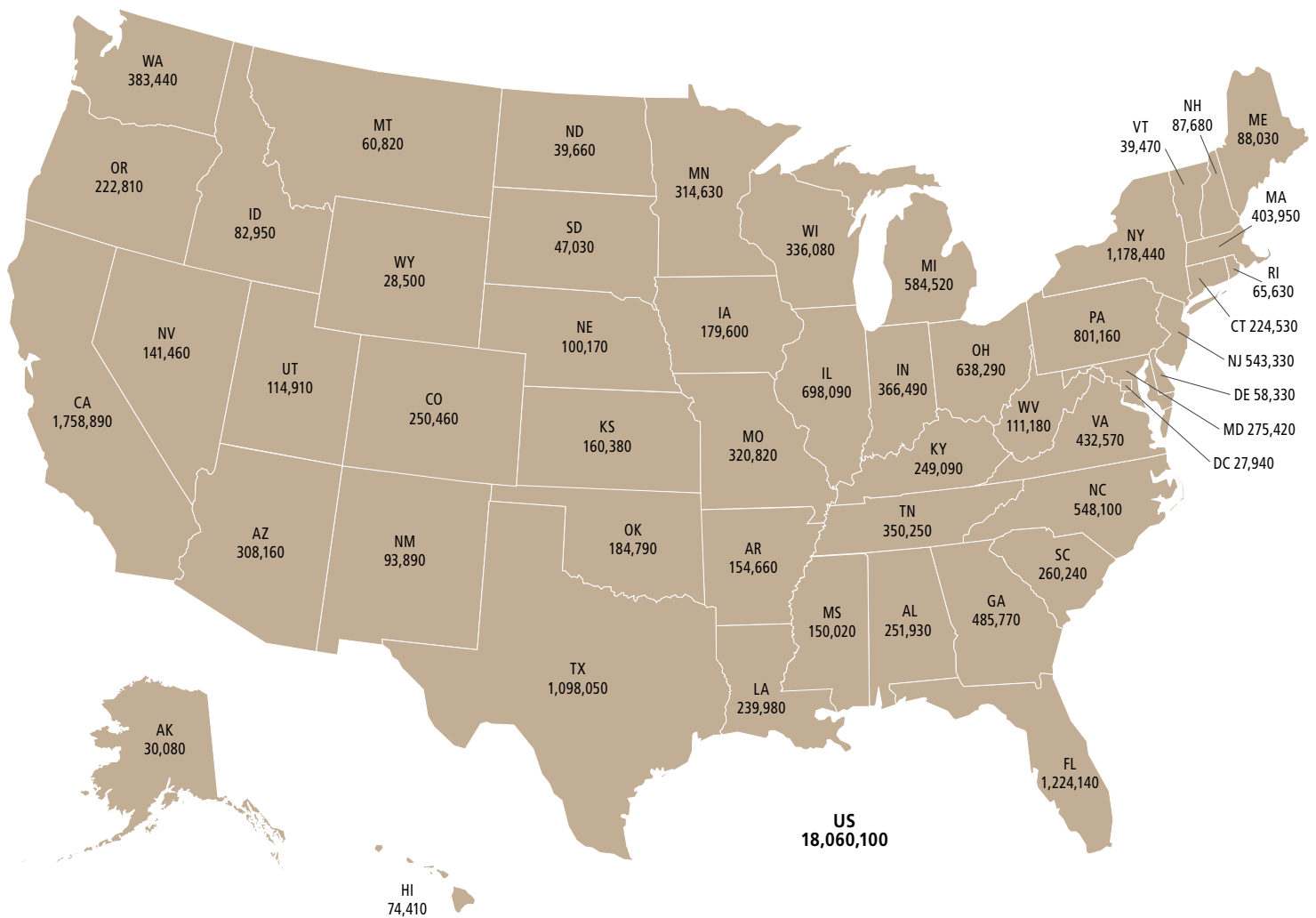


Cancer Treatment & Survivorship Facts & Figures 2022-2024

Estimated Numbers of Cancer Survivors by State as of January 1, 2022



State estimates do not sum to US total due to rounding.

Source: Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

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This publication attempts to summarize current scientific information about cancer. Except when specified, it does not represent the official policy of the American Cancer Society.

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Cancer Treatment & Survivorship Basic Facts

Introduction

The number of cancer survivors living in the United States continues to increase each year as a result of the growth and aging of the population, as well as increases in survival due to changes in early detection practices and treatment advances. Cancer survivors have a diverse range of experiences that vary by cancer type, stage at diagnosis, treatment, and individual patient characteristics and preferences. Information about current treatment patterns and survivorship issues can help the public health community better meet the unique needs of this expanding and heterogeneous population.

Research on cancer survivorship has evolved from a focus on three distinct phases (time from diagnosis to the end of initial treatment, transition from treatment to extended survival, and long-term survival) to encompass a wide range of experiences and trajectories.¹ For example, some individuals live cancer free after initial treatment while others live with cancer as a chronic disease.

This report provides current statistics on the estimated number of cancer survivors in the United States and patterns of first course of treatment. Information on the

long-term and late effects of cancer and its treatment, including recurrence and subsequent cancers, cancer financial hardship, and health behaviors among cancer survivors is also presented.

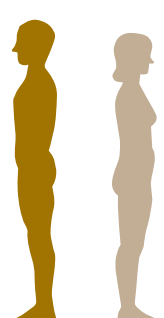
Who Are Cancer Survivors?

For simplicity, the term “cancer survivor” in this report refers to any person with a history of cancer, from the time of diagnosis through the remainder of their life. However, many people with a history of cancer do not identify with the term “cancer survivor.”^{1,2}

How Many People Have a History of Cancer?

The total number of people who have ever been diagnosed with cancer in a given population at a specific point in time is referred to as *cancer prevalence*. An estimated 18 million individuals with a history of cancer were alive on January 1, 2022, in the United States. This estimate does not include carcinoma in situ (noninvasive cancer) of any site except urinary bladder, nor does it include basal cell or squamous cell skin cancers. This estimate also does not account for the impact of the novel coronavirus 2019 (COVID-19) pandemic on cancer occurrence and survivorship, as it is based on observed cancer incidence and survival data available through 2018. (See COVID-19 and Cancer Survivors, [page 5](#).)

Figure 1. Estimated Number of US Cancer Survivors by Site as of January 1, 2022

Male			Female	
Prostate	3,523,230		Breast	4,055,770
Melanoma of the skin	760,640		Uterine corpus	891,560
Colon & rectum	726,450		Thyroid	823,800
Urinary bladder	597,880		Melanoma of the skin	713,790
Non-Hodgkin lymphoma	451,370		Colon & rectum	710,670
Kidney & renal pelvis	376,280		Non-Hodgkin lymphoma	394,180
Oral cavity & pharynx	311,200		Lung & bronchus	367,570
Testis	303,040		Uterine cervix	300,240
Leukemia	300,250		Ovary	246,940
Lung & bronchus	287,050		Kidney & renal pelvis	230,960
All sites	8,321,200		All sites	9,738,900

Estimates do not include in situ carcinoma of any site except urinary bladder and do not include basal cell or squamous cell skin cancers. Estimates should not be compared to previous years because they are model-based projections. (See Sources of Statistics, page 36).

Source: Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

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Currently, cancers of the prostate, melanoma of the skin, and colon and rectum (colorectum) are the three most prevalent among males, whereas cancers of the breast, uterine corpus, and thyroid are most prevalent among females (Figure 1). The majority of cancer survivors (69%) were diagnosed 5 or more years ago, and 18% were diagnosed 20 or more years ago (Table 1). Two-thirds of survivors (67%) are 65 years of age or older, while only 1 in 10 are younger than 50 years of age (Table 2), with considerable variation by cancer type (Figure 2).

Cancer Treatment and Common Side Effects

The goals of treatment are to “cure” the cancer, if feasible (i.e., no evidence of disease); prolong survival; and provide

the highest possible quality of life during and after treatment. Some cancers are not curable, often because they are diagnosed at an advanced stage. However, some advanced cancers, such as some metastatic breast cancer, can be treated as a chronic disease.

There are many types of cancer treatment. *Localized therapies* are limited to specific parts of the body and include surgery, radiation, and cryotherapy or ablation, which damage cancer cells using cold or hot temperature or chemicals. *Systemic therapies*, which may be used alone or in combination with localized therapy, are drugs that travel through the bloodstream and potentially affect all body parts (e.g., chemotherapy, hormonal therapy, immune therapy, and targeted therapy). *Supportive therapies* do not directly treat cancer but

Table 1. Estimated Number of US Cancer Survivors by Sex and Years Since Diagnosis as of January 1, 2022

Years since diagnosis	Male and Female			Male			Female		
	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent
0 to <5 years	5,540,240	31%	31%	2,737,850	33%	33%	2,802,390	29%	29%
5 to <10 years	3,996,380	22%	53%	1,932,820	23%	56%	2,063,560	21%	50%
10 to <15 years	3,045,330	17%	70%	1,446,540	17%	74%	1,598,790	16%	66%
15 to <20 years	2,170,060	12%	82%	996,590	12%	85%	1,173,480	12%	78%
20 to <25 years	1,405,250	8%	89%	598,880	7%	93%	806,370	8%	87%
25 to <30 years	841,830	5%	94%	314,560	4%	96%	527,280	5%	92%
30+ years	1,061,010	6%	100%	293,970	4%	100%	767,040	8%	100%

Note: Percentages may not sum to 100% due to rounding.

