In the Clinic

Care of the Adult Cancer Survivor

Transition to Follow-up Care  page ITC6-2

Follow-up Medical Care  page ITC6-5

Additional Issues in Follow-up Care  page ITC6-12

Tool Kit  page ITC6-14

Patient Information  page ITC6-15

CME Questions  page ITC6-16

CME Objective: To review current evidence for follow-up and medical care of adult cancer survivors.

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Ver the past 4 decades, for many individuals cancer has transformed from a fatal to a more chronic disease. Approximately two thirds of patients diagnosed with cancer today will experience at least 5-year survival (1). Currently, the United States has an estimated 13 million cancer survivors, and this number is expected to grow. More than 40% of people born today in the United States will be diagnosed with cancer at some point in their lives (2).

The rise in the number of cancer survivors has resulted from improved early detection, more effective therapies, and improvements in supportive care. In 1996, the National Cancer Institute established the Office of Cancer Survivorship in response to the growing number of long-term survivors of cancer. Still, there are major gaps in the care of these persons, according to a 2006 report from the Institute of Medicine (IOM) (3). This report identified cancer survivorship as a distinct phase of care and outlined 4 essential components of this care (see the Box: Essential Components of Survivorship Care).

The lives of cancer survivors will be improved if they receive the services essential to maintain health, decrease the risk for recurrence and new cancers, and increase overall quality of life. To achieve these goals, improved disease surveillance and follow-up care are needed. Care is often managed by the primary oncology team; however, patients who live in rural settings, travel a great distance for their cancer treatment, or are discharged by the oncology team may subsequently seek care from family practitioners, general internists, or other primary or specialty care providers. In addition, although the current supply of oncologists is adequate, analyses over the past few years suggest that the United States may face an acute shortage of medical oncologists in the near future and alternative care providers must be identified (4–6).

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## Essential Components of Survivorship Care*

- Prevention of recurrent and new cancers and other late effects
- Surveillance for cancer spread, recurrence, or second cancers; assessment of medical and psychosocial late effects
- Intervention for consequences of cancer and its treatment
- Coordination between specialists and primary care providers to ensure that all health needs are met

*Adapted from reference 3.

### Transition to Follow-up Care

**What are the essential components of follow-up care?**

Care for cancer survivors should focus on monitoring and managing disease recurrence and on effects that occur as a result of cancer and its treatment. It should also emphasize routine health promotion. Ten recommendations for improving the care delivered to cancer survivors are included in the IOM report (see the Box: Institute of Medicine Recommendations for Survivorship Care).

Although the body of knowledge on the long-term and late effects of pediatric cancer treatment is significant, far less is known about issues of adult survivorship. Researchers have recently begun to examine an array of topics in this area, but strong evidence to guide decisions for optimal follow-up care is still lacking. In particular, few resources are available to guide practitioners through the maze of possible treatments, their late effects, surveillance options, and schedules for follow-up care.

This deficiency is a major challenge for health care providers and cancer survivors. In this article, we will provide guidance for the care of adult cancer survivors based on available evidence as well as from our clinical practice and experience caring for cancer survivors. This guidance is meant for all providers of care to these persons.

**When should patients transition to follow-up care?**

There are no clear guidelines for cancer patients of any age regarding transition to primary care and other providers after completion of cancer treatment. Transition time varies and depends on medical,
geographic, and resource restraints. Some patients return to their primary care provider, gynecologist, endocrinologist, cardiologist, or other provider immediately after treatment is completed. Others choose to transition their follow-up care only after they are considered to have little if any risk for disease recurrence or late effects of cancer treatment.

The term “cancer survivor” is used across the cancer care continuum and refers to patients from diagnosis, through active treatment, to completion of primary treatment. Survivors can also be those living with cancer as a chronic or indolent disease maintained on various treatments, depending on the diagnosis. Many will continue to see their oncology team for surveillance; however, they should also be seen by their primary care provider for health maintenance and management of comorbid conditions that may or may not be related to cancer.

We recommend the risk-based approach to survivorship care, which uses a standard based on time from treatment and stage of disease. Oncology providers are more likely to transition patients who have early-stage cancer or who have received treatment that puts them at low risk for late treatment effects, and are at very low risk for recurrence, to other providers. Low-risk survivors are generally most easily managed by these providers. As the risk for late effects and disease recurrence increases, transitioning survivors to other providers for follow-up becomes more complicated (7).

The oncology team should be responsible for communicating with other providers and guiding post-treatment care. Some survivors transition their follow-up care over time, which generally involves seeing their primary care provider for health maintenance and consulting their oncology team only for cancer surveillance. However, in some cases nononcology providers manage comorbid conditions as well as cancer surveillance and treatment-related problems immediately after cancer treatment ends. Regardless of the approach, communication and cooperation among providers and survivors are critical, with the oncology team providing concrete recommendations for care when needed or requested by other providers.

Which types of clinicians should provide follow-up care?

Several models for survivorship care are prominent in the cancer literature. However, there is little empirical research focused on a “best approach,” and in reality, one model does not work for every patient or setting. Historically, most cancer survivors have been followed in oncology practices where surveillance for disease recurrence is the focus of follow-up visits. As such, these survivors are generally followed within the practice setting by the team who delivered their oncology care.

