

# Routine Health Maintenance in Patients Living With Multiple Myeloma: Survivorship Care Plan of the International Myeloma Foundation Nurse Leadership Board

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Patients diagnosed with multiple myeloma are living longer because of new therapeutic options. Helping patients with multiple myeloma maintain a good state of health from the time of diagnosis and throughout their therapy leads to better quality of life. However, patients with multiple myeloma are at risk for illnesses experienced by the general population and at additional risk for illnesses related to multiple myeloma and its treatment. Therefore, the International Myeloma Foundation Nurse Leadership Board (NLB) has developed practice recommendations to meet the particular needs of adult patients with multiple myeloma using evidence-based recommendations for screening and disease prevention, as well as nursing experience. The NLB recommendations are designed to address and overcome barriers to health maintenance by educating and empowering nurses and their patients.

**P**atients with newly diagnosed and relapsed multiple myeloma are living longer because of new therapeutic options that did not exist a decade ago (Kumar, Rajkumar, & Dispenzieri, 2008). Therefore, nurses and patients need to understand the importance of maintaining overall wellness through health promotion and disease prevention. Health maintenance must commence from the time of diagnosis and extend throughout therapy to improve survival by managing therapy appropriately within the context of attendant drug toxicity and the patient's preexisting or therapy-induced comorbid conditions. The International Myeloma Foundation's Nurse Leadership Board (NLB) has developed a health maintenance schedule for patients living with multiple

## At a Glance

- ◆ Patients diagnosed with multiple myeloma are at risk for illnesses other than side effects of their disease and treatment.
- ◆ Making health maintenance an integral part of patients' care plan will help them maintain a good state of health and provide a better quality of life.
- ◆ Practice recommendations have been developed for screening and disease prevention, emphasizing screening for cardiovascular disease, malignancy, endocrine disorders, bone health, sensory changes, psychosocial issues, addiction and substance abuse, nutrition, and other important conditions.

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myeloma. This health maintenance schedule is a tool that can be used by nurses, patients, and their caregivers to provide recommendations on the timing and frequency of screening evaluations (see Figure 1). These evaluations are based on age, gender, and risk factors to facilitate primary and secondary prevention of disease (Frame, 1996). Patients with multiple myeloma are not only at risk for the illnesses experienced by the general population, but also are at additional risk related to the disease and its treatment. Updated evidence-based practice recommendations for screening and preventative services for the general population, based on age, gender, and risk factor assessment, will be presented in this article.

Multiple myeloma typically is a disease afflicting older adults, although more than 30% of patients diagnosed are younger than aged 65 years (National Cancer Institute, 2011). Therefore, the NLB recommendations pertain to an adult population and include screening for cardiovascular disease (i.e., hypertension and hyperlipidemia), other malignancies (i.e., prostate, breast, and colon cancers), endocrine disorders (i.e., type 2 diabetes mellitus and thyroid dysfunction), bone health, sensory changes (i.e., vision and hearing), psychosocial issues, addiction and substance abuse (i.e., tobacco and alcohol), nutrition, and other important conditions (i.e., infection, immunization scheduling, and oral hygiene). The screening recommendations are based on NLB patient treatment experience, have been personalized to suit individual patient needs, and should be used as an overview aimed at health promotion and disease prevention to meet the particular needs of patients with multiple myeloma. These health maintenance recommendations are a first description of the issues facing patients living long term with multiple myeloma. The International Myeloma Working Group will be reviewing the evidence and making consensus statements regarding numerous topics, including the occurrence of secondary malignancies and recommendations for immunization. Updates will be posted at [www.myeloma.org](http://www.myeloma.org).

The NLB is aware that many barriers to health maintenance exist. Time constraints, lack of knowledge regarding current guidelines and their application and relevance, and skepticism all can contribute to a lack of focus on health maintenance for patients with multiple myeloma. To institute change to prevent illness, nurses and patients need to be motivated to embrace a health maintenance approach. Collaboration with patients often is achieved through education. Helping patients with multiple myeloma understand how they can help to improve their overall survival by maintaining their health while undergoing therapy and follow-up is imperative.

## Cardiovascular

### Hypertension

According to the American Heart Association, 33% of Americans older than age 18 have been diagnosed with hypertension (Roger et al., 2011). Men younger than age 55 have a higher prevalence than women of the same age group, but the prevalence rate evens out for those ages 55–64, and then the prevalence rate is higher for women age 65 and older. In addition, the prevalence in African Americans is highest among racial groups at about 41%. (Roger et al., 2011). Most adults with hyperten-

sion are aware of their condition and are using antihypertensive drugs, although hypertension is controlled in only about half of these patients (Roger et al., 2011). Essential or primary hypertension has no identifiable cause, whereas secondary hypertension can develop from chronic kidney disease, coarctation of the aorta (congenital defect), Cushing syndrome (glucocorticoid excess states), chronic steroid therapy, obstructive uropathy, pheochromocytoma, primary aldosteronism (mineralcorticoid excess states), renovascular causes, sleep apnea, thyroid or parathyroid disease, and may be drug induced (Chobanian et al., 2003). Undetected or uncontrolled hypertension over a period of time can lead to stroke, heart attack, heart failure, and renal failure. Nonmodifiable risk factors include age, ethnicity, family history of hypertension, and genetics. Additional modifiable risk factors include lower education, socioeconomic status, being overweight or obese, physical inactivity, psychosocial stressors, sleep apnea, diet (high fat, high sodium, low potassium), and excessive alcohol intake. Lifestyle modifications to prevent primary hypertension are illustrated in Figure 2.

The diagnosis of hypertension is made based on at least two blood pressure readings (systolic of 140 mmHg or higher and diastolic of 90 mmHg or higher) on two separate occasions. Current recommendations for primary prevention of hypertension include weight loss, low-sodium diet, moderation in alcohol consumption, and increased regular physical activity. The initial treatment for hypertension will vary depending on the indication for initiation and comorbid conditions. Clinical trials have determined the class of drugs (e.g., beta-blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, aldosterone antagonists) that should be used for the management of hypertension based on the compelling indication to treat, which includes heart failure, post myocardial-infarction, high coronary artery disease risk, diabetes, chronic kidney disease, and recurrent stroke prevention.

Current screening recommendations by the U.S. Preventative Services Task Force ([USPSTF], 2010) include screening adults age 18 and older and following-up on diagnosis after two or more elevated readings obtained on separate occasions over a period of one to several weeks. The frequency of screening includes

- Normal: Recheck in two years.
- Prehypertension: Recheck in one year.
- Stage I hypertension: Confirm within two months (systolic blood pressure of 140–159 mmHg or diastolic blood pressure of 90–99 mmHg) (Chobanian et al., 2003).
- Stage II hypertension: Evaluate or refer to source of care within one month (systolic blood pressure of 160 mmHg or higher or diastolic blood pressure of 100 mmHg or higher) (Chobanian et al., 2003).
- Hypertensive crisis: Evaluate and treat immediately (higher than 180/110 mmHg).

The various therapies used for treatment of multiple myeloma can lead to either hypertension or hypotension. Therefore, patients may require initiation of antihypertensive medications or dose adjustment of their current regimen. Elevated blood pressures may occur with the use of dexamethasone because of fluid retention (Faiman, Bilotti, Mangan, Rogers, & the International Myeloma Foundation NLB, 2008). The incidence of hypotension with single-agent bortezomib administration is 13%, which may

## Malignancies

### Breast cancer

**Recommendation** for women age 40 or older: Screening mammography with or without clinical breast examination every 1–2 years. **MSC:** None.

### Cervical cancer

**Recommendation** for women younger than age 65: Papanicolaou tests recommended for sexually active women. **MSC:** None.

### Skin cancer

**Recommendation** for men and women of all ages: Skin examinations should be included in general periodic health examinations. **MSC:** Patients with myeloma may be at higher risk because of chemotherapy, stem cell transplantation, radiation, and immunosuppressive agents. Educate patients regarding the need for routine self-examination of their skin and notify practitioners of any noted change.

### Colorectal cancer

**Recommendation** for men and women age 50–75: Annual fecal occult blood testing or screening colonoscopy every 10 years. **MSC:** None.

### Prostate cancer

**Recommendation** for men age 50 and older or those at risk (start at age 45): prostate-specific antigen blood test and DRE annually. **MSC:** None.

## Cardiovascular

### Hyperlipidemia

**Recommendation** for men older than age 35: Screen for lipid disorder. For women older than age 45: Screen for lipid disorder if at increased risk for coronary heart disease. **MSC:** None.

### Hypertension

**Recommendation** for men and women older than age 18: If normal, recheck every two years. **MSC:** Dexamethasone may lead to fluid retention and increased blood pressure, requiring either dose adjustments or initiation of antihypertensives. Bortezomib may cause hypotension, requiring dose reduction, or discontinuation of antihypertensives, or further management with pharmacologic intervention.

## Endocrine

### Diabetes mellitus type 2

**Recommendation** for men and women with hypertension of 135/80 mmHg or higher (sustained): Fasting blood glucose every three years (may be required more frequently if on corticosteroid therapy; at clinician discretion). **MSC:** Studies have shown that about 80% of patients on steroids will develop hyperglycemia. Pharmacologic management may be indicated.

### Thyroid dysfunction

**Recommendation:** None in asymptomatic patients. **MSC:** Incidents of subclinical and clinical hypothyroidism have been seen in patients treated with thalidomide or lenalidomide. Recommend baseline screening prior to the initiation of therapy, with regular interval screening every three months while on therapy.

## Nutrition

### Iron deficiency

**Recommendation:** None. **MSC:** Evaluate the adequacy of iron stores in patients initiating or continuing exogenous erythropoietin therapy.

### Obesity

**Recommendation:** All adult patients should be screened. **MSC:** None.

## Addiction

### Alcohol misuse

**Recommendation:** All adults should be screened for alcohol misuse. **MSC:** Alcohol may exacerbate adverse effects of common myeloma therapeutics with a potential for an increase in gastritis, neuropathy, and liver dysfunction.

## Smoking cessation

**Recommendation:** All adults should be screened for tobacco use. **MSC:** Cigarette smoking and exposure to environmental tobacco smoke increase the risk of pulmonary infections in general and the risk to contract invasive pneumococcal disease by a factor of 4 to 1. Because of the immunocompromised state of patients with multiple myeloma, avoidance is important.

