Ms Holloway is a medical oncology physician assistant and faculty associate at the New York Presbyterian Hospital Weill Cornell Medical College and the Jay Monahan Center for Gastrointestinal Health. For the past 2.5 years she has served as the outpatient physician assistant on the Solid Tumor Service at the New York Presbyterian Weill Cornell Comprehensive Cancer Center, focusing on gastrointestinal malignancies. She received a Bachelor of Arts degree in Psychology from Baylor University, Waco, Texas, and then attended the Physician Assistant Program at Duke University Medical School, receiving her Physician Assistant Certificate of Completion and Master of Health Sciences degree in 1995. She was Physician Assistant National Board Certified with Distinction in 1995. Honors and professional awards include the Wyckoff Heights Medical Center Distinguished Service Award in 1997 and the Richard B. Hayes Foundation Professional Educational Grant in 2005. Ms Holloway currently serves as a subinvestigator on several clinical trials and routinely lectures on oncology-related topics within the New York City area. She is cofounder of the New York City Association of Physician Assistants in Oncology.

A senior clinical editor for *Advanced Studies in Nursing* (ASiN) interviewed Ms Holloway to discuss the current role of the physician assistant and advanced practice nurses in cancer care. Physician assistants join clinical nurse specialists and nurse practitioners as advanced practitioners and, in most of the settings, these professionals serve as front-line decision makers in their practices.

**ASiN**: What types of laboratory tests are important for a physician assistant or advanced practice nurse to perform in diagnosing chemotherapy-induced anemia and neutropenia?

**Ms Holloway**: A complete blood count with indices and blood chemistries should be obtained to rule out any specific noncancer-related cause of anemia, such as bleeding, hereditary anemias, or renal impairment. Functional iron tests should be included in the initial workup to assess anemia. It also is important to know the baseline white blood cell (WBC) counts when diagnosing neutropenia.

**ASiN**: Are there any types of cancers or any particular treatments that are more likely to lead to chemotherapy-induced anemia and neutropenia?

**Ms Holloway**: Generally speaking, patients with hematological malignancies are most often at a greater risk than other types of cancer for chemotherapy-induced neutropenia and its sequelae because of the nature of the underlying disease and the intense treatment that is required. The risk of developing anemia or neutropenia definitely is dependent on the dose-intensity of the regimen and the risk of myelosuppression associated with the type of chemotherapy used.
AS/N: What role do the physician assistant and advanced practice nurse have in educating people to prevent certain types of cancers, treatment of which may lead to chemotherapy-induced anemia or neutropenia? What education strategies can be used to get this message out?

Ms Holloway: Physician assistants and advanced practice nurses have a paramount role when it comes to educating their patients on decreasing the known modifiable risk factors for a multitude of cancers, and by empowering patients to get appropriate screening tests to catch a cancer in the early stages. We must take a good medical history to elicit risk factors (ie, lifestyle and hereditary factors) that can lead to the development of cancer, and then address them appropriately. For instance, inform patients who smoke or use tobacco products about their increased risk of developing lung or head and neck cancer. With that information, the patient may choose to enroll in a smoking cessation program. Or, institute an earlier and more vigorous screening plan for patients and their families whose pedigree is consistent with familial cancer syndromes.

In this day and age, we must become creative in getting the word out. The media seem to be an excellent method of raising awareness. We all saw the impact of the “Couric effect” for colon cancer—a 20% increase in colonoscopies after Katie Couric had her colonoscopy on air.

AS/N: Why is it important for the various healthcare providers (eg, genetics and dietary) to partner together in educating the public about disease prevention, and what role can the physician assistant or advanced practice nurse play in facilitating this partnership?

Ms Holloway: Many physician assistants and advanced practice nurses work in the primary care setting. We have the first opportunity to make a difference—promoting dietary changes and exercise, identifying hereditary predispositions, and helping patients adhere to screening guidelines. There is often-times interplay between preventable and predisposing factors for disease that needs to be addressed in a multidisciplinary form.

An example that comes to mind is the case of a 23-year-old female graduate student who was diagnosed with stage III rectal cancer. Her case, because of unusual age at presentation, required an intensive level of interdisciplinary care when mapping out her management plan. First, because of the patient’s desire to have children in the future, extensive consultations with the radiation oncology team led to the ultimate decision to forego preoperative radiation therapy to preserve fertility. Second, because of her early age at diagnosis and a first-degree relative with early onset cancer, the patient and family were referred for a comprehensive screening session and workup with our genetic counselor. Third, the patient was referred to a psychologist because of a reactive depression, as she had to leave her graduate school program and college friends to return home to receive treatment for a serious illness. A social worker was involved in the case to work with pharmaceutical companies to procure medications not covered by insurance, which we incorporated in the aggressive therapeutic regimen. Each of the healthcare providers involved was crucial in the treatment of this patient.

The physician assistant or advanced practice nurse is often the “go to” person in the practice. In addition to evaluating, managing, and collaborating on chemotherapy and supportive care orders for patients with cancer on a regular basis, we assess and triage the patients’ comprehensive needs whether they be social needs, genetic counseling, or dietary referral.