Source: Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

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Table 2. Estimated Number of US Cancer Survivors by Sex and Age at Prevalence as of January 1, 2022

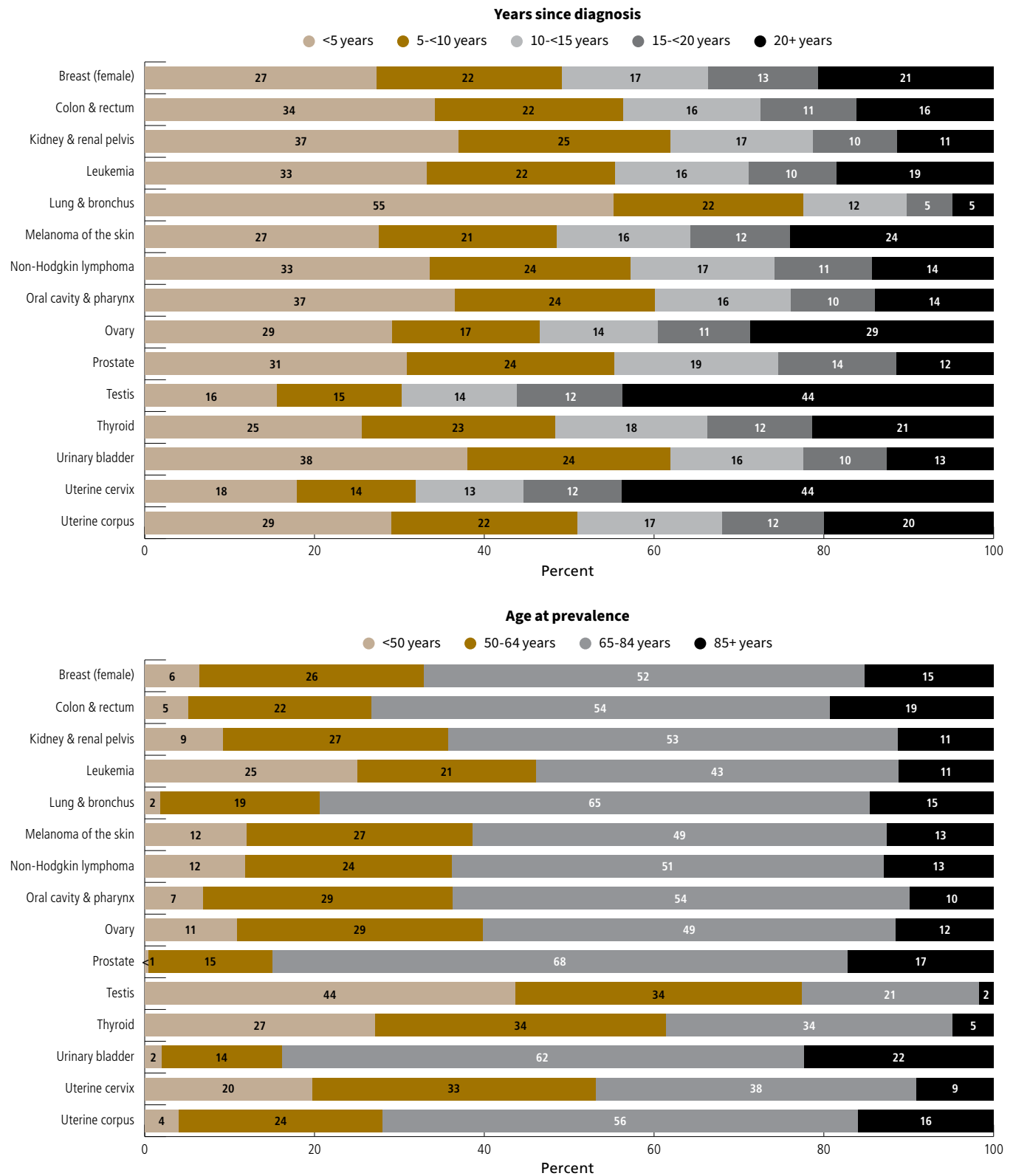
Age at prevalence	Male and Female			Male			Female		
	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent	Number	Percent	Cumulative Percent
All ages	18,060,100	100%		8,321,200	100%		9,738,900	100%	
0-14 years	69,920	<1%	<1%	35,060	<1%	<1%	34,870	<1%	<1%
15-19 years	49,120	<1%	1%	24,580	<1%	1%	24,540	<1%	1%
20-29 years	193,220	1%	2%	93,510	1%	2%	99,700	1%	2%
30-39 years	443,750	2%	4%	184,050	2%	4%	259,700	3%	4%
40-49 years	930,710	5%	9%	334,080	4%	8%	596,630	6%	10%
50-59 years	2,290,540	13%	22%	894,990	11%	19%	1,395,550	14%	25%
60-69 years	4,576,230	25%	47%	2,116,080	25%	44%	2,460,150	25%	50%
70-79 years	5,263,910	29%	77%	2,669,340	32%	76%	2,594,570	27%	77%
80+ years	4,242,690	24%	100%	1,969,520	24%	100%	2,273,180	23%	100%
0-19 years	119,040	<1%	<1%	59,640	<1%	<1%	59,410	<1%	<1%
20-64 years	5,902,960	33%	33%	2,413,690	29%	30%	3,489,260	36%	36%
65+ years	12,038,100	67%	100%	5,847,870	70%	100%	6,190,230	64%	100%

Note: Percentages may not sum to 100% due to rounding.

Source: Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

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Figure 2. Distribution (%) of Survivors for Selected Cancers by Years Since Diagnosis and Age at Prevalence as of January 1, 2022, US.



Percentages may not sum to 100% due to rounding.

Source: Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute.

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are used to address treatment-related side effects and improve quality of life (e.g., medications to reduce nausea or protect against organ damage from chemotherapy or radiation). For some slow-growing cancers, immediate treatment may be deferred as the cancer is monitored over time (i.e., active surveillance). This approach is used for some less aggressive blood cancers and low-risk prostate cancer.

Cancer treatments work through many different mechanisms. For example, radiation therapy uses high-energy beams or particles to kill cancer cells and may be delivered from a source outside the body (as in external beam radiation) or placed internally (e.g., brachytherapy). Chemotherapy drugs generally attack cells that grow quickly, as cancer cells do, but may also affect normal, rapidly growing cells, like hair follicles. Hormonal therapy works by blocking or decreasing the level of the body's natural hormones that sometimes act to promote cancer growth (e.g., certain types of breast cancer). Targeted therapies work by attacking specific proteins on cancer or nearby cells that help them grow, whereas immunotherapy stimulates the patient's immune system to attack the cancer.

Side effects that arise during treatment improve afterward for many patients but persist for others.³ Cancer rehabilitation may improve many side effects and late effects of treatment, such as lymphedema after breast cancer surgery, which may arise months or even years later.⁴ (See Cancer Rehabilitation, [page 25](#).)⁴ Although there is much variation in the prevalence and severity of side effects from person to person and by cancer type and treatment, the most common are pain, fatigue, and emotional distress.^{3,5,6} However, information on long-term and late side effects at the population level is sparse. Efforts to facilitate surveillance of long-term and late effects by linking information on health-related quality of life and patient-reported outcomes with population-based cancer registry data are underway.^{7,8} General information on side effects of treatment for specific cancer types is described in Selected Cancers beginning on [page 7](#). Additional information on side effects, including patient tools to assist with monitoring effects as they arise, is available on [cancer.org \(cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html\)](https://cancer.org/treatment/treatments-and-side-effects/physical-side-effects.html).

Factors That Influence Cancer Survival

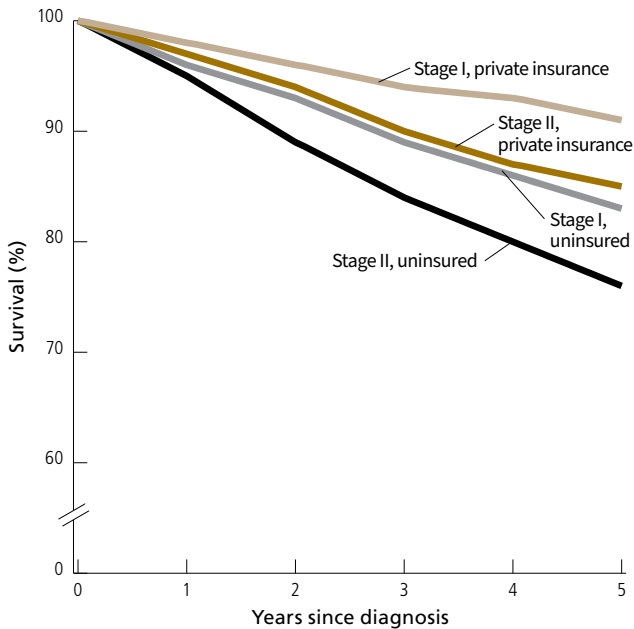
In this report, cancer survival is presented in terms of 5-year relative survival, which is the percentage of patients alive five years after diagnosis after adjustment for normal life expectancy. Although the majority of people who succumb to their cancer die within 5 years of diagnosis, 5-year relative survival does not represent the proportion of patients who are cured because some people die after 5 years. See Sources of Statistics, [page 36](#), for more information about the calculation of survival statistics herein.

In addition to cancer type, cancer survival is influenced by patient age and stage at diagnosis, socioeconomic status, treatment, health insurance coverage, competing health conditions, distance to and type of treatment facility, and financial resources. Many of these factors determine a patient's access to high-quality cancer care, which substantially increases the likelihood of longer survival and higher quality of life. Inadequate health insurance coverage is a major barrier to receipt of timely and appropriate care.^{9,10} For example, uninsured patients diagnosed with stage I colorectal cancer have lower survival than stage II colorectal cancer patients with private insurance ([Figure 3](#)).

Other factors that influence cancer survival include physician and patient attitudes, beliefs, preferences, and implicit or explicit biases, which can affect the type of treatment received.¹¹ Living in a poorer neighborhood, independent of an individual's socioeconomic status, has also been linked to lower survival for some cancers, reflecting disparities in the number of accessible physicians and treatment centers, built environments (e.g., fewer community opportunities for physical activity), social support networks, and other neighborhood resources.¹²

Although 5-year relative cancer survival has increased over the past several decades because of improvements in treatment and earlier diagnosis, Black people continue to have lower survival rates than White people for most cancer types.¹³ Due to long-standing structural racism and discrimination that have limited access to education, employment opportunities, intergenerational transfer of

Figure 3. Disparities in Observed Colorectal Cancer Survival by Insurance Status and Stage, Ages 45-64 Years, 2013-2017



Patients were diagnosed during 2013 to 2017 and followed through 2019.
 Source: National Cancer Data Base, 2021.
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wealth, and economic mobility for Black individuals in the United States, many of the most important social determinants of health continue to be closely associated with race.^{14, 15} Similarly, because the Social Security Act of 1935 created a system of employment-based health insurance coverage that interacts with discriminatory hiring practices and systemic barriers to employment opportunities, health insurance coverage status also continues to be closely associated with race in the US. Compared to Whites, Black people are more likely to be underinsured or uninsured and are as a result more likely to be diagnosed at a later stage for most cancer types (Figure 4). Recent studies have confirmed that insurance differences account for a substantial proportion of the survival disparity between Black and White cancer patients after accounting for age, stage, and other clinical factors.^{16, 17}