## Bone Health

### Osteoporosis

**Recommendation** for women older than 65 or 60 and older with increased risk of fracture: DEXA bone mineral density scans every two years. **MSC:** See bone health practitioner tool.

### Vitamin D deficiency

**Recommendation:** None. **MSC:** Patients with multiple myeloma may be at increased risk for vitamin D deficiency because of older age, renal impairment leading to urinary loss, and increased catabolism from glucocorticoid use.

## Sensory

### Hearing screening

**Recommendation:** None. **MSC:** Patients with multiple myeloma may receive pharmacologic agents during their course of treatment that can increase the risk of hearing loss (e.g., aminoglycoside antibiotics, diuretics, platinum-based chemotherapy).

### Vision screening

**Recommendation** for men and women age 40: Baseline screening. For men and women age 65 and older: Eye examinations every 1–2 years. **MSC:** Patients with multiple myeloma treated with dexamethasone are at increased risk for blurred vision and cataract formation.

## Psychosocial

### Cognitive changes

**Recommendation:** All adults should be screened at periodic health examinations. **MSC:** None.

### Depression

**Recommendation** for all adults: Screening should be included in periodic health examinations. Tools are available to assist practitioners in screening for depression. **MSC:** Fatigue, pain, and anemia are symptoms that can be related to treatment of cancer and cancer-related depression. Distinguishing between the two is important. Support groups may be a useful intervention. Provide information on patient support groups.

### Fatigue

**Recommendation:** All adults should be screened at periodic health examinations (e.g., "Are you tired?"). **MSC:** None.

## Miscellaneous

### Immunizations

**Recommendation** for men and women: Annual influenza vaccine; tetanus booster every 10 years. For men and women aged 65 and older: Pneumococcal vaccine, repeat once after five years. **MSC:** Routine vaccination as primary prevention in the multiple myeloma population is recommended. Varicella vaccine is contraindicated in immunocompromised patients.

### Opportunistic infections

**Recommendation** for all adults: Observe for signs and symptoms of infection during periodic health examinations. **MSC:** Myeloma and the treatment for myeloma can increase the patient's risk of developing an infection by interfering with normal immune function.

### Oral hygiene

**Recommendation:** None. **MSC:** Patients with multiple myeloma receiving bisphosphonate support are at increased risk of osteonecrosis of the jaw, and it is recommended that they maintain good oral hygiene with routine dental evaluation.

DEXA—dual-emission x-ray absorptiometry; DRE—digital rectal examination; MSC—myeloma-specific considerations

## Figure 1. Long-Term Survivor Health Maintenance Tool for Clinicians

necessitate adjustment of antihypertensive medications (Millennium: The Takeda Oncology Company, 2010). Continued assessments with intervention as indicated are important for patient safety.

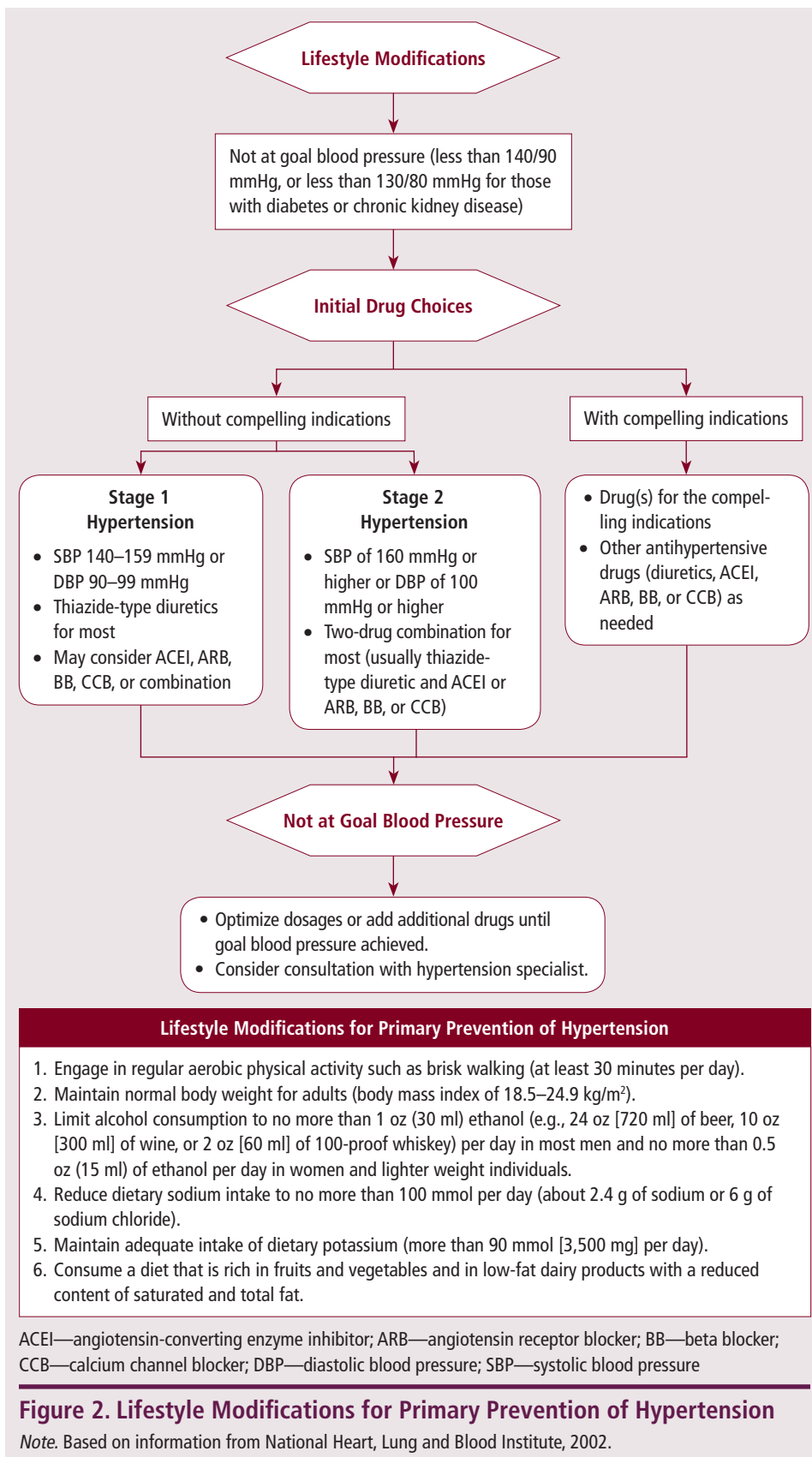
for dyslipidemia will depend on the abnormal values and the risk stratification of the individual. The therapy is described in NCEP (2002) and Grundy et al. (2004), with modifications based on a review of five clinical trials published after initial recommendations

## Hyperlipidemia

Of Americans older than age 20, 15% have a total cholesterol level greater than 240 mg/dl, which is considered high risk. Nonmodifiable risk factors include age, sex (male), and family history of premature coronary heart disease (CHD). Modifiable risk factors include hypertension, cigarette smoking, diabetes, being overweight or obese, physical inactivity, and atherogenic diet (National Cholesterol Education Program [NCEP], 2002).

The diagnosis of hyperlipidemia can be from the results of a fasting lipoprotein profile including total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein cholesterol, and triglycerides. Patient testing and intervention are stratified depending on an individual's risk. The three risk categories include (a) those with established CHD or CHD risk equivalent (i.e., diabetes, peripheral artery disease, other clinical atherosclerotic disease, abdominal aortic aneurysm, symptomatic carotid artery disease, or more than 50% stenosis on angiography or ultrasound), (b) those with two or more risk factors, and (c) those with none or one risk factor. The risk factors to be evaluated include cigarette smoking, hypertension, low LDL cholesterol (less than 40 mg/dl), and family history of premature CHD (first-degree male relative younger than age 55 or first-degree female relative younger than age 65) (NCEP, 2002).

Current recommendations for the primary prevention of hyperlipidemia include lifestyle modifications, such as weight control, dietary modifications, regular physical activity, and smoking prevention or cessation. In addition, patients with elevated LDL or multiple risk factors may use pharmacologic interventions as prevention against CHD (NCEP, 2002). The initial therapy



**Figure 2. Lifestyle Modifications for Primary Prevention of Hypertension**

Note. Based on information from National Heart, Lung and Blood Institute, 2002.

from statin clinical trial results. Current screening recommendations (USPSTF, 2010) for men are older than age 35, screen for lipid disorder every five years if results are normal; and ages 20–35, screen for lipid disorders only in those at increased risk for CHD every five years if results are normal. For women older than age 20, screen for lipid disorders if they are at increased risk for CHD.

USPSTF (2010) makes no recommendation for or against routine screening for lipid disorders in men ages 20–35 or in women age 20 and older who are not at increased risk for CHD.

## Malignancies

### Breast Cancer

An estimated 232,620 cases of breast cancer will be diagnosed in 2011, with about 2,140 of those cases diagnosed in men (American Cancer Society [ACS], 2011a). An increased incidence of breast cancer in Caucasians has been noted and thought to be related to improved diagnosis, such as more frequent mammography, later age at first childbirth, and greater use of hormone-replacement therapy (ACS, 2010a). Nonmodifiable risk factors include age, personal and family history (first-degree relative) of breast cancer, breast tissue changes (lobular carcinoma in situ), genetic changes (*BRCA1*, *BRCA2*), younger than age 12 at menarche, older than age 55 at menopause, menopausal hormone-replacement therapy, race (Caucasian), dense breast tissue, and history of taking diethylstilbestrol (ACS, 2010b). Modifiable risk factors include older age at time of first live birth, nulliparity, radiation therapy to the chest for treatment of lymphoma (risk increased if treated during adolescence, with no increased risk seen after age 40), being overweight or obese following menopause, lack of physical activity, or regular alcohol consumption.

Current USPSTF (2010) screening recommendations include a screening mammography with or without clinical breast examination (CBE) every one to two years for women age 40 and older. Insufficient evidence exists to recommend for or against CBE alone and for or against performing routine breast self-examination.

Current ACS screening recommendations (for average risk) (Smith, Cokkinides, & Brawley, 2009) include

- The benefits or limitations of breast self-examination should be taught to all women beginning in their early 20s.
- CBE should be part of a periodic assessment (at least every three years) for women in their 20s and 30s.
- Annual mammography should begin at age 40.