We prefer the shared care model where the oncology and primary care teams work together to care for the patient. This approach requires effective communication and collaboration and the proper tools to support that communication. Oncology specialists should take the lead when care is being coordinated among providers. Coordination is particularly needed to determine if cancer-specific laboratory and radiographic studies are indicated to evaluate whether the patient has a cancer recurrence or a late treatment-related effect.

Health promotion and aggressive management of comorbid conditions should be the foremost consideration in the care of cancer survivors, regardless of who provides that care. When cancer survivors are transitioned by their oncology team to primary or specialty care providers for follow-up, those

Recommendations for Survivorship Care*

- Raise awareness of cancer survivorship
- Provide a care plan for survivors
- Develop clinical practice guidelines for cancer survivors
- Define quality health care for cancer survivors
- Overcome health care system challenges
- Address survivorship as a public health concern
- Provide survivorship education and training of health care professionals
- Address employment concerns of cancer survivors of all ages
- Improve access to adequate and affordable health insurance
- Invest in research

*Adapted from reference 3.

providers should have a sound understanding of a survivor’s risk for long-term and late effects that are related to cancer therapy, especially those resulting from radiation and chemotherapy.

As the number of cancer survivors increases, more responsibility for the care of this population will be shared among providers. Continuing education programs as well as specialty conferences that include a focus on cancer survivorship care are available and can significantly increase providers’ confidence in caring for survivors.

What information should clinicians have when follow-up care begins?

Clear communication regarding the respective roles of different members of the health care team is critical to a successful transition to survivorship care. Survivorship care plans are an important tool to facilitate communication and allocation of responsibility during the transition from active treatment to survivorship care.

There is considerable debate among oncology providers regarding who should be responsible for developing a personalized plan for posttreatment care and what should be considered and included in the plan. Templates are available that can be used by providers, patients, and family members to develop survivorship care plans, including the LIVESTRONG Care Plan (www.livestrongcareplan.org, accessed 8 March 2013) and templates developed by the American Society of Clinical Oncology (ASCO) (www.asco.org/treatmentsummary, accessed 8 March 2013).

Ideally, the oncology provider should develop a treatment summary and survivorship care plan at the end of early treatment or when risk for recurrence has decreased considerably.

The treatment summary

When a patient transitions care to other providers, the oncology team should provide summary information about the diagnosis and treatment. Ideally, a treatment summary should describe the type and location of the cancer; type of surgery; drug names and cumulative doses of chemotherapy; and types and cumulative doses of radiation therapy, including the location and extent of the radiation field. If a patient does not have a treatment summary, the patient and/or primary care provider should request one from the treating oncologist.

The survivorship care plan

The oncology team should also develop an individualized cancer survivorship care plan. This plan guides recommendations for the type and timing of follow-up scans, laboratory tests, and office visits. It should also include information on the risk for late effects of treatment and specific areas of surveillance based on the type of cancer and treatment received.

Several professional and advocacy groups are working to determine the essential components of survivorship care, define the items that should be included in the cancer treatment summary and survivorship care plan, and delineate services for cancer survivors to ensure optimal care. Work is under way by several groups to define the essential elements of survivorship care and provide general guidance for essential services (8).

In 2006, the IOM proposed elements to be included in a survivorship treatment summary and care plan. However, the lack of research data to support their specific recommendations makes it impossible to determine with any certainty or develop consensus regarding what is necessary to provide optimal care and should be included. In addition, it is sometimes...
difficult to gather the extensive amount of information that the IOM proposes is necessary to develop a treatment summary and care plan for every patient (9).

Another issue that makes it difficult to standardize surveillance and follow-up care is the limited knowledge on the exact incidence and prevalence of many late effects of treatment. It is important that treatment summary templates utilize a combination of best available clinical information and available evidence-based standards to formulate a follow-up plan of care that meets the needs of patients and providers. Communication among providers and patients is the goal, and developing a treatment summary and survivorship care plan does not have to be a lengthy, burdensome process.

As noted, knowledge on surveillance and follow-up guidelines designed specifically for cancer survivors is limited; however, primary care providers should be cognizant of general health promotion and disease prevention topics when caring for cancer survivors with regard to health screening, risk assessment, health promotion, and disease prevention (see the Box: General Counseling Topics for Cancer Survivors).

Although we are focusing on adult cancer survivors, there are approximately 300,000 survivors of childhood cancer in the United States, and most of them receive their medical care from primary care providers. This growing population is at considerable risk for long-term morbidity and mortality in their adult years. Unlike adults, children have long-term follow-up guidelines, developed by the Children’s Oncology Group (COG), that address the need for systematic, comprehensive care of this expanding high-risk patient population. These online guidelines are a valuable resource to providers who follow these cancer survivors (www.survivorshipguidelines.org, accessed 8 March 2013). Recent evidence supports the recommendation that anyone who received chest radiation younger than age 30 years, regardless of dose, should have yearly mammograms and breast magnetic resonance imaging (MRI) beginning at age 25 years (10).