COVID-19 and Cancer Survivors

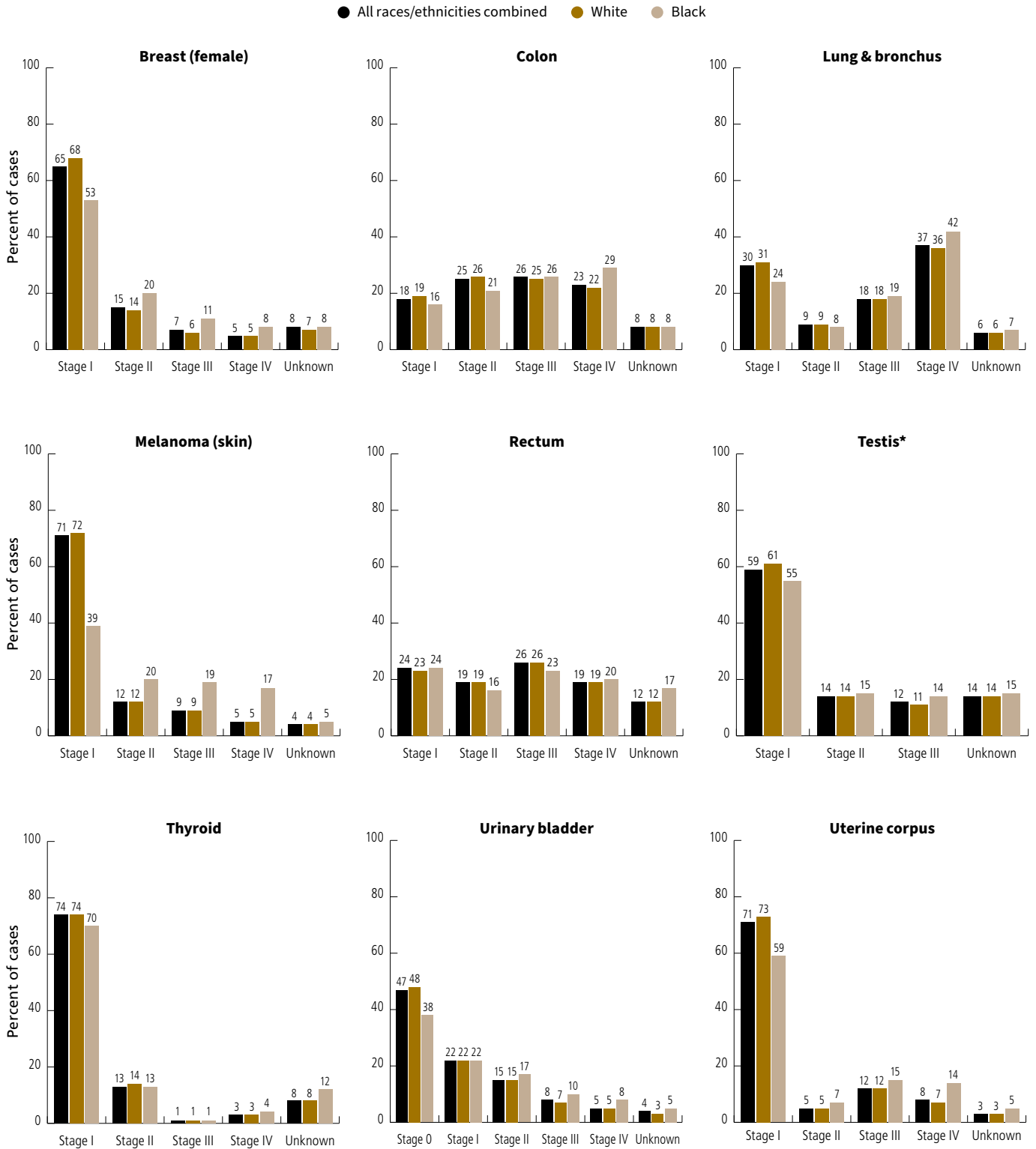
People with active cancer are generally more susceptible to infectious agents because of an impaired immune system due to the cancer itself and/or its treatment (e.g., surgery

and chemotherapy). As such, people with cancer have both a higher risk of becoming infected with coronavirus disease 2019 (COVID-19) and a higher risk of severe illness if infected,¹⁸ especially individuals with lung and hematological cancers (e.g., leukemia, lymphoma) or those who have undergone treatment in the past month. Other factors that have been consistently linked with increased risk of severe disease and/or death in cancer patients mirror those in the general population, and include male sex, older age (≥ 60 years of age), a history of smoking, obesity, hypertension, cardiovascular disease, and diabetes.

Fear of an increased risk of COVID-19 or severe illness among cancer survivors has further complicated access-to-care challenges across the cancer spectrum. These challenges include an overwhelmed health care system, as well as individual-level factors such as loss of employment and/or health insurance coverage and a decrease in access to normal support systems. In one meta-analysis, about one-fourth of cancer patients followed over time experienced treatment delays as a result of the pandemic, largely because of provider- or system-related causes, such as reduced provider availability and supply chain issues.¹⁹ While many delays are related to radiotherapy or chemotherapy care, one study of Medicare recipients also suggested that surgical procedures also declined in the first few months of the pandemic.²⁰ Although preliminary data are available, it is still too early to know the extent to which COVID-related treatment delays will influence cancer survival.²¹⁻²³

For those transitioning to long-term care in the COVID-19 era, the pandemic has substantially impeded the already difficult process of finding a “new normal” as a cancer survivor. Posttreatment survivors have experienced reduced contact with health care providers; increased financial concerns; a rise in unhealthy behaviors associated with increased cancer risk, such as physical inactivity, smoking, and alcohol use; and elevated anxiety and depression.²⁴⁻²⁶ In one study of older breast cancer survivors and individuals without a history of cancer, loneliness increased similarly in both groups from before to during the first wave of the pandemic and was associated with similar degrees of worsening depression and anxiety in both groups.²⁷ While some survivors have avoided medical care due to fears of

Figure 4. Stage Distribution (%) by Race and Cancer Type, 2018



White and Black race excludes persons of Hispanic ethnicity. Stage is based on the American Joint Committee on Cancer's (AJCC) Cancer Staging Manual 8th edition for all cases except testicular cancer patients diagnosed 2014-2017, to whom the 7th edition was applied.

*Testicular cancer does not have a stage IV classification and is based on patients diagnosed during 2014-2018.

Source: National Cancer Data Base, 2021.

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contracting the virus, a substantial proportion – especially those who are younger – have deferred care to cope with income loss, increased debt, and/or less job security as a result of the pandemic.²⁸

In response to some of these challenges, several organizations have released recommendations regarding appropriate triaging and treatment of cancer patients during the pandemic.^{29,30} In addition, telehealth, which is provider care outside a clinician’s office via telephone or video, has expanded rapidly in response to the demand for socially distanced, limited-exposure care.³¹ One

meta-analysis found that telehealth has been used successfully for improving cognitive function and fatigue among survivors, but evidence is more limited for its use for the surveillance of new cancers or recurrences.³² In the same study, general feasibility and patient adherence to telehealth interventions were high, but some patients experienced barriers such as low technology literacy, a lack of trust in technology, and perceived ethical or security concerns. In addition, many studies included in the analysis cited a lack of evidence-based provider guidelines for telehealth as an important limitation.

Selected Cancers

This section contains information about first course of treatment, survival, and common short- and long-term health effects for the most prevalent cancers. Treatment disparities are presented by race/ethnicity for cancers of the female breast, colon, rectum, lung, and uterine corpus.

Breast (Female)

It is estimated that there were more than 4 million women living in the US with a history of invasive breast cancer as of January 1, 2022, and an additional 287,850 women will be newly diagnosed in 2022. The total number of survivors includes more than 150,000 women living with metastatic breast cancer, three-fourths of whom were originally diagnosed with stage I-III disease.³³ One-third of female breast cancer survivors are younger than 65 years of age, reflecting the relatively young median age at diagnosis (63 years).

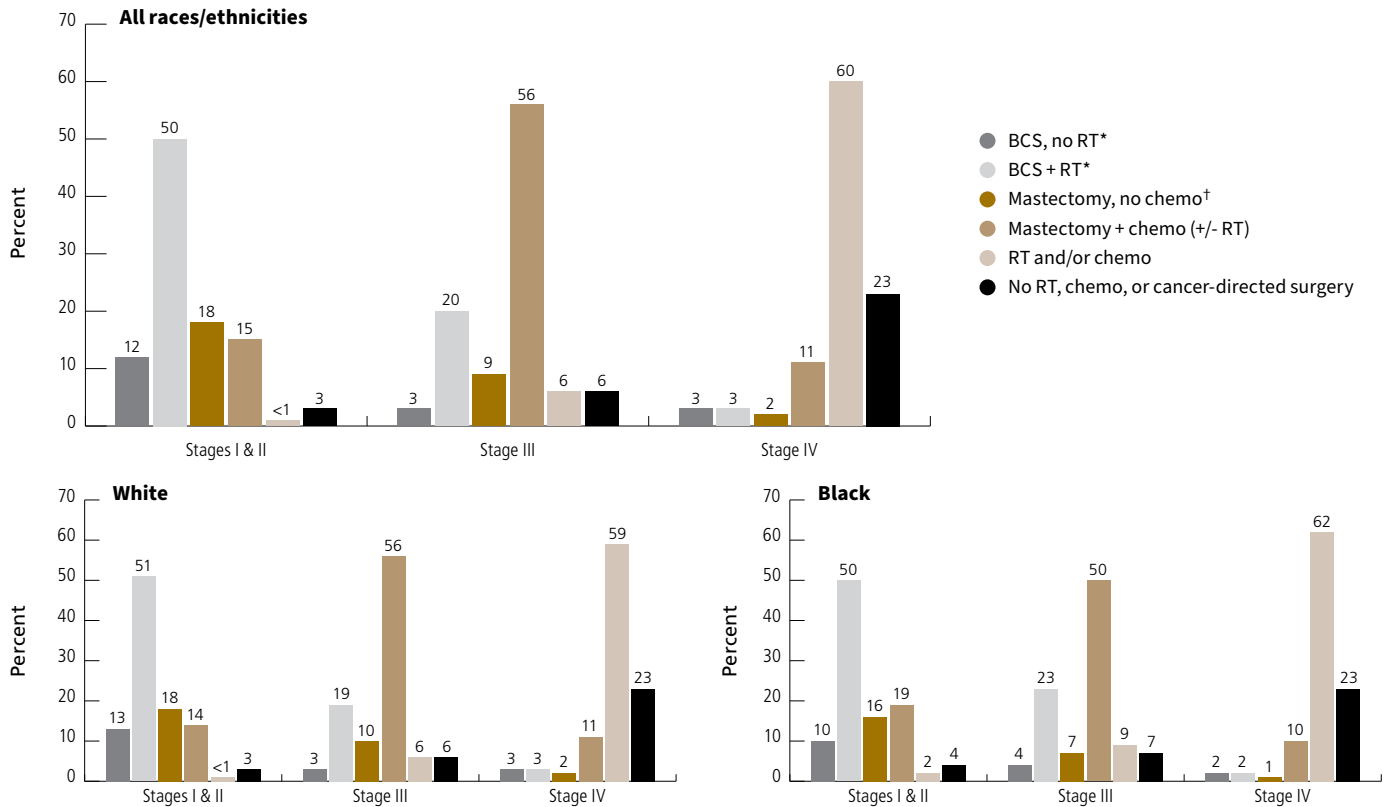
Treatment and survival

Half of women with stage I or II breast cancer undergo breast-conserving surgery (BCS, i.e., lumpectomy/partial mastectomy, in which only cancerous tissue plus a surrounding layer of normal tissue is removed) followed by radiation therapy, whereas mastectomy (surgical removal of the breast) followed by chemotherapy is most common among women with stage III disease (56%)