### Cervical Cancer

An estimated 12,710 cases of cervical cancer are diagnosed each year in the United States, with more than 4,290 deaths annually (ACS, 2011a). Incidence and death rates for other racial groups with cervical cancer appear to be higher than that of Caucasians, which may be a reflection of access to screening and health care. Primary prevention of cervical cancer can be successful with frequent Papanicolaou (Pap) tests, safe sex practices, and human papillomavirus (HPV) vaccination in younger women. Nonmodifiable risk factors include a weakened immune system (HIV, immunosuppressants) and diethylstilbestrol ex-

posure in utero. Modifiable risk factors include HPV infection, failure to undergo routine screening (i.e., Pap test), smoking, sexual history (increased number of partners), long-term use of oral contraceptives, and multiparity (more than five births in conjunction with HPV).

Current USPSTF (2010) recommendations strongly recommend screenings in women who have been sexually active and have a cervix; initiate screening within three years of onset of sexual activity or at age 21 years, whichever comes first. The guidelines recommend against routine screening of women older than age 65 if they have adequate recent screening with normal Pap tests and are not otherwise at high risk, and routine screening for patients with a total hysterectomy for benign disease. Insufficient evidence exists to recommend for or against the routine use of new technologies to screen for cervical cancer and the routine use of HPV testing as a primary screening test for cervical cancer.

Current ACS screening recommendations (Smith et al., 2009) include

- Cervical cancer screening should begin three years after a woman begins having vaginal intercourse, but no later than age 21. Screening must be done annually with conventional Pap tests or every two years using liquid-based Pap tests.
- At or after age 30, women who have had three normal Pap tests in a row may get screened every two to three years with cervical cytology, or every three years with an HPV DNA test plus cervical cytology.
- Women age 70 or older who have had three or more normal Pap tests and no abnormal Pap tests in the past 10 years and women who have undergone a total hysterectomy may choose to stop cervical cancer screening.

### Skin Cancer

Skin cancer (including melanoma and nonmelanoma) is the most common cancer diagnosed in the United States (ACS, 2011a; Woolfe, 2008) and, although not one of the most frequent causes of death, incidence rates have been rising since the 1960s at 4%–8% per year. About 70,230 new cases of melanoma and 8,790 deaths will be reported in 2011 (ACS, 2011a). Melanoma accounts for less than 5% of all skin cancers but causes the most skin cancer deaths. Caucasians have a risk ratio of 1 in 50 (1 in 1,000 for African Americans and 1 in 200 for Hispanics). More than one million nonmelanoma skin cancers (i.e., squamous cell carcinoma and basal cell carcinoma), were diagnosed in 2009, with 80% of skin cancers diagnosed as basal cell and 20% as squamous cell carcinoma.

USPTF (2010) and ACS (2009) recognize the following known risk factors for skin cancer for the general population and the myeloma population: ultraviolet (UV) light; moles (people with many moles are more likely to develop melanoma); fair skin, freckles, and red or blonde hair; family history of melanoma; and weakened immune system (i.e., from treatment or transplantation, older age, male [men have higher rate], and xeroderma pigmentosum, a rare inherited condition).

Risk factors for nonmelanoma skin cancers include UV light, fair skin, older age, male (men are two times as likely to have basal cell carcinomas and three times as likely to have squamous cell carcinomas of the skin), exposure to chemicals (i.e., arsenic, industrial tar, coal, paraffin, and certain types of oil), radiation

exposure, previous history of skin cancer, long-term or severe skin inflammation or injury, psoriasis treatment, basal cell nevus syndrome (a rare congenital condition), reduced immunity, HPV, smoking, and genetic susceptibility. Current screening recommendations (USPSTF, 2010) include

- The use of sunscreens that block UV A and B are recommended, as is limiting intense or chronic exposure to sun.
- Avoid sun exposure between 10 am and 4 pm and wear protective clothing such as wide-brimmed hats, long-sleeved garments, long pants, and sunglasses; some clothing now comes with built-in UV protection; sunscreen and lip balm should have an SPF of at least 15 and should be applied 20–30 minutes prior to sun exposure and reapplied every two hours and after swimming or sweating.
- Comprehensive skin examinations for patients with a personal history of skin cancer, those with precursor lesions, and those with occupational exposure; follow the ABCDEs of melanoma as recommended by the American Academy of Dermatology (2011).
  - **A**symmetry: one half unlike the other half
  - **B**order: irregular, scalloped, or poorly circumscribed
  - **C**olor: Varies from one area to another. May have shades of tan, brown, black, white, red, or blue
  - **D**iameter: larger than 6 mm (the diameter of a pencil eraser)
  - **E**volving: a mole or skin lesion that looks different from other moles or lesions and is changing (evolving) in size, shape, or color.

The ACS recommends a skin examination along with the general periodic health examination. Although the benefits of screening are unproven, people should remain alert for skin lesions with malignant features.

Treatments such as chemotherapy, stem cell transplantation, radiation, and immunosuppressive agents, along with age and sun exposure, may place patients with multiple myeloma at higher risk for developing skin cancer.

## Colorectal Cancer

In 2011, an estimated 101,340 new cases of colon cancer and 39,870 new cases of rectal cancer will be diagnosed (ACS, 2011a). The estimated number of deaths from colon and rectal cancer combined for 2011 will be 49,380 (ACS, 2011a). African Americans have the highest colorectal cancer incidence and mortality rates of all racial groups in the United States (ACS, 2011b). African Americans also have a higher incidence of multiple myeloma; therefore, it would be prudent for healthcare practitioners to educate these patients about the benefits of colorectal cancer screening. Jews of Eastern European descent (particularly Ashkenazi Jews) have one of the highest colorectal cancer risks of any ethnic group in the world. Several gene mutations leading to an increased risk of colorectal cancer have been found in this group; the most common of these DNA mutations is present in about 6% of Jews in the United States (those of Eastern European descent) (ACS, 2008). Other nonmodifiable risk factors include age, personal history of colorectal polyps or colorectal cancer, personal history of inflammatory bowel disease, family history of colorectal cancer, having an inherited genetic susceptibility to the disease (particularly familial adenomatous polyposis and hereditary nonpolyposis colon cancer [or

Lynch syndrome]). Modifiable risk factors also have been identified and include diets high in red meat and processed meat, physical inactivity, obesity, smoking, heavy alcohol use, and type 2 diabetes (ACS, 2010c). Current screening recommendations for colorectal cancer (USPSTF, 2010) include

- Fecal occult blood testing, sigmoidoscopy, or colonoscopy beginning at age 50 and continuing until age 75; in individuals at higher risk, initiating screening at an earlier age is reasonable.
- Based on modeling evidence, this population should be screened using one of the following three regimens (all equally effective in potential life-years gained).
  - Annual screening with high-sensitivity fecal occult blood testing
  - Screening every five years with sigmoidoscopy combined with high-sensitivity fecal occult blood testing every three years
  - Screening colonoscopy every 10 years.

## Prostate Cancer

After skin cancer, prostate cancer is the second most common cancer in men in the United States and the second leading cause of death. An estimated 240,890 new cases of prostate cancer will be diagnosed in 2011, with an estimated 33,720 deaths from the disease (ACS, 2011a). Prostate cancer occurs more often in African American men than in men of other races. African American men also are more likely to be diagnosed at an advanced stage and are more than twice as likely to die of prostate cancer as Caucasian men. Prostate cancer occurs less often in Asian American and Hispanic men than in non-Hispanic Caucasians. The reasons for these racial and ethnic differences are unclear. As stated, African American men are more frequently diagnosed with multiple myeloma than Caucasians. Education regarding the screening recommendations for prostate cancer is extremely important in the myeloma population.

Included in the nonmodifiable risk factors are age, race, ethnicity, family history of prostate cancer, and the inheritance of specific genes. The relationship of several modifiable risk factors and the incidence of prostate cancer have been studied. Some studies have shown that the following factors may increase the risk of prostate cancer: diets high in red meats or high-fat dairy products, obesity, low levels of physical activity, prostatitis, and infection (ACS, 2009).

The USPSTF (2010) concluded that the current evidence is insufficient to assess the benefits of prostate cancer screening in men younger than age 75 and recommends against screening for prostate cancer in men age 75 years or older. However, current ACS screening recommendations for prostate cancer (Snowden, 2010) include the following.

- African American men and men who have a close family member with prostate cancer should have the prostatic-specific antigen blood test and a digital rectal examination annually beginning at age 45.
- All other men should be screened annually beginning at age 50, including prostate-specific antigen blood test and digital rectal examination to check the prostate gland. A discussion with the patient about the benefit or lack of benefit from prostate cancer screening should be conducted so the patient can decide if he wants to be tested or not.



# Endocrine

## Diabetes Mellitus Type 2

An estimated 8.3% of the U.S. population (25.8 million) is living with diabetes, and about 90%–95% of those cases are type 2 diabetics (American Diabetes Association, 2011). About 1.9 million new cases of diabetes are diagnosed each year (American Diabetes Association, 2011), and diabetes is the seventh leading cause of death (about 71,380 per year) (Jemal, Siegel, Xu, & Ward, 2010). Common complications of diabetes include damage to the heart, blood vessels, eyes, kidneys, and nerves. Many of these comorbidities overlap with the common toxicity profiles of antimyeloma therapeutics. Therefore, prompt recognition and intervention for a preexisting or new onset diagnosis of diabetes mellitus type 2 is imperative for quality care. Nonmodifiable risk factors for diabetes include race or ethnicity (African American, Mexican American, Native American, Native Hawaiian, and Asian American), age, and family history. Gender does not seem to be a risk factor (National Institute of Diabetes and Digestive and Kidney Diseases, 2007). Modifiable risk factors include being overweight or obese, hyperglycemia, physical inactivity, and smoking.

Current recommendations for the primary prevention of diabetes mellitus type 2 are based on lifestyle modification. Dietary

changes include a recommendation for moderate weight loss, defined as a 7% reduction in body weight accomplished by a reduction in daily calories and fat. Individuals also are advised to achieve the recommended daily allotment for dietary fiber (14 g of fiber per 1,000 kcal), and that 50% of grain intake comprise whole grain-containing foods. The incorporation of regular exercise (150 minutes per week) at a moderate level also is strongly advised (American Diabetes Association, 2011).