**General Counseling Topics for Cancer Survivors**

- Tests to check general health
- Regular measurements of weight, cholesterol levels, and blood pressure
- Immunizations ("shots") for both children and adults
- Outline special tests to be done at certain time points, such as during pregnancy and after ages 40 and 50 years
- Tobacco prevention
- Healthy diet
- Safe sex
- Regular exercise
- Moderate alcohol consumption
- Avoidance of illegal drugs
- Use of seat belts (and car seats for children) when riding in a car or truck
- Advice about stress and accident prevention
- Regular preventive care

Adapted from the online American Cancer Society Guidelines.

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**Transition to Follow-up Care...** Timing for the transition from oncology care to primary care varies and depends on many factors, including patient and provider preference. A shared care model is optimal, with ongoing communication and collaboration among the providers following the cancer survivor. Transition should be accompanied by a treatment summary and a survivorship care plan to guide surveillance and follow-up.

**CLINICAL BOTTOM LINE**

In addition to having a clear understanding of the cancer diagnosis and treatment regimen, providers must consider several basic factors when planning the follow-up care for cancer survivors (Figure 1). These factors also affect the patient’s health behaviors, and consideration of these factors can help the primary care clinician tailor the health education to the survivor’s individual needs.

**What cardiac issues should the clinician consider?**

Cardiac effects may manifest years after treatment is completed.
Three broad categories of late cardiac effects have been described: vascular disease, hypertension, and myocardial dysfunction (11).

Vascular disease can be caused by radiation therapy, which may result in atherosclerosis of radiated vessels. For example, long-term survivors of Hodgkin lymphoma who received mantle radiation are at risk for premature coronary atherosclerosis. Also, cisplatin–based chemotherapy for testicular cancer is associated with an increased risk for hypertension and coronary disease years later. In addition, delayed development of hypertension can also occur as a result of receiving antiangiogenesis agents with or without radiation therapy. Follow-up for survivors who received cisplatin–based chemotherapy and/or radiation therapy to the chest that includes the heart should include periodic measurement of blood lipids. Since the thyroid gland is in the field of mantle radiation, thyroid function tests should be done regularly.

Annual blood pressure screening, weight measurement, and counseling about weight management should also be performed. Diet and exercise should be encouraged for their overall health benefits.

Delayed structural heart disease, including valvular heart disease and pericardial disease, is associated with chest radiation. Myocardial dysfunction resulting from chemotherapeutic agents has also been demonstrated. For example, anthracyclines, such as doxorubicin, are associated with a dose-dependent cardiomyopathy, whereas the HER2-receptor antagonist trastuzumab has been associated with non–dose-dependent reversible heart failure.

Cancer survivors who received chest radiation or agents associated with myocardial dysfunction should provide a detailed family history to determine if they have any additional familial risk for cardiovascular disease, which will in turn increase treatment-related risk. Radiation therapy technique and quality have improved over the years, and patients treated with thoracic radiation in the 1970s and 1980s should be more closely monitored for cardiac problems. If they present with any cardiac or respiratory symptoms, a stress echocardiogram should be done to evaluate for cardiovascular disease. If the survivor has never been evaluated with a posttreatment echocardiogram, a baseline study should be considered. Despite the lack of evidence for this practice, we have found it to be a beneficial screening strategy. Beyond a baseline study, further cardiac testing is driven by patient symptoms and family history and the discretion of the cardiologist.

What pulmonary conditions should the clinician consider?

Bleomycin–induced inflammation of the lung (pneumonitis) is a dose-dependent reversible acute toxicity that may progress to pulmonary fibrosis in a few cancer survivors (12). Risk factors include advanced age,
cumulative chemotherapy, renal dysfunction, tobacco use, and thoracic radiation. Patients with bleomycin exposure may also be at increased risk for anesthetic complications, such as oxygen toxicity. Patients who received bleomycin should be instructed to inform the anesthesiologist before having any type of general anesthesia.

Radiation-induced pneumonitis may be seen in patients treated with thoracic radiation; however, it can be reversed with corticosteroid therapy. A few patients may also develop pulmonary fibrosis, which can lead to cor pulmonale and respiratory failure (13). Because late effects of radiation therapy can and generally do manifest many years after treatment, clinicians should ask the cancer survivors about their exercise endurance as well as any respiratory symptoms, especially those that occur on exertion.

What cognitive issues should the clinician consider?
Cognitive changes related to chemotherapy and endocrine therapy may occur in breast cancer and other survivors (14). Similar findings have been reported in survivors of leukemia, lymphoma, and ovarian cancer who were treated with chemotherapy and in prostate cancer survivors treated with androgen-deprivation therapy. Whole-brain radiation is associated with delayed cognitive changes. It is difficult to determine the cause of cognitive issues, which could be related to aging, depression, or stress; the cancer treatment itself; or a combination of these factors. Occupational therapy can teach patients numerous techniques to compensate for some of these problems. Neuropsychological testing may help define symptoms regarding executive functioning, work, and related issues.

What sexual and reproductive issues should the clinician consider?
Clinicians should be sensitive to the potential for cancer treatment to result in sexual dysfunction and fertility impairment. In some cases, the potential for these side effects can be reduced.