(Figure 5). Black women are less likely than White women to receive BCS (with or without radiotherapy) for stage I-II disease (60% versus 64%, respectively) and to receive mastectomy for stage III disease (57% versus 66%). Women diagnosed with stage IV disease typically receive radiation and/or chemotherapy without surgery (60%). Most women (84%) with hormone-receptor (HR) positive disease also receive hormonal therapy, although receipt is lower for advanced disease and among Black women (Figure 6). Nearly one-fourth (23%) of stage IV patients do not receive chemotherapy (including immunotherapy or targeted drugs), radiation, or surgery (Figure 5), although some of these patients who have HR-positive disease receive hormonal therapy.

Long-term survival for stage I-II patients treated with BCS followed with radiation to the breast is the same as that for treatment with mastectomy alone.^{34,35} However, some patients require mastectomy because of tumor characteristics, such as locally advanced-stage, large or multiple tumors, or because they are unable to receive radiation treatment because of preexisting medical conditions, previous receipt of breast radiation, or other obstacles (e.g., limited transportation to treatment). Additionally, not all women treated with BCS benefit from adjuvant radiation therapy, such as older women (≥ 70 years of age) with early-stage, HR-positive disease.^{36,37}

Figure 5. Female Breast Cancer Treatment Patterns by Stage, 2018



White and Black race excludes persons of Hispanic ethnicity. BCS = breast conserving surgery, i.e., lumpectomy/partial mastectomy, in which only cancerous tissue plus a surrounding layer of normal tissue is removed; Mastectomy = surgical removal of the entire breast(s); RT = radiation therapy; Chemo = chemotherapy and includes targeted therapy and immunotherapy. *A small number of these patients receive chemotherapy. †A small number of these patients receive radiation therapy. NOTE: Many patients may have received hormonal therapy in addition to the above treatments. See Sources of Statistics, page 36, for information about hormonal therapy receipt.

Source: National Cancer Data Base, 2021.

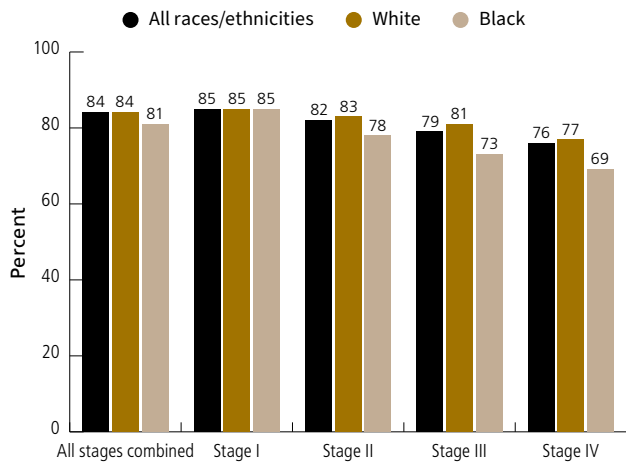
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Despite similar survival when combined with radiation, BCS-eligible patients are increasingly electing mastectomy for a variety of reasons, including reluctance to undergo radiation therapy, fear of recurrence, recent advances in reconstructive procedures, and a desire for symmetry.³⁸⁻⁴⁰ Younger women (those under 40 years of age) and patients with larger and/or more aggressive tumors are more likely to undergo unilateral mastectomy (removal of the affected breast), sometimes with contralateral prophylactic mastectomy (CPM, removal of the unaffected breast).^{41, 42} The percentage of women with early-stage disease in one breast who also underwent CPM increased rapidly from <2% in 1998 to 28%-30% of all mastectomies in 2012-2013.⁴² This trend appears to have leveled off in recent years among patients with small tumors, likely in part because of advocacy campaigns to reduce breast cancer overtreatment.^{42, 43} Although CPM nearly eliminates the

risk of developing a new breast cancer, it does not improve long-term breast cancer survival for most women and is also associated with potential harms.⁴⁴⁻⁴⁶

Women who undergo mastectomy may elect to have breast reconstruction, either with a saline or silicone implant, tissue taken from elsewhere in the body, or a combination of the two. Discussions about breast reconstruction should begin prior to mastectomy because the reconstruction process sometimes begins during the mastectomy surgery. One study found that the proportion of women receiving mastectomies who underwent immediate reconstructive procedures more than doubled between 2004 (18%) and 2013 (41%).⁴⁷ Part of the increase may reflect the parallel rise in women who undergo CPM and are more likely to receive immediate reconstruction.^{39, 48}

Figure 6. Hormonal Therapy Receipt among Hormone-Receptor Positive Female Breast Cancer Patients, 2018



White and Black race excludes persons of Hispanic ethnicity.

Source: National Cancer Data Base, 2021.

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The benefit and timing of systemic therapy is dependent on multiple factors, such as the size of the tumor, the number of lymph nodes involved, the risk of recurrence, and the presence of estrogen or progesterone hormone receptors (referred to as ER or PR positive tumors) and/or human epidermal growth factor receptor 2 (HER2) overexpression on the cancer cells. More than two-thirds of breast cancers test positive for hormone receptors⁴⁹ and can be treated with hormonal therapy. For non-metastatic breast cancer, hormonal therapy may be started before surgery to shrink the cancer (neoadjuvant) but is more often started after other treatments are completed (adjuvant). Premenopausal women are generally treated with tamoxifen unless they are at high risk of recurrence, for whom ovarian suppression (therapy that causes the ovaries to produce less estrogen) in addition to either tamoxifen or an aromatase inhibitor is recommended.⁵⁰ For postmenopausal women, aromatase inhibitors are the preferred hormonal treatment. Other hormonal therapy drugs and/or targeted drugs (e.g., CDK4/6 inhibitors for hormone receptor-positive, HER2-negative disease)⁵¹ are available for treatment of advanced disease. Triple-negative tumors are commonly treated with chemotherapy, sometimes in combination with targeted drugs based on tumor characteristics. Although several new therapies have been approved, advances for this subtype continue to lag because of the disease's molecular heterogeneity.⁵²⁻⁵⁴

The overall 5-year relative survival for breast cancer in women is 90%.⁵⁵ Five-year relative survival approaches 100% for women diagnosed with stage I breast cancer and declines to 28% for patients diagnosed with stage IV disease.⁵⁶ In addition to stage and patient age, other clinical factors that influence breast cancer survival include tumor grade, hormone receptor status, and HER2 status. Female breast cancer survival has increased over time due to earlier detection from widespread mammography use and improvements in treatment, particularly for hormone-receptor positive and HER2 positive tumors.⁵⁷ However, compared to White women, Black women remain less likely to be diagnosed at earlier stages (e.g., 53% versus 68% with stage I; Figure 4). Further, Black women have lower 5-year survival for every stage, with the largest disparity for advanced disease (stage III: 65% versus 77%; stage IV: 19% versus 30%).⁵⁶ These racial disparities are complex but largely explained by individual and neighborhood socioeconomic disparities that result in less access to high-quality medical care and equitable treatment.^{16, 17, 58} However, research has demonstrated that treatment disparities persist for Black patients at all levels of socioeconomic status.⁵⁹ Other contributing factors include a higher incidence of comorbidities and aggressive tumor characteristics among Black women, such as a higher prevalence of triple-negative disease,¹⁶ although Black women have lower survival for every molecular subtype.^{49, 60, 61}

Short- and long-term health effects

Lymphedema of the arm is swelling caused by removal of or damage to underarm lymph nodes during breast cancer surgery or radiation therapy that can develop soon after treatment or years later. The risk of chronic lymphedema has been estimated to be about 20% in women undergoing axillary lymph node dissection,⁶² but may be greatly reduced through ongoing surveillance and early management of the condition. One meta-analysis that examined the efficacy of this approach found a cumulative incidence of lymphedema of 6% among women who underwent axillary lymph node dissection,⁶³ Some evidence suggests that certain exercises, when supervised by a trained professional, and other forms of cancer rehabilitation, such as compression sleeves, may reduce the risk and lessen the severity of lymphedema.^{64, 65} Other

long-term local effects of surgical and radiation treatment include numbness, tingling, and tightness in the chest wall, arms, or shoulders. Recent studies suggest that about one-third of women develop persistent pain after breast cancer surgery or radiation therapy,⁶⁶ with younger women and those who underwent axillary lymph node dissection having higher risk.⁶⁷

Sexual dysfunction and impaired fertility are important concerns for breast cancer survivors but often go unaddressed.⁶⁸ Hormonal treatments for breast cancer can cause menopausal symptoms, such as hot flashes, night sweats, and vaginal dryness, which can lead to pain during intercourse. Younger breast cancer patients may experience impaired fertility;⁶⁹ as such, fertility preservation should be discussed prior to initiating treatment. Recent studies have suggested that fertility preservation prior to breast cancer treatment does not significantly increase all-cause or breast-cancer specific mortality or recurrence, despite the potential for modest treatment delays.⁷⁰⁻⁷²

Breast cancer survivors may also experience temporary or long-term cognitive impairments, anxiety, and fatigue.⁷³ Negative body image affects an estimated 15% to 30% of long-term survivors, particularly those who receive mastectomy without reconstruction,⁷⁴ younger patients, and those who receive CPM.⁷⁵ In addition, some breast cancer treatments increase the risk of systemic long-term and late effects (e.g., heart disease). The American Society for Clinical Oncology has issued guidelines for the prevention and monitoring of cardiovascular problems associated with some breast cancer treatments (e.g., high-dose radiation therapy to the chest, HER2 targeted drugs).⁷⁶ Survivors who undergo premature menopause are at increased risk of osteoporosis;⁷⁷ treatment with aromatase inhibitors, generally reserved for postmenopausal women, can also cause osteoporosis, as well as muscle pain and joint stiffness/pain.⁷⁸ Tamoxifen can slightly increase the risk of endometrial cancer (cancer of the lining of the uterus) and blood clots.⁷⁹

For more information about breast cancer, see *Breast Cancer Facts & Figures*, available online at [cancer.org/statistics](https://www.cancer.org/statistics).