The treatment for diabetes mellitus type 2 can vary dramatically, from conservative lifestyle modifications to pharmacologic intervention with either oral or injectable antidiabetic medications. Adequate management of plasma glucose levels and screening for related complications can improve patient quality of life, reduce comorbidities and death, and decrease the economic burden of diabetes. Screening and treatment guidelines (American Diabetes Association, 2011) may be recommended based on dietary and lifestyle modification, hypertension, hyperlipidemia, CHD, neuropathy, retinopathy, smoking cessation, and foot care.

Current screening recommendations from USPSTF (2010) include fasting plasma glucose in asymptomatic adults with sustained blood pressure (treated or untreated) greater than 135/80 mmHg; however, insufficient evidence exists to recommend routine screening in asymptomatic adults with blood pressure greater than 135/80 mmHg.

According to study results, patients receiving treatment for multiple myeloma can have an increased incidence of hyperglycemia when dexamethasone is incorporated into their regimen. Although the incidence of diabetes induced by steroid therapy in patients with multiple myeloma is unknown, it might be beneficial to follow the recommendations for hyperglycemia evaluation and management in patients on prolonged steroid therapy.

**Table 1. Diagnostic Workup for Primary Hypothyroidism**

TEST	DESCRIPTION	EXPECTED RESULTS
Free T <sub>4</sub>	Level of metabolically active T <sub>4</sub> unbound to protein and available to tissues	Low
Free T <sub>4</sub> index	Mathematical calculation used to correct the estimated total T <sub>4</sub> for the amount of T <sub>4</sub> -binding globulin present. Useful in patients with known or suspected abnormalities of T <sub>4</sub> -binding protein levels.	Low
Serum T <sub>4</sub>	Total circulating T <sub>4</sub> , both bound and unbound	Low
T <sub>3</sub> uptake	Indirect measure of unsaturated T <sub>4</sub> -binding globulin in the blood, with an inverse relationship.	Low
Thyrotropin	Level of thyroid-stimulating hormone in circulation for stimulation of the thyroid gland to release and distribute T <sub>4</sub> and T <sub>3</sub> . Most sensitive test for primary hypothyroidism.	High
T <sub>4</sub> -binding globulin	Determines the level of circulating T <sub>4</sub> -binding globulin. Variations in the level have a major effect on bound and free forms of T <sub>4</sub> and T <sub>3</sub> and can differentiate between hypothyroidism and euthyroidism.	High

T<sub>3</sub>—triiodothyronine; T<sub>4</sub>—thyroxine

Note. Based on information from Fischbach & Dunning, 2004.

## Thyroid Dysfunction

Hypothyroidism is a metabolic state resulting from an insufficient level of circulating thyroxine (T<sub>4</sub>) (Gregerman, 2003). Primary hypothyroidism relates to a problem within the thyroid gland itself rather than a different part of the hypothalamic-pituitary-thyroid axis. Subclinical hypothyroidism is defined as an elevated serum thyroid stimulating hormone (TSH) level despite normal levels of serum-free T<sub>4</sub>. The prevalence is 3%–8% in the population not known to have thyroid disease (Fatourech, 2009). Subclinical hypothyroidism is seen more frequently in women, and the prevalence increases with age. Clinical features of hypothyroidism often are insidious at onset. Signs include hyponatremia, elevated levels of cholesterol and triglycerides, electrocardiogram changes (low voltage and/or T-wave abnormalities); symptoms include easy fatigability, lethargy, cold intolerance, muscle aching, dry skin, hair loss, constipation, facial and periorbital edema, voice changes, and poor memory. The diagnostic work-up for primary hypothyroidism often will stem from the patient's subjective complaints in combination with their history and a physical examination, and should include tests described in Table 1 (Fischbach & Dunning, 2004).

Although treatment for hypothyroidism consists of thyroid hormone replacement with T<sub>4</sub>, some patients may require the addition of triiodothyronine (T<sub>3</sub>) for relief of symptoms; therapy should be individualized (Nygaard, Jensen, Kvetzy, Jarlov, &



Faber, 2009; Wiersinga, 2009). Improvement in symptoms may take months. Serum TSH, T<sub>4</sub>, free T<sub>4</sub>, and/or free T<sub>4</sub> index should be monitored to titrate doses.

Thalidomide therapy often can lead to subclinical hypothyroidism with normal T<sub>3</sub> and T<sub>4</sub> levels and slightly elevated TSH levels (Dimopoulos & Eleutherakis-Papaiakovou, 2004). Some hypothesized mechanisms of action include direct thyrotoxicity or the provocation of an immune reaction against the thyroid. Badros et al. (2002) tested those mechanisms in a study that assessed thyroid function in 174 patients with multiple myeloma assigned to receive chemotherapy alone or in combination with thalidomide. The authors of that study found 20% of patients on thalidomide had a serum TSH level greater than 5 uIU/ml three to four months after enrollment. The study also evaluated an additional 169 patients with relapsed multiple myeloma who had been treated with thalidomide; 75% of those patients with normal baseline TSH levels had increases in their TSH two to six months after starting therapy and 22% had a TSH level greater than 5 uIU/ml. Many of the adverse effects associated with hypothyroidism also may be associated with thalidomide, and include constipation, fatigue, lack of energy, neuropathy, skin rash, and bradycardia.

Hypothyroidism has not been reported in clinical studies of patients on lenalidomide, although it has been reported in a retrospective new case (Figaro et al., 2011). Obtaining baseline TSH, T<sub>4</sub>, free T<sub>4</sub>, and/or free T<sub>4</sub> index levels prior to the initiation of therapy with thalidomide or lenalidomide, and retesting at regular intervals, may help to detect patients with subclinical hypothyroidism (Menon, Habermann, & Witzig, 2007). Co-screening recommendations currently exist for routine evaluation for thyroid disease in asymptomatic patients (USPSTF, 2010); however, the NLB recommends a baseline screening prior to the initiation of therapy, with regular interval screening every three months. Patients with subclinical hypothyroidism also may benefit from replacement therapy at a lower TSH level. More research is needed to establish evidence-based guidelines for such a therapy.

## Bone Health

Because bone health is so important, a companion article in this publication (Miceli et al., 2011) addresses the subject in more detail. Risk factors for osteoporosis and fractures, as well as screening tests and recommended calcium and vitamin D supplementation, are discussed. The related topic of functional mobility and safety is the subject of another companion article by Rome, Jenkins, Lilleby, and the International Myeloma Foundation Nurse Leadership Board (2011), which includes recommendations for maintaining bone strength as well as functional mobility.

## Sensory

### Vision Screening

With the aging of the American population, the number of Americans with major eye diseases is increasing, and vision loss is becoming a major public health issue. Blindness or low vision affects 3.3 million Americans age 40 and older and is projected to affect 5.5 million people by 2020 (National Eye Institute,

2010). Low vision and blindness increase significantly with age. People age 80 and older currently make up 8% of the population but account for 69% of blindness. Age-related macular degeneration, glaucoma, cataracts, and diabetic retinopathy are the most common eye diseases in Americans age 40 and older (National Eye Institute, 2008).

According to the National Eye Institute (2008), a comprehensive eye examination should include at least three diagnostic components: tonometry (to determine the fluid pressure in the eye), a visual acuity test (to measure how well the patient sees at various distances), and pupil dilation (in which eye drops are placed in each eye to widen the pupil, allowing the doctor to see the interior of the eye to check the retina for signs of disease). Current vision screening recommendations for comprehensive medical eye examinations from the American Academy of Ophthalmology (2005) for adults with no risk factors and for adults with conditions or risk factors are shown in Table 2.

Patients at risk include those with diabetes, hypertension, or a family history of ocular disease (e.g., glaucoma, macular degeneration) as well as individuals working in occupations that are highly demanding visually or hazardous to the eye, those taking prescription or nonprescription drugs with ocular side effects, those wearing contact lenses, and those who have had previous eye surgery.

Patients being actively treated for multiple myeloma have a high probability of receiving dexamethasone as part of their treatment regimen. Dexamethasone can cause a wide range of adverse events affecting many organ systems; one such side effect is ophthalmic in nature and includes blurred vision and cataract formation (Faiman et al., 2008). For that reason, patients with multiple myeloma are an at-risk population because they are or have been treated with medications that have the potential to cause ocular side effects.

### Hearing Screening

Hearing loss is one of the most common conditions affecting older adults. About 17% (36 million) American adults say that they have some degree of hearing loss. Roughly 33% of Americans ages 65–74 and 47% of those 75 and older have hearing loss. Men are

**Table 2. Vision Screening Recommendations for Adults**

AGE (YEARS)	FREQUENCY OF EVALUATION	
	ADULTS WITH NO RISK FACTORS	AT-RISK ADULTS <sup>a</sup>
Younger than 40	5–10 years	Every 2–4 years
40–54	Every 2–4 years; baseline eye screening at age 40	Every 1–3 years
55–64	Every 1–3 years	Every 1–2 years
65 or older	Every 1–2 years	Every 6–12 months

<sup>a</sup> A patient is considered to be at increased risk when the evaluation reveals signs that are suggestive of a potentially abnormal condition or when risk factors for developing ocular disease are identified but the patient does not yet require intervention (i.e., a patient with diabetes mellitus).

*Note.* Based on information from American Academy of Ophthalmology, 2005.

more likely to experience hearing loss than women (National Institute on Deafness and Other Communication Disorders, 2009). However, adults generally ignore its effects, delay their decision to seek audiologic services, and put off recommended treatment (e.g., hearing aids). For many, a hearing aid is an unwelcome reminder of the aging process or associated with a disability. A hearing aid will not restore normal hearing. Many people have unrealistic expectations and are, therefore, disappointed when difficulties arise. Finally, hearing aids are expensive and usually are not covered by health insurance, making them cost prohibitive for many patients.

Ototoxicity is commonly medication-induced; ototoxic drugs include aminoglycoside antibiotics (e.g., gentamicin), loop diuretics (e.g., furosemide), and platinum-based chemotherapy agents (e.g., cisplatin). The effects may be reversible and temporary or irreversible and permanent. Individuals receiving these medications should be aware of the potential ototoxicity and may be advised to undergo more frequent screening examinations.

Hearing screening tests provide a quick and cost effective way to separate people into two groups, pass and fail. Those who pass hearing screenings are presumed to have no hearing loss. Those who fail are in need of an in-depth evaluation by an audiologist, and also may need follow-up care from other professionals.