Sexual dysfunction is a common consequence of cancer therapy (15), and long-term sexual dysfunction may be related to treatment-associated menopause and hypogonadism. In women, menopausal symptoms can occur as a result of premature ovarian failure induced by chemotherapy, and in some cases, pelvic radiation. Hot flashes, decreased libido, and vaginal dryness are among the most common symptoms of survivors of a variety of cancers who experience ovarian failure. Over-the-counter lubricants and herbal compounds relieve some of these problems. Hormone replacement therapy may be indicated, but its use may be affected by the cancer diagnosis and family history of cancer and should be prescribed only after an oncology consultation.

In men, hypogonadism may result from surgery, such as bilateral orchiectomy, treatment with certain chemotherapy and hormonal drugs, and pelvic and cranial radiation. Assessment includes a history regarding excessive fatigue or sexual dysfunction, a physical examination, and measurement of free and total testosterone levels and leutinizing hormone. Hormone replacement therapy may be necessary and may require consultation with an oncologist and an endocrinologist.

In men and women, surgery may result in body disfigurement that may lead to psychological issues that cause sexual dysfunction. Also, anatomical injury can cause sexual dysfunction directly—for example, erectile dysfunction after prostate cancer surgery. Pelvic radiation may result in fibrosis and vasculopathy and may also lead to sexual dysfunction. Consultation with a urologist, gynecologist, or professional counselor may be indicated.
Infertility is also a consequence of some cancer treatments. In women, gynecologic surgery and radiation therapy can lead to infertility by reducing ovarian reserve or impairing conception (16), and systemic chemotherapy can result in amenorrhea and depletion of ovarian germ cells. In men, testicular cancer may be associated with disease-related oligospermia and azospermia. Systemic chemotherapy and radiation may also result in azospermia; however, this condition may be reversible over time, and it may require 2 years or more before fertility potential can be determined. Sperm banking before therapy is recommended when possible. Pelvic and retroperitoneal surgery may affect erectile and ejaculatory function temporarily or permanently. In men and women, advances in fertility preservation have markedly improved the reproductive outlook for cancer survivors, and embryo, oocyte, and ovarian cryopreservation in women and sperm and testicular tissue cryopreservation in men have resulted in preserved fertility.

Sex and fertility are frequently ignored for numerous reasons, including lack of comfort with the topics. There have been significant advances in fertility preservation and management of sexual dysfunction over the past decade, and providers should be educated in these topics. Cancer survivors concerned about sexual function and infertility should be referred to the appropriate specialist for an evaluation that may include semen analysis, hormone level testing, and discussion of options. Referral to a professional counselor may also be indicated.

What bone health issues should the clinician consider?

Cancer therapies may be associated with bone loss and osteoporosis (17). Surgical oophorectomy, surgical orchectomy, gonadotropin–releasing hormone agonists and antagonists, chemotherapy-induced ovarian failure, and aromatase inhibitors can promote bone loss. Dual-energy x-ray absorptiometry (DEXA) scans screen for bone loss in cancer survivors. Preventive measures, such as supplemental calcium and vitamin D, exercise, and tobacco and alcohol cessation, should be encouraged. Bisphosphonates and rank-ligand–directed therapy, such as denosumab, may be considered as well as referral to a specialist when bone loss is detected. Corticosteroids used in some cancer treatments can affect the blood supply and result in avascular necrosis of any joint. Providers should consider MRI if a patient who has been treated with corticosteroids reports joint pain.

What other medical issues should the clinician consider?

The more common remaining medical issues are second malignant neoplasms, endocrinopathies, neurotoxicity, ototoxicity, nephrotoxicity, and lymphedema.

Second malignant neoplasms

Long-term cancer survivors are at risk for second malignant neoplasms (18). For example, a patient with a history of breast cancer is at increased risk for contralateral breast cancer, which is not a disease recurrence or metastatic disease, but rather a new cancer.

Cancer survivors should undergo routine age- and risk factor–appropriate cancer screening regardless of their personal cancer history. Family history plays an important role in determining the age at which screening should begin for specific cancers. The survivorship care plan should outline the cancer screening tests recommended by the oncology team to detect disease recurrence and second malignant neoplasms. Routine cancer screening for other cancers, such as gynecologic examination with pap smears, colonoscopy, mammography, serum prostate-specific antigen measurement, and digital rectal examination, should be
conducted on the same schedule as that of the general population. However, survivors with a family history of cancer diagnosed at a younger-than-average age for that cancer should begin screening at a younger age.

Second malignant neoplasms may also be a late consequence of cancer treatment. Radiation therapy can result in mutagenesis and subsequent cancer development in the field of radiation. As noted earlier, long-term survivors of Hodgkin lymphoma who received mantle radiation therapy have increased risk for breast, lung, and thyroid cancer if the breasts, lungs, or thyroid were included in the field of radiation. Also, recent evidence supports the recommendation that any woman younger than 30 years who received chest radiation, regardless of dose, have annual mammography and breast MRI beginning at age 25 (10). Chemotherapy, including alkylating agents (such as nitrogen mustard) and topoisomerase inhibitors (such as etoposide) may increase the risk for leukemia. Finally, exposures that caused the first cancer may also cause a second cancer. For example, a lung cancer survivor with a history of tobacco use has an increased risk for head and neck cancer, bladder cancer, and new lung cancer unrelated to the original cancer except through tobacco use.