Cancers in Children and Adolescents

It is estimated that there were 69,920 cancer survivors ages 0-14 years (children) and 49,120 survivors ages 15-19 years (adolescents) living in the US as of January 1, 2022, and an additional 10,470 children and 5,480 adolescents will be diagnosed in 2022. Leukemia survivors account for more than one-fifth of all cancer survivors younger than 20 years of age.⁵⁵ When combined with adult survivors, there are close to 400,000 survivors of childhood and adolescent cancer, reflecting the relatively high survival rates for many of these cancers in recent decades.⁸⁰

Treatment and survival

Pediatric cancers – those that most commonly occur in children – are often treated in specialized centers with a coordinated team of experts, including pediatric oncologists, surgeons, and nurses; social workers; child life specialists; and psychologists. It is usually most appropriate for adolescents diagnosed with pediatric cancers to be treated at pediatric facilities or by pediatric specialists rather than by adult-care specialists, partly because they may be more likely to offer the opportunity for participation in clinical trials.^{81,82} Studies have shown that adolescent patients diagnosed with acute lymphocytic leukemia (ALL) have better outcomes on pediatric than adult protocols, particularly when treated in experienced pediatric oncology settings.^{83,84} However, teen patients with cancers that are more common among adults, such as breast, melanoma, testicular, and thyroid, may be more appropriately treated by adult-care specialists.⁸²

For all childhood and adolescent cancers combined (excluding benign and borderline brain tumors), the 5-year relative survival rate increased from 58% during 1975-1977 to 85% during 2011-2017 among children and from 68% to 86% among adolescents due to new and improved treatments.^{55,85} However, survival varies considerably depending on cancer type, patient age, and other characteristics. The overall survival rate among adolescents is heavily influenced by high survival for thyroid cancer (>99%) and Hodgkin lymphoma (97%), masking lower survival than children for several cancers, including acute lymphocytic leukemia (76% versus 92%)

and Ewing sarcoma (59% versus 76%). (For more childhood and adolescent cancer survival rates, see the Cancer Statistics Center at cancerstatisticscenter.cancer.org.)

Short- and long-term health effects

People with a history of childhood or adolescent cancer can experience treatment-related side effects for the remainder of their lives. Aggressive treatments, especially those used in the 1970s and 1980s, have resulted in many late effects, including an increased risk of subsequent cancers. A large follow-up study of pediatric cancer survivors found that almost 10% developed a subsequent cancer (most commonly female breast, thyroid, and bone) over the 30-year period following initial diagnosis.⁸⁶ Another study found that 50% of these survivors had developed a severe or life-threatening chronic health condition by 50 years of age.⁸⁷ More than half of children exposed to cancer treatments potentially toxic to the heart or lungs (e.g., chest radiation and anthracyclines) develop issues with these organs.⁸⁸

Sexual and psychosocial long-term and late effects are also important concerns for childhood and adolescent cancer survivors. High doses of chemotherapy have been associated with lower fertility, especially in male survivors,⁸⁹ and pelvic radiation increases risk for premature menopause among female survivors.⁹⁰ Compared to women without a history of cancer, female survivors of childhood cancer are also more likely to experience serious cardiac problems during pregnancy as well as preterm birth.⁹¹ Some treatments may result in developmental delays and negatively impact mental health and achievement of social and educational goals.⁹² For example, in one long-term study, young adult survivors of childhood cancer who had impairment to their central nervous system or sensory functioning as a result of cancer had slightly lower educational attainment, were more likely to be unemployed, and were less likely to be married compared to people without a history of cancer.⁹³

It is essential that pediatric cancer survivors are monitored for long-term and late effects. The Children's Oncology Group (COG), a National Cancer Institute-supported clinical trials group that cares for more than 90% of US children and adolescents diagnosed with

cancer, has developed long-term follow-up guidelines for managing late effects in survivors of childhood cancer. Visit the COG website at survivorshipguidelines.org for more information on childhood cancer management.

Colon and Rectum

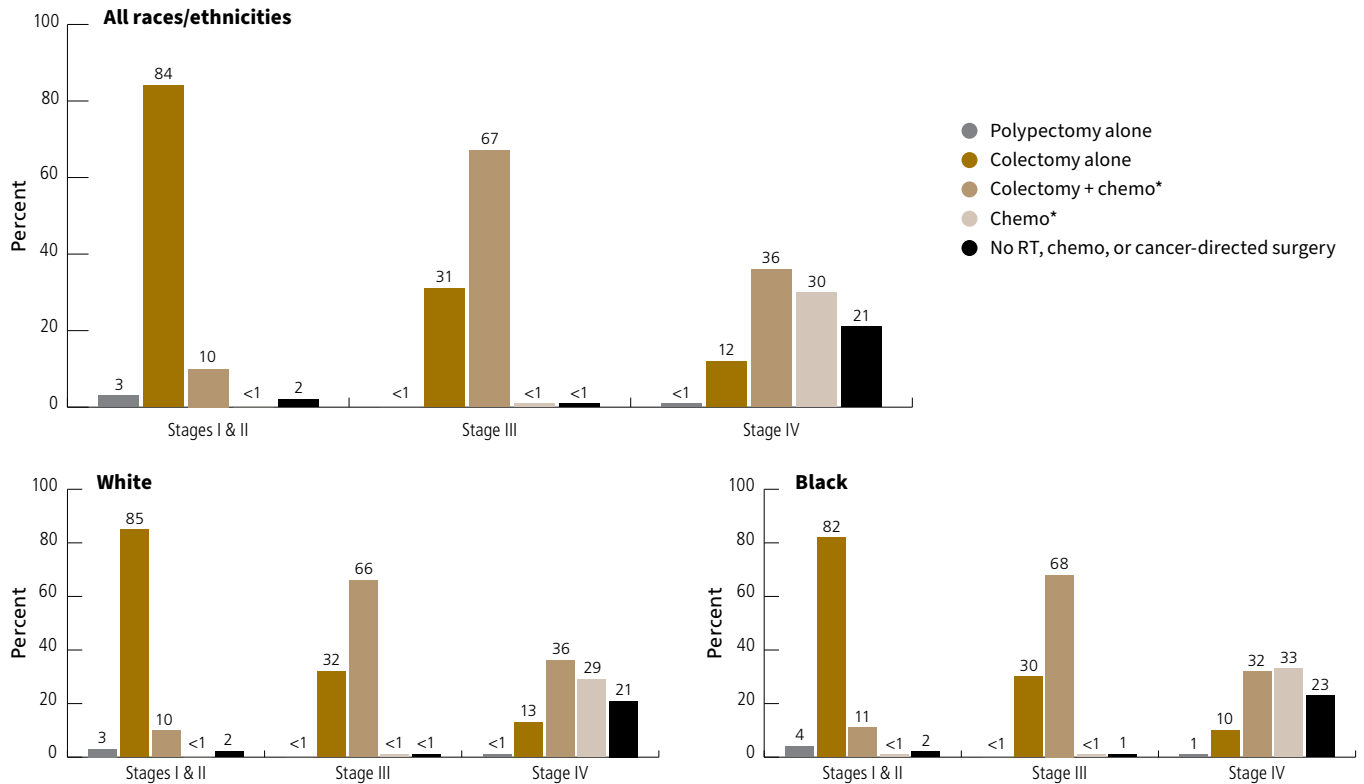
It is estimated that as of January 1, 2022, there were more than 1.4 million men and women living in the US with a previous colorectal cancer diagnosis, and an additional 151,030 cases will be diagnosed in 2022. Patients with rectal cancer tend to be younger at diagnosis than those with colon cancer (median age 62 versus 69, respectively).⁵⁵ About three-fourths of colorectal cancer survivors are 65 years of age or older (Figure 2).

Treatment and survival

The majority of stage I and II colon cancer patients are treated with colectomy (surgical removal of all or part of the colon) without chemotherapy (84%), while those with stage III disease usually receive adjuvant chemotherapy (67%) (Figure 7). For rectal cancer, 61% of stage I patients have a proctectomy (surgical removal of the rectum) or proctocolectomy (removal of the rectum and all or part of the colon), about half of whom also receive radiation and/or chemotherapy (Figure 8). In contrast to colon cancer, stage II and III rectal cancers are often treated with chemotherapy combined with radiation before surgery (neoadjuvant). About one-half (49%) of patients with stage IV colon cancer and 29% of those with stage IV rectal cancer have limited spread to other organs (e.g., the liver) and are treated with surgery, usually with chemotherapy and/or radiotherapy. Chemotherapy is the most common treatment for unresectable metastatic disease. More than half of metastatic colorectal cancers are candidates for targeted drugs or immunotherapies because of specific molecular features.^{94,95}

One of the largest racial differences in cancer treatment is for stage I rectal tumors, for which 66% of White patients receive proctectomy or proctocolectomy versus only 41% of Black patients (Figure 8). Black rectal cancer patients with stage II/III disease are also less likely to receive chemoradiotherapy prior to proctectomy or proctocolectomy (57% versus 60%) and patients with

Figure 7. Colon Cancer Treatment Patterns by Stage, 2018



White and Black race excludes persons of Hispanic ethnicity. Chemo = chemotherapy and includes targeted therapy and immunotherapy drugs; RT = radiation therapy. *A small number of these patients also receive radiation therapy.

Source: National Cancer Data Base, 2021.

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stage IV disease are slightly more likely to go without any treatment for both colon (23% versus 21%; [Figure 7](#)) and rectal cancers (19% versus 17%; [Figure 8](#)).