No screening recommendations currently exist for routine evaluation of hearing. Hearing screening is performed when requested, when conditions occur that increase risk for hearing loss, or when mandated by state or local laws. All hearing screening programs should be conducted under the supervision of an audiologist holding the American Speech-Language-Hearing Association's (ASHA) Certificate of Clinical Competence. Adults should be screened at least every 10 years through age 50 and at three-year intervals thereafter (ASHA, 2009). Most patients with multiple myeloma are older adults with a median age at diagnosis between ages 68–70. Education and communication between patients and healthcare providers is crucial. Hearing loss represents a significant barrier to accurate evaluation and management of the disease process in these individuals.

## Psychosocial

### Depression

Depression affects 19 million Americans annually, with most studies indicating that 20%–25% of patients with cancer will be afflicted at some point in their treatment (Passik, McDonald, Dugan, Edgerton, & Roth, 1997). Diagnosing depression in a patient with cancer can be challenging because various physical symptoms such as fatigue, poor appetite, and difficulty sleeping can be attributed to the disease, treatment, or depression. A clinician needs to distinguish the difference between the symptoms associated with the patient's medical illness or treatment and depressive symptoms associated with syndromal depression (McDaniel, Musselman, Porter, Reed, & Nemeroff, 1995). In the general population, depression is the most common clinical psychiatric problem in primary care (Katon et al., 2006). Although feelings of sadness and anxiety as well as other emotions are typical with the diagnosis of cancer, using the *Diagnostic and*

*Statistical Manual of Mental Disorders* fourth edition (DSM-IV) and patient history is critical when depression is suspected. Signs and symptoms of depression include persistent sadness, anxious mood, sleeping too much or too little, decreased appetite, weight loss or gain, restlessness, and feelings of despair or denial. Chronic disease such as cancer, medication side effects, gender, family history, situational events, biologic factors, and cognitive changes (e.g., poor self-esteem, negative thinking patterns) all are risk factors for depression. In addition, the role that steroids, as part of the treatment paradigm, may play in mood alteration should be considered. Risk factors for depression found to be positively correlated with advanced age include bereavement, sleep disturbance, disability, female gender, and prior history of depression.

**Screening:** Several questionnaires are available to assist the clinician in screening for depression, such as the Zung Self-Rating Depression Scale, the Center for Epidemiological Studies Depressions Scale, the Beck Depression Inventory, and the Patient Health Questionnaire (PHQ-9) (Kroenke & Williams, 2001; Woolfe, 2008). The PHQ-9 is an easy-to-use patient questionnaire that is a self-administered version of the PRIME-MD<sup>®</sup> diagnostic instrument for common mental disorders. The PHQ-9 is the depression module, which scores each of the nine DSM-IV criteria as 0 (not at all) to 3 (nearly every day). Validity has been assessed against an independent structured mental health professional interview and has been validated for use in primary care. The PHQ-9 score of 10 or higher had a sensitivity of 88% and a specificity of 88% for major depression. Assessments via telephone are even possible with this tool (Kroenke & Williams, 2001; Woolfe 2008). The PHQ-9 can be accessed at [www.phqscreeners.com](http://www.phqscreeners.com).

Once depression is diagnosed correctly, the clinician may find it necessary to start an antidepressant or may refer the patient to a specialist such as a psychiatrist who focuses on patients with cancer. Differentiating between depression and anxiety also is important. Clinicians need to improve their assessment skills when diagnosing cancer-related depression (Woolfe, 2008). The oncology social worker is a valuable resource to assist patients with related challenges of financial difficulties, such as insurance and housing issues, as well as social support. Many social workers are licensed counselors and can provide their services for patients and family members through counseling and group support sessions. The International Myeloma Foundation offers support services and groups (both online and face-to-face) and more information can be found at <http://myeloma.org/SupportGroup.action?tabId=6&menuId=0&queryPageId=7>. Despite the high prevalence of depression in patients with cancer, it often is underdiagnosed and, therefore, untreated (Portenoy & Itri, 1999).

### Fatigue

Fatigue can be a major obstacle in patients with cancer, affecting their overall quality of life. Patients describe fatigue as decreased energy, weakness, and somnolence. Fatigue can be cumulative as with radiotherapy, or can have an acute onset as with patients receiving chemotherapy (Portenoy & Itri, 1999). Patients with multiple myeloma often undergo a complicated treatment regimen that may produce fatigue (Coleman et al., 2003). Fatigue has been reported in 80%–99% of patients receiving treatment

### Resources from the International Myeloma Foundation

The International Myeloma Foundation provides information on multiple myeloma for healthcare providers and patients, including Myeloma Manager™, Personal Care Assistant™, and software designed specifically to help patients and caregivers battling multiple myeloma to track and understand their laboratory results. More information can be found at [www.myeloma.org](http://www.myeloma.org).

and may be a barrier to functional recovery (Curt et al., 2000). Patients also may experience fatigue related to depression, pain, anemia, or the chemotherapy; therefore, providers need to have good assessment skills. In a quantitative study conducted by the Fatigue Coalition of Patients Undergoing Chemotherapy, 18% reported fatigue (second to nausea) as a complaint during chemotherapy, and 25% of patients reported fatigue as the number one complaint post-treatment (Curt et al., 2000). Ninety percent of the patients that reported fatigue considered themselves active prior to their diagnosis of cancer, and 91% felt this impacted them in leading a normal life (Curt et al., 2000). A study by Stone et al. (2000) showed that fatigue has a major effect on quality of life and is underrecognized by healthcare professionals. Risk factors for fatigue include anemia, dyspnea, loss of appetite, weight loss, and pain medications.

### Cognitive Changes

Patients with cancer may experience cognitive changes also referred to as chemo brain. These changes can have an effect on processing, organizational skills, memory, concentration, and attention span, which may be mild to debilitating and last for up to 10 years (Ahles & Saykin, 2002; Tannock, Ahles, Ganz, & van Dam, 2004), affecting quality of life for the patient and his or her family members (Staat & Segatore, 2005). Exposure to chemotherapy may affect cognitive function, but it has been difficult to identify which agents exert the greatest effect. Risk factors include chemotherapy, radiation therapy, and bone marrow or stem cell transplantation.

Research continues at evaluating treatment regimens and the attendant effect on patients' cognitive function and their quality of life. Clinicians must recognize the relevant signs and symptoms and educate their patients and caregivers. The healthcare team needs to be aware of the implications that treatment has on the lives of patients. By recognizing the signs and symptoms of depression, fatigue, and cognitive changes, appropriate interventions can be made to improve the overall quality of life of patients.

**Screening:** The NLB recommends asking the following questions during routine screening at all provider encounters to detect depression or other cognitive changes: In the past two weeks, have you felt down, depressed, or hopeless? In the past two weeks, have you felt little interest or pleasure in doing things?

## Addiction and Substance Abuse

### Smoking Cessation

The problem of smoking among cancer survivors is substantial. About 20% of cancer survivors report that they currently

smoke, a rate only slightly lower than those without a history of cancer (Hewitt, Greenfield, & Stovall, 2006). Many cancer survivors are former smokers (38%) and, therefore, are at considerable risk for relapse of their smoking habit (Hewitt et al., 2006). Persistent smoking following diagnosis contributes to poor long-term outcomes. Cessation of cigarette smoking has been associated with a reduction in treatment complications, improved survival, and a decrease in risk for second cancers (Hewitt et al., 2006). Benefits of smoking cessation also include reduction in risk of cardiovascular and pulmonary disease (Hewitt et al., 2006). Current USPSTF (2010) screening recommendations for smoking include

- Screen all adults for tobacco use and provide tobacco cessation intervention for those who use tobacco products.
- Oncology providers should find “teachable moments,” and a failure to routinely assess smoking status and provide smoking cessation counseling is a lost opportunity.

Guidance on how to provide smoking cessation counseling is available and has been shown to be effective in combination with pharmacotherapy. Counseling and clinical considerations to prevent tobacco use follow (USPSTF, 2010).

- Brief tobacco cessation counseling interventions, including screening, brief counseling (three minutes or less), and/or pharmacotherapy, have proven to increase tobacco abstinence rates, although a dose-response relationship exists between quit rates and the intensity of counseling. Effective interventions may be delivered by a variety of primary care clinicians.
- The “5-A” behavioral counseling framework provides a useful strategy for engaging patients in smoking cessation discussions.
  - Ask about tobacco use.
  - Advise to quit through clear personalized messages.
  - Assess willingness to quit.
  - Assist to quit.
  - Arrange follow-up and support.

Helpful aspects of counseling include providing problem-solving guidance for smokers to quit and give social support within and outside of treatment. Common practices that complement this framework include motivational interviewing, the “5 Rs” used to treat tobacco use (relevance, risks, rewards, roadblocks, and repetition), assessing readiness to change, and more intensive counseling and/or referrals for those needing extra help.

Telephone “quit lines” have also been found to be an effective adjunct (see [www.ahrq.gov/path/tobacco.htm](http://www.ahrq.gov/path/tobacco.htm) for resources). Clinics that implement screening systems designed to regularly identify and document a patient's tobacco use status increased their rates of clinician intervention. However, limited evidence exists that supports the effect of screening systems on tobacco cessation rates.

U.S. Food and Drug Administration-approved pharmacotherapy includes several forms of nicotine replacement therapy (i.e., nicotine gum, nicotine transdermal patches, nicotine inhaler, nicotine nasal spray), sustained-release bupropion, and varenicline tablets. Other medications, including clonidine and nortriptyline, have been efficacious (Nides, 2008). Nonpharmacologic interventions such as hypnosis, acupuncture, diet aids, smoking deterrents, and low-level laser therapy have been suggested for smoking cessation. Evidence does not support improved quit rates with these

types of interventions. However, on an individual basis, these therapies may provide the patient with added confidence to be successful in their quit attempt (Williams, 2007).

Barriers to smoking cessation among patients with cancer can include strong nicotine dependence because of a long history of heavy tobacco use, fatalistic beliefs, psychological distress, and social influences such as family members who smoke. Building smoking cessation counseling into important cancer treatment care transitions has been suggested as a way to promote smoking cessation. Teachable moments for smoking cessation counseling and relapse prevention include at the time of diagnosis, during active treatment, and during transition from inpatient to outpatient care and follow-up visits. In each of these clinical settings, involvement of family members is important given the likelihood that smoking is common among the family members of patients with cancer (Hewitt et al., 2006).