Endocrinopathies
Surgery or radiation therapy involving an endocrine organ may result in loss of hormone production. For example, pancreatectomy for pancreatic cancer may result in diabetes. After thyroidectomy for thyroid cancer, thyroid hormone replacement is always required. Radiation can also cause failure of the endocrine organs. For example, mantle radiation therapy for Hodgkin lymphoma leads to a high rate of hypothyroidism. The gonads are especially vulnerable. Surgical procedures, radiation (for example, to the testicles, pelvis, and brain), and certain chemotherapy and endocrine therapy can lead to loss of gonadal function. Cancer survivors should be evaluated yearly to determine if hormone replacement is needed, and the evaluation should include taking a history that asks about symptoms of gonadal or other hormone deficiency, a physical examination, and appropriate laboratory testing.

Neurotoxicity, ototoxicity, and nephrotoxicity
Several chemotherapeutic agents, including the taxanes, vinca alkaloids, and certain platinum compounds, may cause peripheral neuropathy, especially in patients with diabetes and those predisposed to neuropathy for other reasons. Peripheral neuropathy is hard to manage, and although it may resolve or lessen over time, it remains indefinitely in many patients. Gabapentin and a few other drugs have limited efficacy, and consultation with a pain management specialist may be helpful. Providers should caution patients with leg and foot neuropathies to be careful when walking since they are at increased risk for falling. Some patients report benefit from herbal remedies and others from acupuncture. Cancer survivors who received cisplatin may have high-frequency hearing loss and tinnitus, and referral to an audiologist may be indicated. Cisplatin, ifosfamide, and methotrexate are nephrotoxic. Although these agents rarely result in the need for dialysis, they often contribute to decreased glomerular filtration rate. For this reason, cancer survivors who received these agents should have annual serum creatinine testing. Cancer survivors who received cisplatin may have high-frequency hearing loss and tinnitus, and referral to an audiologist may be indicated. Cisplatin, ifosfamide, and methotrexate are nephrotoxic. Although these agents rarely result in the need for dialysis, they often contribute to decreased glomerular filtration rate. For this reason, cancer survivors who received these agents should have annual serum creatinine testing.

Lymphedema
sentinel lymph node biopsy has decreased the frequency of this complication. Referrals to physical therapy and lymphedema specialists in communities where they are available, as well as use of decompressive massage, can significantly improve lymphedema.

Are there specific medical issues for survivors of the most commonly diagnosed cancers: lung, colon, breast, and prostate?

Clinicians now commonly encounter cancer survivors in their daily practice, so familiarity with the late consequences of the more common cancers and their treatment is important.

Lung cancer

Many lung cancer survivors who have had thoracic surgery or radiation have decreased pulmonary reserve, and yet they continue to smoke. These patients are at increased risk for new lung cancers and other tobacco-induced malignancies. Clinicians should focus on promoting smoking cessation with individual and group counseling, medications including nicotine replacement therapy and varenicline, and Web-based computer programs that may help modify behavior.

Colon cancer

Colorectal cancer survivors are at risk for second malignant neoplasms, especially new, unrelated colonic adenomas and cancers. Some survivors have ongoing issues with weight loss or gain, continence, diarrhea, or constipation, and these issues can be life-altering. Referral to a gastroenterologist or stoma therapist may be indicated for bowel management. Dietary instruction and referral to a nutritionist and referrals for psychosocial counseling as indicated can also be helpful.

Breast cancer

Breast cancer survivors confront a variety of challenges, including increased risk for second breast cancers, premature ovarian failure, cardiac toxicity, and lymphedema. For example, premature ovarian failure can result in hot flashes, vaginal dryness, and decreased libido. Estrogen replacement is often contraindicated because of concerns that it may increase risk for disease recurrence, but acupuncture or antidepressants have shown some efficacy in decreasing hot flashes. There are also many over-the-counter, nonhormonal lubricants that can be used for vaginal dryness. Premature ovarian failure can also result in bone loss, osteopenia, and osteoporosis, and bone density should be evaluated with a DEXA scan. Chest radiation and some chemotherapy agents can cause cardiac problems in breast cancer survivors, and a baseline echocardiogram should be done after treatment is complete. Breast cancer survivors should have routine follow-up mammograms and some should have MRI scans, as advised by the oncology team.

Prostate cancer

Prostate cancer patients who have surgery may experience erectile dysfunction and urinary incontinence. Men treated with radiation therapy may also experience erectile dysfunction and gastrointestinal symptoms related to proctitis. Men treated with androgen ablation therapy may have hot flashes and decreased libido. Sexual function, erectile dysfunction, and hormonal issues for men and women are frequently managed by urologists. Biofeedback can assist with incontinence, and medication for erectile dysfunction often allows these survivors to maintain intimate relations. Referral to counseling regarding sexual dysfunction may be a good option for some, given the emotional effects of dysfunction on both patients and partners.

Are there common medical issues for survivors of lymphoma, leukemia, and hematopoietic cell transplantation?

Survivors of hematologic cancer confront a spectrum of potential...
medical problems, including second malignant neoplasms as a result of chemotherapy or radiation therapy and cardiac late effects related to chemotherapy or radiation therapy. Some of these patients will have lifelong immunologic deficits, putting them at risk for infection.