Patients undergoing surgery may need a colostomy, which is the creation of an abdominal opening, or stoma, from the large intestine for elimination of body waste. In many cases, once the colon or rectum heals, the stoma is closed and the ends of the large intestine reconnected in a procedure called colostomy reversal. A permanent colostomy may be required in the uncommon instance that the anus and the sphincter muscle are removed during surgery.

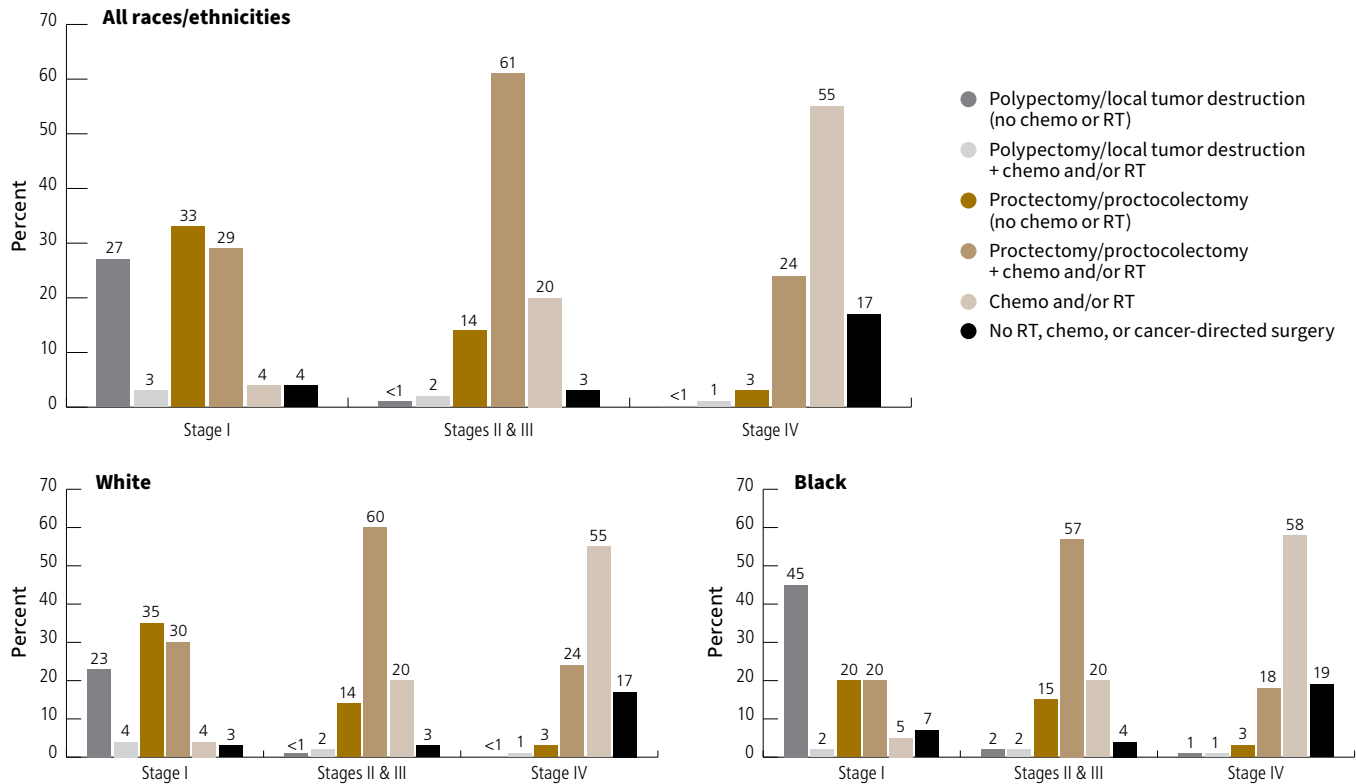
Five-year relative survival for colorectal cancer patients has improved from 50% in the mid-1970s to 65% for those diagnosed during 2011-2017,^{55,85} reflecting advances in early detection and improvements in treatment, but remains

lower in Black patients (59%) compared to White patients (65%). Differences in health insurance coverage have been estimated to account for one-half of this survival disparity.⁹⁶ Only about 4 in 10 people are diagnosed with stage I or stage II disease ([Figure 4](#)), for which the 5-year survival rate is 93% and 82%, respectively.⁵⁶ Survival declines to 70% for stage III and 12% for stage IV disease. Overall 5-year survival is slightly higher for rectal (67%) versus colon cancer (64%).⁵⁵

Short- and long-term health effects

Long-term survivors of colorectal cancer report good overall quality of life compared with that of the general population, but higher rates of depression.⁹⁷ Colorectal cancer survivors often experience bowel dysfunction, including diarrhea (especially among those receiving oxaliplatin-based chemotherapies)^{98,99} and incontinence and perianal irritation (especially among rectal cancer

Figure 8. Rectal Cancer Treatment Patterns by Stage, 2018



White and Black race excludes persons of Hispanic ethnicity. Chemo = chemotherapy and includes targeted therapy and immunotherapy drugs; RT = radiation therapy.
Source: National Cancer Data Base, 2021.

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survivors treated with pelvic radiation).^{100, 101} Rectal cancer survivors, particularly those with a colostomy, are more likely than colon cancer survivors to experience bladder dysfunction, sexual dysfunction, and negative body image.^{102, 103} A trained ostomy therapist can address many of these concerns, as well as issues that arise from colostomy care, such as skin irritation and dietary considerations.¹⁰⁴ Studies have suggested that the prevalence of sexual dysfunction as a result of colorectal cancer treatment is higher than for other cancers.¹⁰⁵ For example, reproductive-aged patients treated with pelvic radiation may suffer from impairment of the ovaries or testes as a result of exposure.¹⁰⁶ The ovaries in particular are exposed to high doses of radiation through the treatment, and patients may want to consider fertility preservation through surgically moving the ovaries out of the radiation field (ovarian transposition).⁶⁹

See *Colorectal Cancer Facts & Figures*, available online at cancer.org/statistics, for more information about colorectal cancer.

Leukemia and Lymphoma

It is estimated that as of January 1, 2022, there were 526,730 people living with a history of leukemia in the US, and an additional 60,650 people will be diagnosed in 2022. Leukemia originates from cells in the bone marrow and is classified into four main groups according to cancer cell type and rate of growth: acute lymphocytic leukemia (ALL), chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL; also referred to herein simply as CLL), acute myeloid leukemia (AML), and chronic myeloid leukemia (CML). In this report, CLL is included among leukemias for the purpose of reporting historical trends, although it is now recognized as a type of lymphoma.

Although leukemia is the most common cancer in children, the vast majority (93%) of leukemia patients are diagnosed at 20 years of age and older.¹⁰⁷ ALL accounts for nearly 80% of leukemias in children and more than half of those in adolescents, but is less common in adults compared to the other subtypes. The median age at diagnosis is 17 for ALL, 65 for CML, 68 for AML, and 70 for CLL.⁵⁵

Lymphoma is cancer that begins in the white blood cells of the immune system called lymphocytes. There are two major types of lymphoma: Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL). NHL is further divided into many subtypes based on cell type and rate of growth, and they progress and respond differently to treatment. It is estimated that as of January 1, 2022, there were 229,040 HL survivors and 845,550 NHL survivors, and that 8,540 and 80,470 new cases of HL and NHL, respectively, will be diagnosed in 2022. HL has a much younger median age at diagnosis (39 years) compared to NHL (67 years of age), reflecting the fact that it is one of the most common childhood and adolescent cancers.⁵⁵

Treatment and survival

AML. Acute myeloid leukemia (also called acute myelogenous leukemia) arises from myeloid cells in the bone marrow and is rapidly fatal in the absence of treatment. The standard treatment for AML consists of an induction phase, which is designed to induce complete remission (i.e., no microscopic evidence of disease), followed by a consolidation phase to kill any remaining leukemia cells. Appropriate treatment is influenced by the patient's age and health, as well as the molecular characteristics of the cancer; some older adults are not able to tolerate the most aggressive and effective regimens.¹⁰⁸ Some patients undergo allogeneic stem cell transplantation (in which the transplanted cells come from a donor whose tissue type closely matches the patient's) after receiving chemotherapy, alone or with radiation, as part of a conditioning regimen. A number of targeted drugs are also now available.¹⁰⁹ Additional information on the treatment of AML and on acute promyelocytic leukemia is available on cancer.org (cancer.org/cancer/acute-myeloid-leukemia/treating.html).

Approximately 60% to 85% of adults 60 years of age and younger with AML can expect to attain complete remission following the first phase of treatment, and 35% to 40% of patients in this age group will be cured.^{108, 110} In contrast, 40% to 60% of patients older than 60 years of age will achieve complete remission, and only 5% to 15% will be cured. About 4% of AML cases occur in children and adolescents (ages 0-19 years),¹⁰⁷ for whom the prognosis is much better. The 5-year relative survival is 69% for children and adolescents, but declines to 58%, 35%, and 9% for patients ages 20-49, 50-64 years, and ages 65 years and older, respectively.⁵⁶

CML. Chronic myeloid leukemia (also called chronic myelogenous leukemia) is usually easily diagnosed because the involved cells contain the BCR-ABL gene, typically found within an abnormal chromosome known as the Philadelphia chromosome. There are three phases of CML, including the chronic phase, which is the least aggressive and characterized by no or mild symptoms; the accelerated phase, which may cause symptoms such as fever, poor appetite, and fatigue; and the aggressive blast phase, which has the most severe symptoms and may rapidly lead to death.