Encouraging smoking cessation is particularly important in patients with multiple myeloma because the pathophysiology of the disease includes a susceptibility to infections, particularly pneumonia. Cigarette smoking and exposure to environmental tobacco smoke increase the risk of pulmonary infections in general and the risk to contract invasive pneumococcal disease by a four-fold factor (Herr et al., 2009). In addition, other pulmonary infections are more frequent in smokers, including influenza and tuberculosis (Herr et al., 2009).

Smokers usually have a lower physical endurance than nonsmokers. Smoking decreases lung capacity, whereas exercise increases it. Patients with multiple myeloma are at risk for dyspnea on exertion related to anemia and prior pulmonary infections. Smoking adds an additional burden to the exercise tolerability. Healthcare practitioners caring for patients with myeloma should screen patients for tobacco use and implement tobacco cessation counseling guidelines.

## Alcohol Misuse

Currently, about 14 million people in the United States (one in every 13 adults) abuse alcohol or are alcoholics (National Institute on Alcohol Abuse and Alcoholism, 2009) and several million more engage in risky drinking that could lead to alcohol issues (i.e., binge drinking and heavy drinking on a regular basis). In addition, 53% of men and women in the United States report that one or more of their close relatives have a drinking problem (National Institute on Alcohol Abuse and Alcoholism, 2009). Alcohol misuse includes “risky or hazardous” and “harmful” drinking, defined as more than seven drinks per week or more than three drinks per occasion for women, and more than 14 drinks per week or more than four drinks per occasion for men (National Institute on Alcohol Abuse and Alcoholism, 2009). Harmful drinking describes people who currently are experiencing physical, social, or psychological harm from alcohol use but do not meet the criteria for dependence. Alcohol abuse and dependence are associated with repeated negative physical, psychological, and social effects from alcohol (USPSTF, 2010). The following risk factors may increase an individual’s likelihood of abusing alcohol: gender (more common in men than women), family history, genetic factors, cultural factors, psychological vulnerability, and psychiatric disorders (American Psychiatric Association, 2000).

Identifying alcoholism may be difficult because no detectable physiologic difference exists between a person who drinks frequently and a person with alcoholism. Identification involves an objective assessment regarding the damage that imbibing alcohol does to the drinker’s life compared with the subjective benefits the drinker perceives from consuming alcohol. Although many cases exist where an alcoholic’s life has been significantly damaged, some borderline cases do occur that can be difficult to classify. Screening tools for detecting a loss of control of alcohol use include self-reports in questionnaire form and scores or tallies that sum up the general severity of alcohol use (National Institute on Alcohol Abuse and Alcoholism, 2009).

The CAGE questionnaire (Ewing, 1984) is one such example that may be used to screen patients quickly in a doctor’s office. Two “yes” responses indicate that the respondent should be investigated further. The questionnaire asks the following questions: Have you ever felt you needed to Cut down on your drinking? Have people Annoyed you by criticizing your drinking? Have you ever felt Guilty about drinking? Have you ever felt you needed a drink first thing in the morning (Eye-opener) to steady your nerves or to get rid of a hangover?

Other screening tools include the following.

- The Alcohol Dependence Data Questionnaire: A more sensitive diagnostic test than CAGE, it helps distinguish a diagnosis of alcohol dependence from one of heavy alcohol use.
- The Alcohol Use Disorders Identification Test: A screening questionnaire developed by the World Health Organization. This test is unique in that it has been validated in six countries and is used internationally. Like CAGE, it uses a simple set of questions with a higher score earning a deeper investigation.
- The Paddington Alcohol Test: Designed to screen for alcohol-related problems in those attending accident and emergency departments. It correlates well with the Alcohol Use Disorders Identification Test, but is administered in less time.

**Screening:** USPSTF (2010) recommends screening and behavioral counseling interventions to reduce alcohol misuse by adults, including pregnant women, in primary care settings. Patients with multiple myeloma who abuse alcohol are particularly challenging for the healthcare team. Alcohol may exacerbate many of the disease- or treatment-related symptoms. One of the most concerning is alcoholic neuropathy, which typically presents as a generalized sensorimotor polyneuropathy with numbness, weakness, and sensory ataxia. Because peripheral neuropathy can be an adverse event associated with several pharmacologic agents used to treat myeloma, it can be difficult to determine whether this is an alcohol or treatment-induced finding.

Many types of inflammation and irritation of the stomach are classified under the broad medical term gastritis. A variety of factors or conditions can cause this disorder, one of which is the consumption of alcohol. The use of certain medications, particularly corticosteroids, also may induce this condition. Because corticosteroids are drugs that are used commonly in the treatment of multiple myeloma, patients should be cautioned that concomitant alcohol consumption may exacerbate the symptoms of gastritis. Because of this, practitioners should attempt to identify patients who have problems with alcohol.

An additional concern when treating patients that abuse alcohol is the misinterpretation of laboratory data. Liver function tests (i.e., total bilirubin levels and serum transaminase values)

can be abnormal in these individuals. That may mask potential adverse events caused by drug treatments for myeloma. Some treatment regimens (e.g., those that contain bortezomib) require dose modifications for those individuals with hepatic impairment.

## Nutrition

### Iron Deficiency

Iron deficiency is the most common nutritional deficiency in the United States and the leading cause of anemia (Killip, Bennett, & Chambers, 2007). The sources of iron deficiency include blood loss (e.g., menstrual, gastrointestinal), an increase in requirement that is unmet by dietary intake (e.g., pregnancy, growth), and malabsorption (e.g., celiac disease, post-gastrectomy, vegetarian diet, poor diet, excessive use of proton pump inhibitors or antacids) (Centers for Disease Control and Prevention [CDC], 1998). Iron deficiency can lead to anemia and fatigue, impairing the ability to perform activities of daily living. Adults may complain of fatigue and weakness as well as decreased work performance, difficulty maintaining body temperature, and decreased immune function (CDC, 2002). Patients also may report glossitis. The diagnosis of anemia is made by laboratory evaluation, although a definitive diagnosis may come from a bone marrow biopsy showing low to absent iron stores. The laboratory evaluation of anemia is described in Table 3.

The current recommendations for the primary prevention of iron deficiency anemia focus on dietary intake and enhanced absorption. The recommended dietary allowance for adult men and women, who are not of childbearing potential, is 8 mg per day; women of childbearing potential should ingest 18 mg per day (Institute of Medicine Food and Nutrition Board, 2001). Heme iron is found in sources such as lean red meats, fish, and poultry, and is easier for the body to absorb. The nonheme iron sources found in plant and fortified foods are not as easy to absorb, but the process can be enhanced by ingesting an adequate amount of vitamin C during meals. Polyphenols, phytates, and

calcium also may decrease the amount of nonheme iron that can be absorbed.

The treatment of iron deficiency begins with identifying the cause. Malignant or benign lesions producing blood loss must be identified and appropriately treated. A normal dietary intake will only meet the needs of daily iron loss, but oral or parental supplementation will be required to build back stores. The most common cause of poor response to oral therapy is lack of adherence from side effects (constipation, cramping, diarrhea, or nausea) or poor absorption (concomitant antacid therapy). The side effects can be minimized by initially taking the iron with food and titrating the dose as tolerated. It typically takes six months of therapy to replete iron stores, although a rise in hemoglobin should be seen within one to two months of adequate therapy. All oral supplements should be taken between meals and spaced one to two hours from calcium or antacid ingestion. The options for iron replacement include oral iron replacement (e.g., ferrous sulfate, gluconate, fumarate, iron polysaccharide) and parenteral replacement (for those with poor absorption or intolerance to oral therapy).

No screening recommendations currently exist for routine evaluation for iron deficiency anemia outside the setting of children and women of childbearing potential. However, one of the indicators to treat asymptomatic patients with multiple myeloma is the observation of worsening anemia. Outside the setting of obvious disease progression or other indications to initiate systemic therapy, a work-up to determine the etiology of the anemia is warranted. Another indication to evaluate for the adequacy of iron stores are those patients initiating or continuing exogenous erythropoietin therapy (Katodritou, Zervas, Terpos, & Brugnara, 2008).

### Obesity

According to ACS (2006), obesity has reached epidemic proportions and, in the past 15 years, obesity rates have risen by 48%. Obesity can contribute to the development of several chronic diseases from cardiovascular to cancer. About 1% of the adult population is moving into the obese category, with a body mass index of greater than 30 kg/m<sup>2</sup> every year (Woolfe, 2008). Risk factors associated with obesity include insulin resistance, diabetes, hypertension, dyslipidemia, CHD, stroke, heart failure, cancer, and early mortality. Current screening recommendations for obesity (ACS, 2006; USPSTF, 2010) include the following.

- Screen all adult patients for obesity and offer counseling and behavior interventions.
- Balance caloric intake with physical activity.
- Eat at least five servings of fruits and vegetables daily.
- Choose whole grains over processed.
- Limit red meat intake.
- Develop healthy eating patterns.

## Miscellaneous

### Opportunistic Infections

Multiple myeloma and its treatment can increase a patient's risk of developing an infection by interfering with normal immune function. The healthcare team must monitor patients for

**Table 3. Laboratory Evaluation for Iron Deficiency Anemia**

TEST	DESCRIPTION	RESULT INTERPRETATION
Complete blood count	Evaluate the number and volume of red blood cells (hemoglobin, hematocrit, mean corpuscular volume).	Low <ul style="list-style-type: none"> <li>• Hemoglobin</li> <li>• Mean corpuscular volume</li> </ul>
Serum ferritin	Measurement of stored iron	Low
Serum iron	Measurement of iron in the blood	Low
Total iron-binding capacity	Measurement of iron-binding capacity within the serum	High
Transferrin saturation	Measurement of vacant iron-binding sites	High

*Note.* Based on information from Fischbach & Dunning, 2004.

infection and treat them appropriately. Risk factors for infection include neutropenia, poor nutrition, surgery, chemotherapy, radiation, biotherapy, or immunotherapy as well as bone marrow or stem cell transplantation. Recommendations to prevent infections include the following: monitor for signs and symptoms of infection; wash hands; avoid crowds if neutropenic; avoid anyone with fever, influenza, or other infections; maintain good dental hygiene; use prophylactic antibiotics; observe catheter care; and discuss travel plans with the healthcare team.