Providers should recognize that these survivors might have hypogammaglobulinemia or functional asplenia that increases risk for serious bacterial infections. In these cases, the provider should educate survivors regarding infection risk and prevention by avoiding ill persons; adopting good hand-washing techniques; and having yearly flu vaccines and keeping other immunizations up-to-date.

Survivors of allogeneic hematopoietic cell transplantation are at increased risk for chronic graft-versus-host disease, which can persist for years after treatment (20). Survivors with a manifestation of any form of this disease should be referred to their oncology team for evaluation and management.

Are there specific medical issues for survivors who were treated with surgery, radiation therapy, or chemotherapy?

Many of these issues are discussed above. Specific problems arise depending on the dose and field of radiation therapy and the specific agents and doses of chemotherapy, so these must be considered when determining how to assess and manage the cancer survivor.

The provider should consider which organs were in the field of radiation. For example, survivors who received chest radiation therapy need to undergo breast cancer surveillance, thyroid testing, and a cardiac evaluation as indicated. Survivors who have received chest radiation and/or certain chemotherapy drugs, such as doxorubicin, also require a baseline echocardiogram, and we advise yearly lipid screening. Of note, the synergistic effects of chemotherapy and radiation for treatment of certain cancers should also be considered. For example, the risk for cardiac dysfunction is increased for individuals who received anthracyclines and chest radiation rather than those who received either of these treatments alone.

Adult survivors who received cranial or craniospinal radiation as children need surveillance regarding cognitive, fertility, and other endocrine issues. Survivors who had major abdominal or pelvic surgery or radiation are at risk for a wide array of issues, such as adhesions, many years after treatment. Cancer treatment causes more problems than can be addressed in detail here. Clinicians caring for cancer survivors should contact the oncology team for guidance and advice when questions and concerns arise.

Follow-up Medical Care... With the increasing number of long-term cancer survivors, clinicians need to be knowledgeable about the types of and risks for treatment-related medical effects. Collaboration between the primary care provider, surgical oncologist, radiation oncologist, and medical oncologist is critical to optimize the medical care of long-term cancer survivors. Providers should have a complete summary of a patient’s cancer treatment, including specific information regarding surgery, radiation therapy, and chemotherapy, to guide follow-up care. The most common late medical effects of treatment among cancer survivors include issues of fertility; bone health; and cardiac, pulmonary, cognitive, and sexual functioning. Risk for a secondary malignancy is also a major concern.
Cervical cancer

- Yearly mammograms are recommended starting at age 40 years and continuing for as long as a woman is in good health.
- Clinical breast examination about every 3 years for women in their 20s and 30s and every year for women 40 years and older.
- Women should know how their breasts normally look and feel and report any changes promptly to their health care provider. Breast self-examination is an option for women starting in their 20s.

The American Cancer Society recommends that some women be screened with MRI in addition to mammograms and a different schedule if indicated by personal or family history.

Cervical cancer

- Begin screening about 3 years after beginning vaginal intercourse and no later than 21 years of age. Screen every year with the regular pap test or every 2 years with the liquid-based pap test.
- Beginning at age 30 years, if the results of 3 pap tests in a row are normal, the screening interval can be lengthened to every 2 to 3 years.
- Women older than 30 years should be tested every 3 years with either the conventional or liquid-based pap test.
- Women 70 years of age or older who have had 3 or more normal pap tests in a row and no abnormal pap test results in the past 10 years may stop pap tests.
- Women who have had a total hysterectomy (removal of the uterus and cervix) may stop pap tests, unless the surgery was done as a treatment for cervical cancer or precancer.
- Women who have had a hysterectomy without removal of the cervix should continue to have pap tests.

Some women—because of their history—may need to have a different screening schedule for cervical cancer.

(continued on the next page)
just like any other patient, although concerns about cancer recurrence may be high, and in some populations, risk for suicidal ideation associated with certain risk factors is increased, such as depression, hopelessness, uncontrolled pain, and difficulties with interpersonal relationships (24).

What is the role of exercise and rehabilitation?
In 2009, the American College of Sports Medicine convened a group of experts to evaluate the evidence and subsequently issued guidelines on exercise for cancer survivors. It identified the role of exercise in maintaining a healthy body composition and body image (25) and concluded that exercise aids in managing fatigue, mood disorders, and sleep problems and improves quality of life (25). Exercise is safe for most survivors. Participation in low- to moderate-intensity activity, such as walking, flexibility exercise, and resistance training, does not require a formal evaluation in many patients. However, survivors should follow the guidelines for exercise testing before participating in more vigorous exercise. Survivors should avoid being sedentary and recognize that any level of physical activity may be beneficial. The emphasis for cancer survivors is on returning to normal daily activities, and the guidelines emphasize the importance of individualized exercise programs being developed by trained professionals (25).

What is the role of complementary and alternative medicine?
Cancer survivors often use complementary and alternative medicine, in part because these approaches emphasize quality of life related to a more positive mental outlook and help them take an active role in improving their health (26). Acupuncture, meditation, yoga, and art therapy have been shown to increase a survivor’s perception of control over their health; improve menopausal symptoms; and relieve fatigue, pain, and sleep problems. Also, dance therapy, movement therapy, and mindfulness offer promising approaches for the management of fear about recurrence, lower physical functioning, and the reduction in quality of life from long-term treatment (27).