The standard treatments for CML are targeted drugs called tyrosine kinase inhibitors (e.g., imatinib), which are very effective at inducing remission and decreasing progression to the accelerated phase. Previously it was thought that these drugs had to be taken indefinitely to keep the disease in check; however, recent studies have found they can be safely discontinued in a subset of patients,¹¹¹ which can substantially improve patient quality of life.¹¹² For cancers that are resistant to tyrosine kinase inhibitors, chemotherapy or stem cell transplantation may be used. In part due to the discovery of these targeted therapies in the late 1990s, the 5-year survival rate for CML has more than doubled from 34% for those diagnosed during 1994-1996 to 71% for those diagnosed during 2011-2017.^{55, 85}

ALL. Acute lymphocytic leukemia (also called acute lymphoblastic leukemia) is a disease in which too many immature lymphocytes are produced in the bone marrow. The disease typically progresses rapidly without

treatment, which in adults is generally delivered in three phases and consists of 4-6 weeks of induction chemotherapy (given to induce remission), followed by several months of consolidation (or intensification) therapy, and 2-3 years of maintenance chemotherapy.¹¹³ Pediatric regimens, which also have shown survival benefit for adolescents and some young adults, are generally more complex and may include additional phases and agents.¹¹⁴ Some ALL patients have a chromosomal abnormality similar to that in CML and benefit from the addition of a tyrosine kinase inhibitor. Stem cell transplantation is recommended for some patients whose leukemia has high-risk characteristics at diagnosis or for those who relapse after remission. Chimeric antigen receptor (CAR) T-cell therapy, which genetically modifies the patient's immune system to fight the cancer, is also an option for patients with a specific subtype of ALL who have relapsed or not responded to other treatments.¹¹⁵ Survival rates for patients with ALL have increased rapidly since the mid-1970s, from 7% to 40% among adults ages 20 years and older and from 54% to 89% in children and adolescents, largely reflecting optimization of chemotherapeutic regimens by age.^{55, 56, 85}

CLL/SLL. Chronic lymphocytic leukemia/small lymphocytic lymphoma is characterized by the overabundance of mature lymphocytes in the blood and bone marrow. It usually progresses slowly and is most commonly diagnosed in older adults. Treatment is not likely to cure the disease and is generally reserved for symptomatic patients or those who have low counts of normal (non-leukemic) blood cells or other complications. For patients with early disease, active surveillance (carefully monitoring over time for disease progression) is a common approach. For patients with more advanced disease, available treatments, which include chemotherapy, immunotherapy, and/or targeted therapies, can delay the progression of disease, but may not extend survival.¹¹⁶⁻¹¹⁸ CAR-T cell immunotherapy has also been used in patients with disease that has relapsed or not responded to other treatments.¹¹⁵ The overall 5-year relative survival for CLL is 87%, although there is a large variation among individual patients, ranging from several months to normal life expectancy.⁵⁵

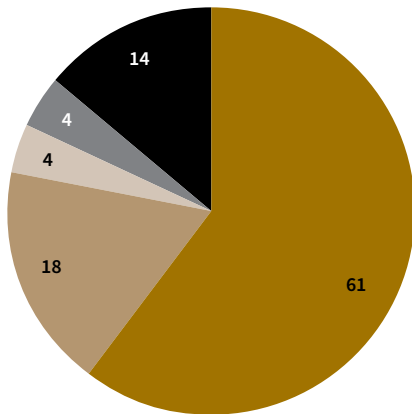
HL. Hodgkin lymphoma is a cancer of the lymph nodes that often starts in the neck, chest, or abdomen. Of the two major types of HL, classical HL is more common and is distinguishable by the presence of Reed Sternberg cells. Nodular lymphocyte-predominant HL (NLPHL) accounts for only about 5% of cases and is a more slow-growing disease with a generally favorable prognosis.¹¹⁹

Classical HL is usually treated with multi-agent chemotherapy, sometimes in combination with radiation when the disease is diagnosed at an early stage.¹²⁰ If initial treatment is not effective, a different chemotherapy regimen may be tried, sometimes followed by autologous ("patient's own") stem cell transplantation, or the targeted drug brentuximab vedotin may also be used.¹²¹ For patients with NLPHL, radiation therapy or lymph node excision alone may be appropriate for early-stage disease^{119, 120} while chemotherapy plus radiation, as well as the monoclonal antibody rituximab, may be recommended for later-stage disease. Five-year survival for all HL combined is 88% and is higher for NLPHL (96%) than for classical HL (87%).^{55, 56}

NHL. There are multiple types of non-Hodgkin lymphoma, with the most common types being diffuse large B-cell lymphoma (DLBCL), representing about 4 in 10 cases, and follicular lymphoma, representing 2 in 10 cases.¹⁰⁷ About 50% of NHL patients are cured with treatment, although prognosis varies substantially by subtype.¹²² In contrast to most cancers, initial treatment for DLBCL is generally similar across stage, although radiation therapy alone is typically used only in certain cases of early-stage disease.¹²³ Most DLBCL patients receive a standard multiagent chemotherapy regimen (82%), either with (61%) or without (21%) immunotherapy (such as rituximab) (Figure 9).¹²⁴ Follicular lymphomas tend to grow slowly and often do not require treatment until symptoms develop, but are generally not curable.¹²⁵ Some cases of follicular lymphoma transform into DLBCL. If NHL persists or recurs after standard treatment, stem cell transplantation or CAR T-cell therapy may be an option. Five-year survival is 90% for follicular lymphoma and 64% for DLBCL.⁵⁶

Figure 9. Diffuse Large B-Cell Treatment Patterns (%), 2014-2018

- Chemo + immunotherapy (+/- RT)
- Chemo (no RT or immunotherapy)
- Chemo + RT (no immunotherapy)
- Immunotherapy and/or RT
- No RT, chemo, or immunotherapy



Chemo = chemotherapy and includes targeted therapy; RT = radiation therapy.
Source: National Cancer Data Base, 2021.
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Short- and long-term health effects

Some survivors, such as those who received stem cell transplant, have recurrent infections and low blood cell counts that may require blood transfusions. In addition, allogeneic (i.e., donor cells) transplantation for acute leukemias may lead to chronic graft-versus-host disease, which can cause skin changes, dry mucous membranes (eyes, mouth, vagina), joint pain, weight loss, shortness of breath, and fatigue.¹²⁶

Leukemia treatment regimens that involve anthracyclines can have heart-damaging effects, as can chest radiation for Hodgkin lymphoma (e.g., valvular heart disease and coronary artery disease) and possibly diabetes mellitus.^{127, 128} Radiation to the chest during childhood or adolescence also increases the risk of breast cancer among both women and men.¹²⁹ Certain chemotherapy drugs, as well as high-dose chemotherapy used with stem cell transplant, can lead to infertility. In the past, most children with ALL received cranial radiation therapy, which is associated with long-term cognitive deficits,¹³⁰ but this treatment is used less frequently and in lower dosages today.

Lung and Bronchus

It is estimated that there were 654,620 men and women living in the US with a history of lung cancer as of January 1, 2022, and an additional 236,740 cases will be diagnosed in 2022. The median age at diagnosis for lung cancer is 71.⁵⁵

Treatment and survival

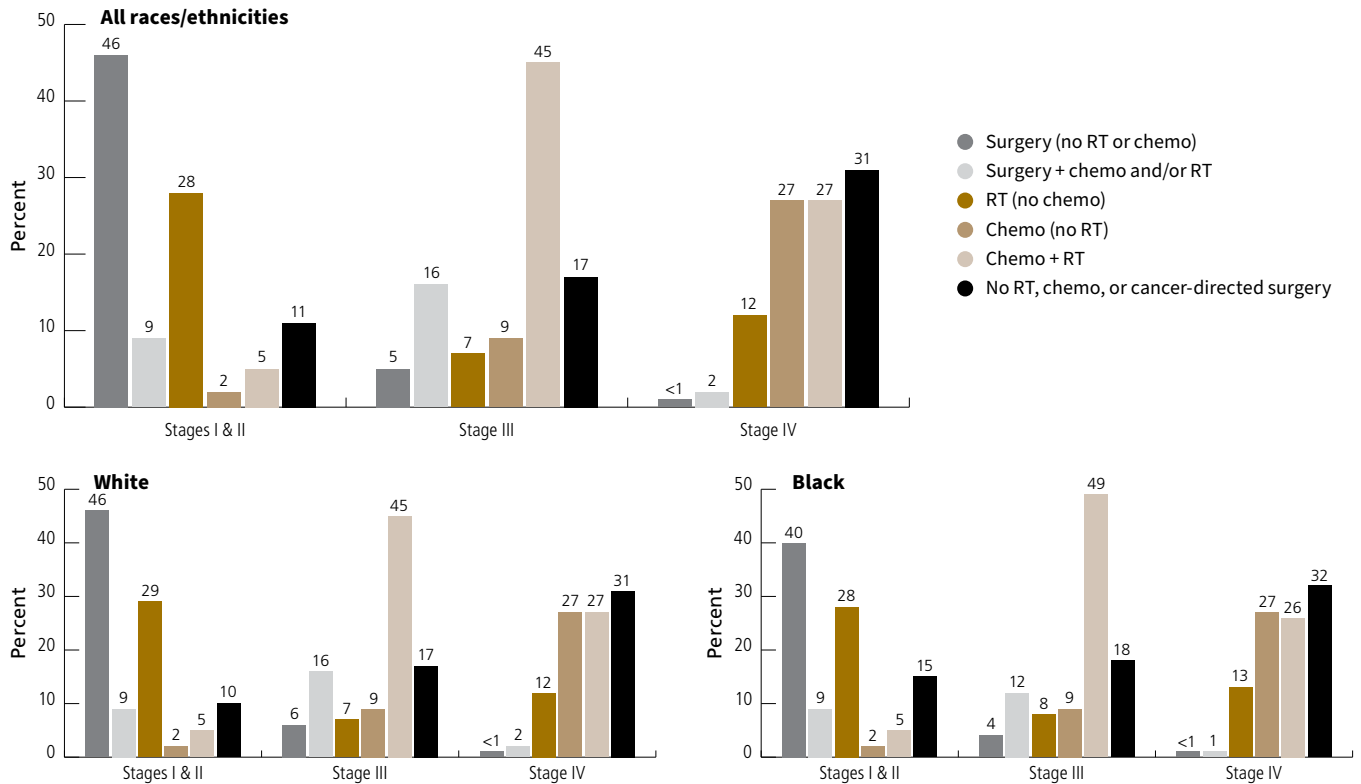
Lung cancer is classified as small cell (14% of cases) or non-small cell (82%) for the purposes of treatment (3% of cases are unclassified).¹⁰⁷ Depending on type and stage of cancer, treatment may include surgery, radiation therapy, chemotherapy, targeted therapies, and/or immunotherapy.