## Immunizations

Immunizations are an important primary prevention that should be continued even when on active treatment for cancer. For most adult patients with multiple myeloma who have received childhood vaccinations, the seasonal influenza vaccine and the pneumococcal vaccine should be administered. Varicella vaccine currently is contraindicated for immunocompromised patients because of immunosuppressive agents such as steroids and other antimyeloma therapy (Marin, Guris, Chaves, Schmid, & Seward, 2007). However, healthcare providers might consider vaccinating family members living with the patient and treating the patients with prophylactic antiviral therapy for a period of time after vaccination. After autologous or allogeneic transplantation, patients should follow the guidelines and recommendations of their transplantation center as well as their healthcare provider.

**Influenza vaccine:** For the general population, anyone with a medical condition, including those immunocompromised such as patients with multiple myeloma, should receive an annual influenza vaccination. The trivalent inactivated influenza vaccine given via intramuscular (IM) injection is the recommended vaccine for immunocompromised patients. The vaccination should be offered in early autumn, although high-risk patients can still be offered the vaccine after an outbreak is noted in the community. The CDC recommends chemoprophylaxis in individuals at high risk who are vaccinated after influenza activity has begun, those who provide care to high-risk populations, and those who have immune deficiencies (Woolfe, 2008).

**Pneumococcal vaccine:** Immunocompromised patients with multiple myeloma are at risk for developing pneumococcal disease. Two forms of the vaccination exist: the pneumococcal polysaccharide vaccine, and the pneumococcal conjugate vaccine. Those receiving the pneumococcal polysaccharide vaccine include patients age 65 or older (in Alaska, for patients living in certain high-risk areas where an increased rate of invasive disease is noted, it may be recommended for those age 50 or older) and immunocompromised patients age 2 or older. The vaccination can be administered either IM or subcutaneously and should be repeated in five years for those at greatest risk. Severe adverse events are rare with the vaccination.

**Tetanus booster:** The tetanus booster is recommended every 10 years.

**Post-transplantation vaccinations:** Patients post-transplantation remain immunocompromised for about 6–12 months and, even after immune reconstitution, they may not have continued immunity to pathogens for which immunizations have previously been given. Antibody titers to vaccine-preventable diseases decline during the one to four years after autologous or allogeneic transplantation if not revaccinated (Dykewicz, 2001).

Immunizations such as polio, tetanus toxoid, diphtheria toxoid, pneumococcus, hepatitis B, haemophilus influenzae type B conjugate, and measles, mumps, and rubella, should be initiated per the guidelines and recommendations of the transplantation center at appropriate intervals.

## Oral Hygiene

The American Dental Association's (2009) recommendations for adults for general dental care include brushing teeth twice daily, cleaning between the teeth daily with floss or an interdental cleaner, and seeing the dentist regularly for examinations (including x-rays if warranted) and professional cleaning. Most dental practices and dental insurance companies cite twice yearly visits as the minimum required to maintain good oral hygiene. The risk of osteonecrosis of the jaw associated with the use of IV bisphosphonates and recommendations for prevention, diagnosis, and treatment are discussed in Miceli et al. (2011).

Tobacco use in all forms is the biggest risk factor for oral cancer. Alcohol use combined with tobacco use increases this risk. Patients should be encouraged to avoid tobacco and to limit alcohol use to decrease their risk for oral cancer (USPSTF, 2010). Direct inspection and palpation of the oral cavity is the most commonly recommended method of screening for oral cancer, which can be provided by dentists during routine visits. However, little data exists on the sensitivity and specificity of this method and, although other screening techniques are being evaluated, they are still considered experimental.

## Summary

Health promotion and disease prevention to maintain overall wellness should begin at the time of diagnosis and follow the continuum of care throughout the patient's life span. Nurses are in a unique position to play a pivotal role in the promotion of primary and secondary prevention practices through education and collaboration with patients and their caregivers.

Patients with multiple myeloma are living longer because of the advent of new therapeutic options. Preventing comorbid conditions from occurring or worsening through education and support should enable nurses and other healthcare providers to offer patients more treatment options, resulting in improved quality and quantity of life for those living with multiple myeloma.

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## References

Ahles, T.A., & Saykin, A. (2002). Cognitive effects of standard-dose chemotherapy in patients with cancer. *Psychosocial Issues, 19*, 812–820.

- American Academy of Dermatology. (2011). The ABCDEs of melanoma. Retrieved from <http://www.aad.org/public/exams/abcde.html>
- American Academy of Ophthalmology. (2005). *Preferred practice committee. Preferred Practice Pattern® guidelines. Comprehensive adult medical eye evaluation*. San Francisco, CA: Author.
- American Cancer Society. (2006). The complete guide—Nutrition and physical activity. Retrieved from [http://www.cancer.org/docroot/PED/content/PED\\_3\\_2X\\_Diet\\_and\\_Activity\\_Factors\\_That\\_Affect\\_Risks.asp](http://www.cancer.org/docroot/PED/content/PED_3_2X_Diet_and_Activity_Factors_That_Affect_Risks.asp)
- American Cancer Society. (2008). Guidelines for the early detection of cancer. Retrieved from <http://www.cancer.org/Search/indexQueryText=Guidelines+for+the+Early+Detection+of+Cancer>
- American Cancer Society. (2009). What are the risk factors for prostate cancer? Retrieved from [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_4\\_2X\\_What\\_are\\_the\\_risk\\_factors\\_for\\_prostate\\_cancer\\_36.asp?sitearea=](http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_What_are_the_risk_factors_for_prostate_cancer_36.asp?sitearea=)
- American Cancer Society. (2010a). What are the key statistics about breast cancer? Retrieved from <http://www.cancer.org/Cancer/BreastCancer/DetailedGuide/breast-cancer-key-statistics>
- American Cancer Society (2010b). What are the risk factors for breast cancer? Retrieved from <http://www.cancer.org/Cancer/BreastCancer/DetailedGuide/breast-cancer-risk-factors>
- American Cancer Society. (2010c). What are the risk factors for colorectal cancer? Retrieved from [http://www.cancer.org/docroot/CRI/content/CRI\\_2\\_4\\_2X\\_What\\_are\\_the\\_risk\\_factors\\_for\\_colon\\_and\\_rectum\\_cancer.asp?sitearea=](http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_What_are_the_risk_factors_for_colon_and_rectum_cancer.asp?sitearea=)
- American Cancer Society. (2011a). *Cancer facts and figures, 2011*. Retrieved from <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-029771.pdf>
- American Cancer Society. (2011b). Learn about cancer: Colorectal cancer. Retrieved from <http://www.cancer.org/Cancer/ColonandRectumCancer/DetailedGuide/colorectal-cancer-risk-factors>
- American Dental Association. (2009). Manage your oral health and oral health topics. Retrieved from <http://www.ada.org/5624.aspx?currentTab=1>
- American Diabetes Association. (2011). Diabetes basics. Retrieved from [http://www.diabetes.org/diabetes-basics/?utm\\_source=WW&utm\\_medium=GlobalNavDB&utm\\_campaign=CON](http://www.diabetes.org/diabetes-basics/?utm_source=WW&utm_medium=GlobalNavDB&utm_campaign=CON)
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Speech-Language-Hearing Association. (2009). Who should be screened for hearing loss? Retrieved from <http://www.asha.org/public/hearing/Who-Should-be-Screened/>
- Badros, A.Z., Siegel, E., Bodenner, D., Zangari, M., Zeldis, J., & Barlogie, B. (2002). Hypothyroidism in patients with multiple myeloma following treatment with thalidomide. *American Journal of Medicine, 112*, 412–413. doi:10.1016/S0002-9343(01)01137-8
- Centers for Disease Control and Prevention. (1998). *Recommendations to prevent and control iron deficiency in the United States*. Retrieved from <http://www.cdc.gov/mmwr/pdf/rr/rr4703.pdf>
- Centers for Disease Control and Prevention. (2002). Iron deficiency—United States, 1999–2000. *Morbidity and Mortality Weekly Reports, 51*, 897–899.
- Chobanian, A.V., Bakris, G.L., Black, H.R., Cushman, W.C., Green, L.A., Izzo, J., . . . the National High Blood Pressure Education Program Coordinating Committee. (2003). Seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure. *Hypertension, 42*, 1206–1252. doi:10.1161/01.HYP.0000107251.49515.c2
- Coleman, E., Coon, S., Hall-Barrow, J., Richards, K., Gaylor, D., & Stewart, B. (2003). Feasibility of exercise during treatment for multiple myeloma. *Cancer Nursing, 26*, 410–419.
- Curt, G.A., Breitbart, W., Cellac, D., Groopmand, J.E., Horninge, S.J., Itrif, L.M., . . . Vogelzang, N.J. (2000). Impact of cancer-related fatigue on the lives of patients: New findings from the Fatigue Coalition. *Oncologist, 5*, 353–360. doi:10.1634/theoncologist.5-5-353
- Dimopoulos, M.A., & Eleutherakis-Papaiakovou, V. (2004). Adverse effects of thalidomide administration in patients with neoplastic diseases. *American Journal of Medicine, 117*, 508–515. doi:10.1016/j.amjmed.2004.03.040
- Dykewicz, C.A. (2001). Summary of the guidelines for preventing opportunistic infections among hematopoietic stem cell transplant recipients. *Clinical Infectious Diseases, 33*, 139–144. doi:10.1086/321805
- Ewing, J.A. (1984). Detecting alcoholism: The CAGE questionnaire. *JAMA, 252*, 1905–1907. doi:10.1001/jama.252.14.1905
- Faiman, B., Bilotti, E., Mangan, P.A., Rogers, K., & the International Myeloma Foundation Nurse Leadership Board. (2008). Consensus statement for the management of steroid-associated side effects in patients with multiple myeloma. *Clinical Journal of Oncology Nursing, 12*(3, Suppl.), 53–62. doi:10.1188/08.CJON.S1.53-62
- Fatourechi, V. (2009). Subclinical hypothyroidism: An update for primary care physicians. *Mayo Clinic Proceedings, 84*, 65–71. doi:10.4065/84.1.65
- Figaro, M.K., Clayton, W., Usuh, C., Brown, K., Kassim, A., & Lakhani, V.T. (2011). Thyroid abnormalities in patients treated with lenalidomide for hematologic malignancies: Results of a retrospective case review. *American Journal of Hematology, 86*, 467–470. doi:10.1002/ajh.22008
- Fischbach, F.T., & Dunning, M. (2004). *A manual of laboratory and diagnostic testing* (7th ed.). Philadelphia, PA: Lippincott Williams and Wilkins.
- Frame, P.S. (1996). Developing a health maintenance schedule. In S.H. Woolf, S. Jonas, & E. Kaplan-Liss (Eds.), *Health promotion and disease prevention in clinical practice* (pp. 517–530). Philadelphia, PA: Lippincott Williams and Wilkins.
- Gregerman, R.I. (2003). Thyroid disorders. In L.R. Barker, J.R. Burton, & P.D. Zieve (Eds.), *Principles of ambulatory medicine* (6th ed., pp. 1230–1252). Philadelphia, PA: Lippincott Williams and Wilkins.
- Grundy, S.M., Cleeman, J.I., Merz, C.N., Brewer, J.H., Clark, L.T., Hunninghake, D.B., . . . the Coordinating Committee of the National Cholesterol Education Program. (2004). A summary of implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III Guidelines. *Arteriosclerosis, Thrombosis, and Vascular Biology, 24*, 1329–1330. doi:10.1161/01.ATV.0000139012.45265.e0
- Herr, C., Beisswenger, C., Hess, C., Kandler, K., Suttorp, N., Welte, T., . . . The CAPNETZ Study Group. (2009). Suppression of pulmonary innate host defense in smokers. *Thorax, 64*, 144–149. doi:10.1136/thx.2008.102681
- Hewitt, M., Greenfield, S., & Stovall, E. (2006). *From cancer patient to cancer survivor: Lost in translation*. Washington, DC: The National Academies Press.
- Institute of Medicine Food and Nutrition Board. (2001). Dietary reference intakes. Retrieved from <http://books.nap.edu/openbook.php?isbn=0309072794&page=290>