What about employment, insurance, and disability?
Personal and work lives are affected by cancer. Many survivors are hesitant to disclose their diagnosis because they fear it will affect employment, insurance, and advancement in the workplace. Physical disability and limitations caused by cancer have resulted in work and insurance discrimination for some cancer survivors. For example, one study that examined confidentiality and disclosure and their effects on work and insurance among a group of breast cancer survivors found that many of them believed that cancer affected their work and nearly 20% identified insurance problems. A substantial minority of these women believed that cancer also affected their personal relationships (28). Another study found greater functional deficits among unemployed cancer survivors (as compared with employed); awareness by employers and coworkers of patients’ diagnoses; and reports by cancer survivors of disease-related discrimination in hiring, induction into the military, and obtaining health and disability insurance (29, 30). Follow-up clinicians should be prepared to discuss these issues.

Cancer Screening Guidelines (continued)
Endometrial (uterine) cancer
- At the time of menopause, all women should be informed about the risks and symptoms of endometrial cancer
- Women should report any unexpected bleeding or spotting to their doctors
- Some women—because of their history—may need to consider having a yearly endometrial biopsy.

Prostate cancer
Men should make an informed decision regarding prostate cancer screening. Research has not proven that the benefits of testing outweigh the harms.
- Rectal examination yearly beginning at age 40 years
- Discussion of the pros and cons of PSA testing starting at age 50 years
- PSA if African American or have a father or brother who had prostate cancer before age 65 years.

Cancer-related checkup
- For people aged 20 years or older having periodic health examinations, a cancer-related checkup should include health counseling and, depending on a person’s age and sex, examinations for cancers of the thyroid, oral cavity, skin, lymph nodes, testes, and ovaries and for some nonmalignant (noncancerous) diseases.

In the Clinic

Care of the Adult Cancer Survivor

PIER Module
http://pier.ucpennlive.org/physicians/diseases/000636.001.html
PIER module on cancer from the American College of Physicians.

Patient Information
www.cancer.net/survivorship
Cancer information from the American Society of Clinical Oncology, including the booklet titled Cancer Survivorship: Next Steps for Patients and Their Families.
www.cdc.gov/cancer/survivorship/
www.cdc.gov/cancer/survivorship/basic_info/index.htm
www.cdc.gov/cancer/survivorship/basic_info/
www.cdc.gov/cancer/survivorship/caregivers/index.htm
Resources for cancer survivors from the CDC, including basic information on cancer survivorship in English and Spanish and information for caregivers.
Resources related to living with cancer from the National Institutes of Health’s MedlinePLUS.

Clinical Guidelines
www.livestrong.org/What-We-Do/Our-Approach/Reports-Findings/Defining-Survivorship-Care—Lessons-Learned-from-t
Report defining survivorship care from the LIVESTRONG Survivorship Center of Excellence Network.
www.nap.edu/catalog.php?record_id=11993
Cancer Care for the Whole Patient recommends actions to meet the psychosocial health needs of patients with cancer, published by the National Academies Press in 2008.
www.cdc.gov/cancer/survivorship/index.htm
www.cdc.gov/cancer/survivorship/caregivers/index.htm
Information on cancer survivorship, including information for caregivers, from the CDC.

Quality-of-Care Guidelines
www.cdc.gov/cancer/survivorship/what_cdc_is_doing/action_plan.htm
A National Action Plan for Cancer Survivorship, a report on ways to address the issues facing cancer survivors from the CDC.
www.nap.edu/openbook.php?isbn=0309095956
A report on the phase of care that follows primary treatment for cancer from the National Cancer Policy Board in 2005.
http://iom.edu/Reports/2012/Living-Well-with-Chronic-Illness.aspx
Living Well with Chronic Illness: A Call for Public Health Action, a report from the Institute of Medicine.

Additional Issues in Follow-up Care... Caring for cancer survivors can be complicated and challenging. In addition to cancer surveillance and screening for recurrence, it is important to ensure the social, psychological, and economic well-being of cancer survivors and their families. A wide array of services can supplement the care of cancer survivors provided by the follow-up clinician, and familiarity with resources available in the community as well as information on the Internet can be useful. Referral to physical and occupational therapy for neurocognitive evaluations, to acupuncture and other supportive services, to pain management teams, and to social service agencies can help ensure that the diverse needs of cancer survivors are met.

CLINICAL BOTTOM LINE
THINGS YOU SHOULD KNOW ABOUT CANCER SURVIVORSHIP

Who are cancer survivors?
- Anyone who has ever been diagnosed with cancer and is living today.
- About 60% of cancer survivors are older than age 65 years, because cancer tends to affect older people.
- Advances in cancer treatment and earlier detection are leading to longer survival.
- Two thirds of people diagnosed with cancer live at least 5 years after diagnosis.
- Survivorship includes the family members, friends, and caregivers of survivors, whose lives are also affected by the cancer diagnosis.

What happens after treatment ends?
- Once treatment ends, people with cancer look forward to returning to normal life; however, it can still be a difficult transition.
- Cancer survivors may have questions about follow-up care and worries about the cancer returning.
- They may also have to cope with new physical, emotional, social, and financial challenges.