AS/N: What is the role of the physician assistant or advanced practice nurse in the diagnosis and treatment of acute and chronic disease in oncology patients?

Ms Holloway: Along with the practicing physicians, we see oncology patients regularly and oftentimes assume the role of primary care provider during periods of active treatment. The patients rely on us to evaluate and manage issues associated with some of their comorbidities, such as heart disease and diabetes. Because of the evolving nature of oncology and the emerging drugs associated with treatment, physician assistants and advanced practice nurses know best the nuances of the side effects seen with these treatments and how they affect the patients’ baseline status.

AS/N: How do other comorbid diseases contribute to anemia or neutropenia? How is the treatment of these comorbid diseases important?

Ms Holloway: In patients with many comorbidities, including complications from renal, pulmonary, and heart disease, the symptoms are more pronounced earlier on, particularly with patients presenting with anemia. The patients’ abilities to tolerate chemotherapy...
and its side effects are severely compromised. People with a delicate underlying health status may succumb to neutropenic complications or take a longer time to recover. For those reasons, it is important to optimize the patients’ health before the initiation of a chemotherapy regimen.

For instance, good control of diabetes makes a patient less susceptible to superimposed infections, such as cellulitis or urinary tract infections, and avoids a prolonged recovery time in the setting of neutropenic infections because a patient with diabetes is prone to infections and poor or delayed healing. Some of the therapeutic agents used in our colon cancer population (eg, cetuximab and fluorouracil) are known for skin toxicities, such as rash or skin breakdown. Therefore, the patient with diabetes with skin lesions is at risk for cellulitis. Couple that scenario with neutropenia, and the patient is at even a higher risk for a fulminant infection.

AS/N: Why is baseline laboratory information critical for developing a supportive care plan for assessing a patient’s risk of infection and for monitoring future treatment- and infection-associated toxicity?

Ms Holloway: Knowing the patients’ baseline laboratory values (particularly the WBC count, absolute neutrophil count, and Hgb) is essential, as patients with lower baseline counts are at a higher risk for further decreases when exposed to treatment regimens. Upon our initial oncology consultation, baseline laboratory work is ordered for every patient, including a complete blood count and routine blood chemistries. From these initial results we know if the patient is starting oncology treatment as anemic or neutropenic, and we can tailor a more aggressive supportive care plan from the beginning. Also, knowing the patient’s prechemotherapy baseline laboratory test results allows us to track trends during the course of treatment.

AS/N: Why is site-specific evaluation and therapy important in the management of neutropenia? What sites are more prone to infection during a neutropenic event?

Ms Holloway: If the exact site of infection can be identified, then the treatment can be tailored to be the most effective in controlling it. Vulnerable sites of infection in the neutropenic patient are the lungs; alimentary canal, including the mouth, bowel, and rectum; and the skin.

Most of the chemotherapy patients in our practice have venous access devices, which are often prone to infections. When a patient presents with febrile neutropenia, the access site must be evaluated for overt signs and symptoms, such as redness and tenderness. Also, blood cultures must be performed for each lumen of the device. Oftentimes, even in the absence of overt signs, there will be a positive blood culture from one of the lumens. In that case, the patient will be hospitalized to receive intravenous antibiotics.
AS/N: What is the benefit of keeping up-to-date on the latest information regarding the diagnosis and management of chemotherapy-induced anemia and neutropenia?

Ms Holloway: The bottom line is, the patient with cancer will benefit. It is our responsibility to optimize and implement our understanding of the benefits of risk assessment, early intervention, and appropriate use of growth factors that have become a mainstay in the care plan of neutropenic and anemic patients.

Physician assistants and advanced practice nurses must be well versed in all aspects of supportive care management. We must be up-to-date on all the new modalities to manage common chemotherapy side effects, such as nausea, vomiting, and neuropathies. It is a delicate balance, and quality of life will not be dramatically improved if even one of the side effects is improperly managed. There are dozens of medications on the market targeting different mechanisms for use in the management of nausea and vomiting alone. It is our responsibility to understand these options and their mechanisms and use them optimally.

AS/N: How do you address the emotional needs of a patient with chemotherapy-induced anemia or neutropenia? Additionally, how are the emotional needs of family members addressed?

Ms Holloway: We are meeting patients and their families at a point in their lives in which their world has been turned upside down. It is a very frightening and uncertain time for everyone involved. Patients and their family members need to feel as if we are approachable, as human beings and as healthcare providers. When patients who are undergoing chemotherapy start to develop known complications, such as anemia and neutropenia, they need to be reassured and educated about what is happening and the preventive measures that will be taken to try to ameliorate the situation. The family members often feel very helpless, especially while the patient is being actively treated. Thorough education that focuses on side-effect management and current available treatment options is important and can empower patients and their caregivers, making them feel less anxious and in control.

AS/N: What are the major concerns of patient and family that advanced practitioners address?