- Jemal, A., Siegel, R., Xu, J., & Ward, E. (2010). Cancer statistics, 2010. *CA: A Cancer Journal for Clinicians*, *60*, 277–300.
- Katodritou, E., Zervas, K., Terpos, E., & Brugnara, C. (2008). Use of erythropoiesis stimulating agents and intravenous iron for cancer and treatment related anaemia: The need for predictors and indicators of effectiveness has not abated. *British Journal of Haematology*, *142*, 3–10. doi:10.1111/j.1365-2141.2008.07163.x
- Katon, W., Russo, J., Sherbourne, C., Craske, M., Fan, M.Y., & Roy-Byrne, P. (2006). Incremental cost-effectiveness of a collaborative care intervention for panic disorder. *Psychological Medicine*, *36*, 353–363. doi:10.1017/S0033291705006896
- Killip, S., Bennett, J.M., & Chambers, M.D. (2007). Iron deficiency anemia. *American Family Physician*, *75*, 671–678.
- Kroenke, K.S., & Williams, J.B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of Internal Medicine*, *9*, 606–613.
- Kumar, S.K., Rajkumar, S.V., & Dispenzieri, A. (2008). Improved survival in multiple myeloma and the impact of novel therapies. *Blood*, *111*, 2516–2520. doi:10.1182/blood-2007-10-116129
- Marin, M., Guris, D., Chaves, S.S., Schmid, S., & Seward, J.F. (2007). Prevention of varicella. Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morbidity and Mortality Weekly Report*, *56*(RR04), 1–40.
- McDaniel, S.J., Musselman, D.L., Porter, M.R., Reed, D.A., & Nemeroff, C.B. (1995). Depression in patients with cancer: Diagnosis, biology and treatment. *Archives of General Psychiatry*, *52*(2), 89–99.
- Menon, S., Habermann, T., & Witzig, T. (2007). Lenalidomide-associated hypothyroidism. *Leukemia and Lymphoma*, *48*, 2465–2467. doi:10.1080/10428190701704613
- Miceli, T., Colson, K., Faiman, B., Miller, K., Tariman, J.D., and the International Myeloma Foundation Nurse Leadership Board. (2011). Maintaining bone health in patients with multiple myeloma: Survivorship care plan of the International Myeloma Foundation Nurse Leadership Board. *Clinical Journal of Oncology Nursing*, *15*(4, Suppl.), 9–23.
- Millennium: The Takeda Oncology Company. (2010). *Velcade® (bortezomib)* [Product information]. Cambridge, MA: Author.
- National Cancer Institute. (2011). Surveillance Epidemiology and End Results fast facts—SEER stat fact sheets: Myeloma. Retrieved from <http://seer.cancer.gov/statfacts/html/mulmy.html#incidence-mortality>
- National Cholesterol Education Program. (2002). Third report of the National Cholesterol Education Program (NCEP) Expert Panel on the Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Final report. *Circulation*, *106*, 3143–3421.
- National Eye Institute. (2008). *Age-related eye diseases and conditions at a glance*. Retrieved from [http://www.nei.nih.gov/nehep/programs/visionandaging/materials/AgeRelatedDiseasesAtAGlance\\_508.pdf](http://www.nei.nih.gov/nehep/programs/visionandaging/materials/AgeRelatedDiseasesAtAGlance_508.pdf)
- National Eye Institute. (2010). Vision loss from eye diseases will increase as Americans age. Retrieved from <http://www.nei.nih.gov/news/pressreleases/041204.asp>
- National Heart, Lung and Blood Institute. (2002, November). *Primary prevention of hypertension: Clinical and public health advisory from the National High Blood Pressure Education Group*. Retrieved from <http://www.nhlbi.nih.gov/health/prof/hbp.pphbp.pdf>
- National Institute of Diabetes and Digestive and Kidney Diseases. (2007). National diabetes statistics, 2007. Retrieved from <http://diabetes.niddk.nih.gov/dm/pubs/statistics/#allages>
- National Institute on Alcohol Abuse and Alcoholism. (2009). Alcohol alert: Screening for alcoholism. Retrieved from <http://pubs.niaaa.nih.gov/publications/aa08.htm>
- National Institute on Deafness and Other Communication Disorders. (2009). NIH senior health: Hearing loss. Retrieved from <http://nihseniorhealth.gov/hearingloss/hearinglossdefined/01.html>
- Nides, M. (2008). Update on pharmacologic options for smoking cessation treatment. *American Journal of Medicine*, *121*(4A), S20–S31.
- Nygaard, B., Jensen, E.W., Kvetzky, J., Jarlov, A., & Faber, J. (2009). Effect of combination therapy with thyroxin (T<sub>4</sub>) and 3, 5, 3-triiodothyronine versus T<sub>4</sub> monotherapy in patients with hypothyroidism. A double-blind, randomized cross-over study. *European Journal of Endocrinology*, *161*, 895–902. doi:10.1530/EJE-09-0542
- Passik, S.D., McDonald, M.V., Dugan, J.W., Edgerton, S., & Roth, A.J. (1997). Depression in cancer patients: Recognition and treatment. *Medscape Psychiatry and Mental Health eJournal*, *2*(3).
- Portenoy, R.K., & Itri, L.M. (1999). Cancer-related fatigue: Guidelines for evaluation and management. *Oncologist*, *4*, 1–14.
- Roger, V.L., Go, A.S., Lloyd-Jones, D.M., Adams, R.J., Berry, J.D., Brown, T.M., . . . Wylie-Rosett, J. (2011). Heart disease and stroke statistics—2011 update. *Circulation*, *123*, e18–e209. doi:10.1161/CIR.0b013e3182009701
- Rome, S.I., Jenkins, B.S., Lilleby, K.E., and the International Myeloma Foundation Nurse Leadership Board. (2011). Mobility and safety in the multiple myeloma survivor: Survivorship care plan of the International Myeloma Foundation Nurse Leadership Board. *Clinical Journal of Oncology Nursing*, *15*(4, Suppl.), 41–52.
- Smith, R.A., Cokkinides, V., & Brawley, O.W. (2009). Cancer screening in the United States, 2009: A review of the current American Cancer Society guidelines and issues in cancer screening. *CA: A Cancer Journal for Clinicians*, *59*, 27–41.
- Snowden, R.V. (2010). Revised prostate cancer screening guidelines: What has—and hasn't—changed. Retrieved from [http://www.cancer.org/docroot/nws/content/nws\\_1\\_1x\\_revised\\_prostate\\_cancer\\_screening\\_guidelines\\_what\\_has\\_and\\_hasnt\\_changed.asp](http://www.cancer.org/docroot/nws/content/nws_1_1x_revised_prostate_cancer_screening_guidelines_what_has_and_hasnt_changed.asp)
- Staat, K., & Segatore, M. (2005). The phenomenon of chemo brain. *Clinical Journal of Oncology Nursing*, *9*, 713–721. doi:10.1188/05.CJON.713-721
- Stone, P., Richardson, A., Ream, E., Smith, A.G., Kerr, D.J., & Kearney, N. (2000). Cancer-related fatigue: Inevitable, unimportant, and untreatable? Results of a multi-centre patient survey. *Annals of Oncology*, *11*, 971–975. doi:10.1023/A:1008318932641
- Tannock, I.F., Ahles, T.A., Ganz, P.A., & van Dam, F.S. (2004). Cognitive impairment associated with chemotherapy for cancer: Report of a workshop. *Journal of Clinical Oncology*, *22*, 2233–2239. doi:10.1200/JCO.2004.08.094
- U.S. Preventive Services Task Force. (2010). *The guide to clinical preventive services, 2010–2011*. Agency for Healthcare Research and Quality. Retrieved from <http://www.ahrq.gov/clinic/pocketgd1011/pocketgd1011.pdf>
- Wiersinga, W.M. (2009). Do we need still more trials on T<sub>4</sub> and T<sub>3</sub> combination therapy in hypothyroidism? *European Journal of Endocrinology*, *161*, 955–959. doi:10.1530/EJE-09-0879
- Williams, J.M. (2007). Nonpharmacologic approaches to facilitate smoking cessation. *University of Tennessee Advanced Studies in Pharmacy*, *4*(8), 221–224.
- Woolfe, S. (2008). Immunizations. In S.H. Woolfe, S. Jonas, & E. Kaplan-Liss (Eds.), *Health promotion and disease prevention in clinical practice* (pp. 359–434). Philadelphia, PA: Lippincott Williams and Wilkins.