenure variables. The one significant trend for sites that offer 3 or 4 levels is that these sites start technicians at a lower salary and reward tenure and high level job responsibility resulting in the highest overall technician salary (\$16.28/hour). On the other hand, they pay the lowest average pharmacist salary (\$101,384/year).

Tenure did not make a significant difference in salary or job responsibilities for technicians until they have been employed for more than 10 years. Interestingly, tenure of more than 10 years resulted in a grouping of technicians who are at the highest average salary level (\$16.28/hour) and a grouping of pharmacists who are at the second lowest average salary level (\$99,971/year). Most of those pharmacists practice at a high clinical level,

and it is speculated that perhaps they are comfortable in their job and derive high job satisfaction from their practice level, therefore, salary is of lesser importance. This group is probably responsible for skewing the average salary of the "high clinical practice level" group downward.

Office-based practice represented 20.2% of the responders. Their average technician salary was less than the overall survey average (\$15.22/hour), and their average pharmacist salary was higher than the overall survey average (\$104,161/year).

BCOP certification was rewarded with a higher than average salary (\$109,160/year). This trend could be in part because many of the pharmacists taking BCOP certification are seasoned practitioners, and some of the sites offer a salary incentive for becoming certified. However, PTCB certification resulted in a group that earned less than average salary (\$15.22/hour). This trend is possibly explained because the technicians who are practicing at the highest salary ranges are not using skills measured by PTCB and, therefore, do not take the test, thus the average salary is skewed downward.

Salary is highly affected by competitive markets, supply, and demand. We looked at 6 national regions and found no significant trends; however, undoubtedly differences exist between local markets, which individual practices must take into account.

Finally, considering the relationship to national averages, oncology staff may already be compensated at a higher level. Whether that is because we have proven our value or because of market scarcity is unknown. Significant variability and open-ended comments remind us of the job stress and difficulties in recruiting and retaining top job performers. The authors believe that more should be done to develop practice standards and measure the value pharmacists and technicians bring to the oncology workplace.

CE OPPORTUNITIES THROUGH HOPA

Go to www.hoparx.org/ce.aspx to access all programs. Non-members of HOPA are also eligible to earn CE credit from these programs. Current activities and programs available:

Prevention and Treatment of VTE in Cancer Patients: Best Practices

This program was produced from a live symposium held on June 15, 2007 at the HOPA Annual Meeting in Denver. Individuals who attended the Best Practices VTE lecture and claimed CE credit are ineligible to claim credit for this enduring webcast.

<http://www.hoparx.org/vteceinfo.aspx>

Release date: September 1, 2007

Expiration date: September 30, 2008

Estimated time to complete activity: 1 hour

Enhancing Patient Adherence to Improve Outcomes With Oral Chemotherapy

This program was produced from a live symposium held on June 14, 2007 at the HOPA Annual Meeting in Denver. Individuals who attended the Best Practices VTE lecture and claimed CE credit are ineligible to claim credit for this enduring monograph.

http://www.uspharmacist.com/index.asp?show=article&page=8_2144.htm

Release date: October 2007

Expiration date: October 31, 2008

Estimated time to complete activity: 90 to 100 minutes

Taking Aim at Multiple Targets: Oncology Pharmacist Perspectives on Tyrosine Kinase Inhibitors

This program was produced from a live symposium held on June 14, 2007 at the HOPA Annual Meeting in Denver. Individuals who attended Taking Aim at Multiple Targets: Oncology Pharmacist Perspectives on Tyrosine Kinase Inhibitors and claimed CE credit are ineligible to claim credit for this enduring monograph.

<http://www.hoparx.org/documents/ASiMmonograph.pdf>

Release date: November 15, 2007

Expiration date: November 15, 2009

Estimated time to complete this educational activity: 80 minutes

Need more information? Email HOPA at info@hoparx.org or call Andy Beloff at 609-436-2412.