What can be done to improve life after cancer treatment ends?
- Discuss follow-up care with your health care provider.
- Schedule any recommended visits, screenings, and medical tests.
- Be aware of possible delayed effects of treatment, such as forgetfulness, balance problems, or pain.
- Make lifestyle changes to improve health after cancer, such as quitting smoking or losing weight.
- Seek help for any problems that arise, such as counseling for emotional problems.

For More Information

www.cancer.gov/cancertopics/coping/survivorship
www.cancer.gov/esp/esp/sobrellevar/supervivencia
Information on living with and beyond cancer from the NIH’s National Cancer Institute, in English and Spanish.

http://nhseniorhealth.gov/lifeaftercancer/whoisacancersurvivor/01.html
Information for older patients on life after cancer from NIH Senior Health.

www.cancercare.org/patients_and_survivors
Professional support services and cancer information for patients and survivors from the CancerCare nonprofit organization.

www.canceradvocacy.org/
Information and support for people who survive cancer from the National Coalition for Cancer Survivorship.
CME Questions

1. A 65-year-old woman is evaluated in the emergency department 30 minutes after having a 1-minute episode of involuntary jerking of the right hand that spread up to the right arm and a subsequent 2-minute episode of loss of consciousness and witnessed generalized tonic–clonic seizure activity. She has a 1-month history of increasing confusion and low-grade headache. Two years ago, she was treated for cutaneous melanoma.

On physical examination, the patient is awake and alert. Vital signs are normal. There are no signs of meningismus and no papilledema. She has mild right-sided facial droop and only antigravity strength in the right arm; strength is normal elsewhere.

Laboratory studies, including a complete blood count, measurement of serum electrolyte and plasma glucose levels, and a urine toxicology screen, show no abnormalities.

Which of the following is the most appropriate next diagnostic test for this patient?

A. CT scan of the head
B. Electroencephalogram
C. Gadolinium-enhanced MRI of the brain
D. Lumbar puncture
E. PET scan

2. A 27-year-old woman is admitted to the hospital with a 1-week history of worsening exertional substernal chest pressure relieved by rest. She was admitted after 30 minutes of chest pain relieved with sublingual nitroglycerin tablets. Medical history is significant for Hodgkin lymphoma 7 years ago, treated with high-dose (90 Gy) chest radiation therapy. She reports a history of cocaine use. There is no history of fever or rash. She takes no medications.

On physical examination, temperature is normal, blood pressure is 110/50 mm Hg, pulse rate is 98/min, and respiration rate is 14/min. Cardiopulmonary and peripheral vascular examinations are normal.

Serum toxicology screen is negative. Serum troponin I level is 0.01 ng/mL (0.01 µg/L). Prothrombin and activated partial thromboplastin time are normal.

Electrocardiogram during chest pain at the time of admission indicates ST-segment depression in leads V1 to V4. Cardiac catheterization shows 60% ostial narrowing of the left main coronary artery and 60% narrowing of the proximal left anterior descending coronary artery.

Which of the following is the most likely cause of this patient’s chest pain?

A. Antiphospholipid syndrome
B. Cocaine-induced coronary artery vasospasm
C. Coronary artery disease
D. Kawasaki disease

3. A 65-year-old man comes to the office for routine follow-up. He says he is feeling well. The patient has a history of a 2-cm thyroid cancer with 2 positive cervical lymph nodes that was treated with a total thyroidectomy and radioactive iodine therapy 1 year ago. Six months ago, results of laboratory studies showed a stimulated thyroglobulin level of less than 0.2 ng/mL (0.2 µg/L) and no thyroglobulin antibodies, and a neck ultrasound showed no evidence of any residual disease. The patient takes levothyroxine, 188 µg/d. Other medications include atenolol, 50 mg/d, for hypertension.

On physical examination, vital signs are normal, and BMI is 27.9. Examination of the neck reveals a well-healed surgical scar at its base. No cervical lymphadenopathy or mass is noted. The patient has a slight bilateral upper extremity tremor.

Results of laboratory studies show a thyroid-stimulating hormone level of 0.3 µU/mL (0.3 mU/L) and a free thyroxine (T4) level of 1.96 ng/dL (25.3 pmol/L).

Which of the following is the most appropriate next step in management?

A. Decrease the dosage of levothyroxine
B. Increase the dosage of levothyroxine
C. Make no changes to the medication regimen
D. Measure the triiodothyronine (T3) level

4. A 40-year-old woman is evaluated in the office during a routine examination. She is asymptomatic. She has a history of stage I, hormone receptor–negative, HER2-negative left breast cancer that was diagnosed 3 years ago. She was treated with modified radical mastectomy followed by chemotherapy with docetaxel and cyclophosphamide.

On physical examination, vital signs are normal. The left chest wall is well-healed with no nodularity. No right breast masses, axillary lymphadenopathy, or supraclavicular lymphadenopathy is present. The remainder of the examination is unremarkable.

The patient will undergo periodic mammography and routine health maintenance.

Which of the following would be the most appropriate additional evaluation in this patient?

A. Annual bone scan
B. Annual CT scan
C. Annual PET scan
D. Annual tumor marker measurement, comprehensive metabolic panel yearly
E. No additional studies