Ms Holloway: Side effects and quality-of-life issues; patients want to know practical things, such as "Am I going to lose my hair? Will I be able to play with my grandchildren? Will I have to quit working or modify my work schedule?" I think giving a patient information about the potential side effects of a particular regimen before starting treatment is important. I always explain that every patient responds a little differently, and the known side effect may be only mild. We reassure our patients that regardless of the severity of the side effect, we will get them through it. For hair loss issues, a wig can be prescribed. For chemotherapy-induced nausea, vomiting, and diarrhea concerns, I educate them about the availability of new and effective antinausea and anti-diarrheal agents.

AS/N: How important is it for the physician assistant or advanced practice nurse to provide one-on-one care with patients and family members?

Ms Holloway: I think it is really important for us to be available for the patients and family members to help field their questions. We have to remember that their world and family dynamics have been altered in a major way by their disease. I feel that 1 to 2 weeks after the initial visit, the information starts to sink in and there needs to be a lot of individualized attention at that point to address and help sort through the long- and short-term issues.

In our practice, we try to telephone patients at home the day after they start their regimen. Most of our regimens are weekly or biweekly, thus we see our patients and their families in our office on a regular basis. This facilitates close contact and dialogue with all parties involved and fosters a good patient/family member-provider bond.

AS/N: What trends do you see as important regarding oncology treatment strategies?

Ms Holloway: Combination therapy—combining traditional cytotoxic agents that indiscriminately affect all cells, thus the more pronounced side effects, with targeted therapy that focuses on identified cancer-specific mechanisms. This is an exciting, explosive time in oncology treatment. I think quality-of-life issues and minimization of side-effect profiles of treatment regimens will become more of a focus as the overall survival times in patients with cancer increase and we start treating some cancers as a chronic disease. We also will see trends emerge toward designing chemotherapy based on a specific person’s genomics.
**ASiN:** How significant is targeted therapy in treating oncology patients? How has this progressed over the years?

*Ms Holloway:* Targeted therapy is here to stay. It has taken the oncology field by storm, and every disease state is incorporating targeted therapy into its traditional cytotoxic chemotherapy regimes. Two new targeted therapy agents have been approved in the past 2 years for colon cancer alone. Ten years ago we only had 1 basic drug to treat colon cancer; today there are 6 drugs, and the overall survival for stage IV disease in colorectal cancer has essentially doubled. We can expect to see further advances in targeted therapy.

**ASiN:** What current treatment strategies are most commonly used for chemotherapy-induced anemia and neutropenia?

*Ms Holloway:* Following laboratory parameters closely, using risk assessment to identify patients who are at a higher risk for chemotherapy-induced anemia and neutropenia, early and aggressive intervention with growth factors, and following dose-adjustment guidelines.

**ASiN:** What agents are effective in the treatment of chemotherapy-induced anemia and neutropenia? What benefits do you see that they provide to your patients?

*Ms Holloway:* Growth factors provide a synthetic stimulus to the system and help a patient produce needed red blood cells or WBCs. Patients will have a smaller risk for infection and possibly will become less fatigued. These measures potentially improve patients’ experiences during treatment by affecting their quality of life. Additionally, these patients may avoid hospitalization and visits to their practitioners’ offices.

**ASiN:** The NCCN (National Comprehensive Cancer Network) guidelines advocate a wider use of growth factors to manage febrile neutropenia in patients with a greater than 20% risk of developing the condition and recommend consideration of growth factors in those patients with a risk of 10% to 20%. What has been your experience with these agents, and how have they affected the supportive care of your patients?

*Ms Holloway:* My experience has been very positive. These agents have had a great impact on patients’ outcomes and experiences with regard to their treatment and ability to adhere to intense therapeutic regimens without dose delays or reductions. This allows patients to receive the fullest, most optimal course of treatment. By using growth factors prophylactically, treatment is more cost effective; more importantly, it is quality-of-life effective.

**ASiN:** How important is daily evaluation in treating fever and neutropenia?

*Ms Holloway:* We educate patients on taking their temperatures regularly and about the importance of calling or coming into the office at the first sign of fever. We instruct patients to heighten their awareness of possible signs of fever or infection (eg, feeling warm, chills, cough, changes in bowel or urinary habits, and skin redness/tenderness) and instruct them to take their temperature and report fevers higher than 38°C to our office immediately.

**ASiN:** In the future, what emerging treatment strategies do you see as having an impact on chemotherapy-induced anemia and neutropenia?

*Ms Holloway:* The continued use of growth factors and evidence-based guidelines that help identify treatment situations in which prophylaxis and intervention are warranted will have an impact on chemotherapy-induced anemia and neutropenia. Synchronization of growth factor dosing to chemotherapy administration is one emerging treatment strategy that is having a positive impact on chemotherapy-induced anemia and neutropenia. Also, the new dosing data recently published on the growth factor darbepoetin alfa suggests the number of injections needed is decreased, which will have a beneficial effect on patient and staff time management. It is also important that patients with cancer participate in clinical trials. With all the new developments in cancer therapy and supportive care, this is a great way for patients to be exposed to the latest and best treatments that are coming down the pipeline.