The main treatment for small cell lung cancer (SCLC) is chemotherapy.¹³¹ Some patients may also receive radiation to the chest, which may be given concurrently with chemotherapy, and/or prophylactic cranial radiation therapy to help prevent brain metastases. More recently, the addition of an immune checkpoint inhibitor to chemotherapy has been shown to improve survival in advanced SCLC.¹³²

More than half (55%) of stage I and II non-small cell lung cancer (NSCLC) patients undergo surgery, which usually involves partial (wedge resection) or total (lobectomy) removal of the affected lobe, or partial removal of the affected airway (sleeve resection) (Figure 10). In contrast, only 21% of patients with stage III NSCLC undergo surgery, while most (61%) are treated with chemotherapy and/or radiation. Only a very small proportion of all NSCLC patients undergo pneumonectomy (removal of the entire lung).¹³¹ Black cancer patients are less likely than White patients to receive surgery at every stage (stage I-II: 49% versus 55%; stage III: 16% versus 22%, Figure 10). Racial differences in surgical receipt remain but are smaller when Black patients receive treatment at academic centers and from surgeons who specialize in thoracic care.^{133, 134}

There are many targeted and immunotherapy drugs now available to treat advanced NSCLC,¹³⁵ although some are only effective for treating cancers with certain genetic mutations. Uptake of immunotherapy has been rapid;

Figure 10. Non-Small Cell Lung Cancer Treatment Patterns by Stage, 2018



White and Black race excludes persons of Hispanic ethnicity. Chemo = chemotherapy, and includes targeted therapy; RT = radiation therapy.

Source: National Cancer Data Base, 2021.

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in 2018, about 33% of newly diagnosed stage IV NSCLC patients received immunotherapy, nearly triple the proportion in 2016 (12%).^{131, 136} Other advances in treatment, such as improved staging and video-assisted thoracic surgery,¹³⁷ have improved survival for every stage of NSCLC.¹³⁸ Five-year relative survival for lung cancer overall is 22% (White patients: 22%; Black patients: 20%), because symptoms usually do not appear until the disease has spread to other parts of the body. Only 30% of lung cancer patients are diagnosed with stage I disease (Figure 4), for which 5-year survival is 65%.⁵⁶ Five-year survival for SCLC (7%) is lower than that for NSCLC (26%) overall and for each stage.

Short- and long-term health effects

Many lung cancer survivors have impaired lung function (especially if they have had surgery and/or had preexisting lung problems due to smoking) and may require long-

term supplemental oxygen.¹³⁹ In some cases, respiratory therapy and medications can improve fitness and allow these survivors to resume normal daily activities. Lung cancer survivors who are current or former smokers are at increased risk for subsequent lung cancers and other smoking-related cancers, especially head and neck or urinary tract cancers. Survivors may feel stigmatized because of the social perception that lung cancer is a self-inflicted disease, which can be particularly difficult for those who never smoked.¹⁴⁰

Melanoma of the Skin

It is estimated that there were nearly 1.5 million invasive melanoma survivors living in the US as of January 1, 2022, and an additional 99,780 people will be diagnosed in 2022. Women tend to be diagnosed at a younger age than men (61 versus 67 years of age, respectively), reflecting differences

by sex and age in occupational and recreational exposure to ultraviolet radiation, as well as frequency of health care interactions. About 4 in 10 melanoma survivors (39%) are younger than age 65 (Figure 2).

Treatment and survival

Surgery to remove the tumor and surrounding tissue is the primary treatment for nonmetastatic melanoma. Patients with stage III melanoma usually also have nearby lymph nodes removed and may be offered immunotherapy after surgery or, if their melanoma contains a BRAF mutation (about half of all skin melanomas, the majority of which are V600),¹⁴¹ a combination of targeted drugs. Treatment for patients with stage IV melanoma has changed in recent years and typically includes these new immunotherapy and targeted drugs.¹⁴² Several targeted drugs for metastatic melanoma with BRAF and other mutations have been shown to improve survival.^{143, 144} About 4 in 10 patients with metastatic disease who receive either chemotherapy or immunotherapy also receive radiation therapy.¹³¹

The 5-year relative survival rate for melanoma is 93%, up from 82% for patients diagnosed in the mid-1970s.^{55, 85} More than two-thirds (71%) of melanomas are diagnosed at stage I (Figure 4), for which the 5-year relative survival approaches 100%.⁵⁶ However, for patients diagnosed with stage IV disease, 5-year survival declines to 25%.

Short- and long-term health effects

Depending on the size and location of the melanoma, removal can be disfiguring. Patients with several lymph nodes removed during surgery may develop lymphedema. Immunotherapy drugs used to treat melanoma can cause a number of side effects, including inflammation of the lungs, colon, or kidneys, and endocrine disorders (e.g., hypothyroidism and adrenal insufficiency). In addition, melanoma survivors are about 13 to 16 times more likely than the general population to develop additional melanomas due to skin type and other genetic and behavioral risk factors,¹⁴⁵ so it is important for them to monitor skin spots/growths and limit sun exposure.

Prostate

It is estimated that there were more than 3.5 million men with a history of prostate cancer living in the US as of January 1, 2022, and an additional 268,490 men will be diagnosed in 2022. The vast majority (85%) of prostate cancer survivors are 65 years of age or older (Figure 2). The median age at diagnosis is 67.⁵⁵

Treatment and survival

Treatment options vary depending on stage of the cancer; patient characteristics, such as age and other medical conditions; and personal preferences. High-quality, national data on prostate cancer treatment patterns are limited, particularly for hormonal (referred to as androgen deprivation therapy, or ADT) and radiation therapies. Active surveillance rather than immediate treatment is a commonly recommended approach for low-risk, localized cancer.¹⁴⁶ In a recent analysis of cancer registry data, active surveillance for low-risk disease increased from 15% to 42% from 2010 to 2015 among men of all ages combined, while radical prostatectomy (removal of the prostate) declined from 47% to 31%.¹⁴⁷ Use of active surveillance is even higher among men who are older and also varies substantially by region.^{148, 149}

Higher-risk disease may be treated with radical prostatectomy, radiation therapy, ADT, or a combination thereof. Advanced prostate cancer may be treated with ADT, chemotherapy, radiation therapy, and/or other treatments. Cancers that have, or are likely to, spread to the bone may be treated with bone-directed therapy to prevent fractures and slow the disease. ADT is generally the first treatment used for advanced disease and can often control the cancer for long periods of time and help relieve pain and other symptoms. For men with advanced cancers that stop responding to traditional ADT, radioligand therapy or newer drugs that block or lower testosterone further may be effective.¹⁵⁰⁻¹⁵³

Since the mid-1970s, the 5-year relative survival rate for all stages combined has increased from 68% to 98%.⁵⁵ However, it is unknown how much of the increase is due to detection of indolent disease, which would never cause

harm, via screening with the prostate specific antigen test. Most (84%) prostate cancers are diagnosed in the local or regional stages, for which the 5-year relative survival rate approaches 100%. However, the proportion of localized-stage diagnoses is declining, reflecting recommendations from the United States Preventive Services Task Force against routine screening in some age groups in an attempt to reduce harms associated with overdiagnosis and overtreatment. Researchers are closely monitoring the downstream effects on the rising occurrence of distant-stage disease, for which 5-year relative survival declines to 31%. (Summary stage is presented because TNM [tumor size, node involvement, and presence of metastasis] stage IV disease includes both metastatic patients and high-risk individuals without metastasis.)

Short- and long-term health effects

Although survival rates are favorable for patients with early-stage disease treated with surgery or radiotherapy (with or without ADT), both are associated with substantial risk of physical impairment (sexual, urinary, and bowel).^{154, 155} Many prostate cancer survivors who have been treated with surgery or radiation experience incontinence, erectile dysfunction, and/or bowel complications, which may be permanent.¹⁵⁶ Sexual

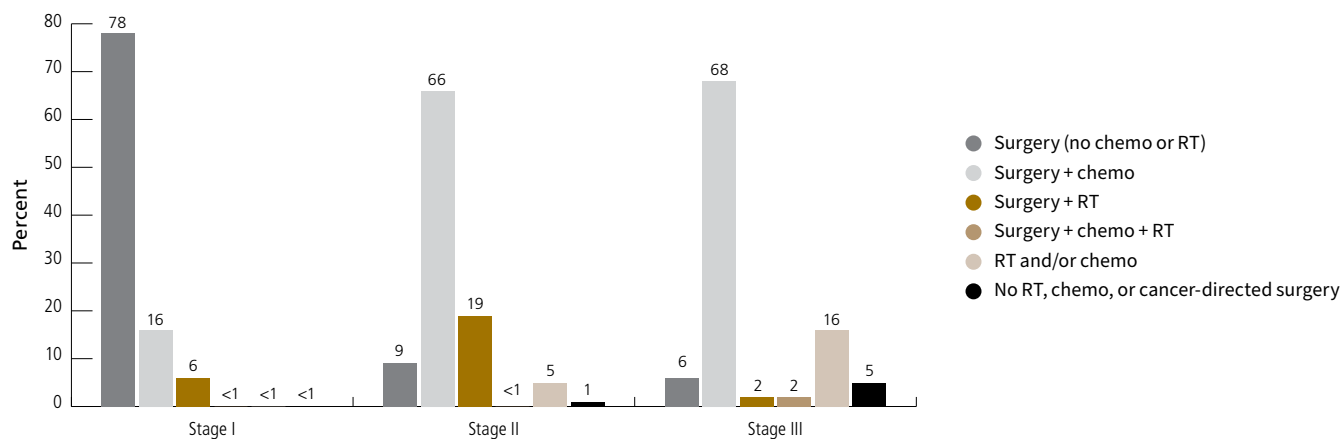
counseling in this population can be helpful in restoring comfort with intimacy.⁶⁸ Patients receiving hormonal treatment may experience loss of libido, hot flashes, night sweats, irritability, and mild breast development. Hormonal therapy also increases the risk of anemia, osteoporosis, and metabolic syndrome,¹⁵⁷ and may increase the risk of cardiovascular disease and depression.¹⁵⁸ Supportive therapies can reduce the risk of bone fractures for high-risk patients with non-metastatic disease. Certain bone-targeted therapies can also reduce skeletal morbidity, including bone pain, in patients with metastatic castration-resistant disease.¹⁵⁹

Testis

It is estimated that there were 303,040 testicular cancer survivors in the US as of January 1, 2022, and an additional 9,910 men will be diagnosed in 2022. Testicular germ cell tumors (TGCTs) account for more than 96% of testicular cancers.¹⁰⁷ These tumors arise from cells that normally develop into sperm cells. The median age at diagnosis for testicular cancer is 33,⁵⁵ much younger than most other cancers.

TGCTs are categorized based on cell type as seminomas (56%), nonseminomas (15%), or mixed (29%).¹⁰⁷ Nonseminomas generally occur among younger men

Figure 11. Treatment Patterns for Seminomatous Testicular Germ Cell Tumors, 2014-2018

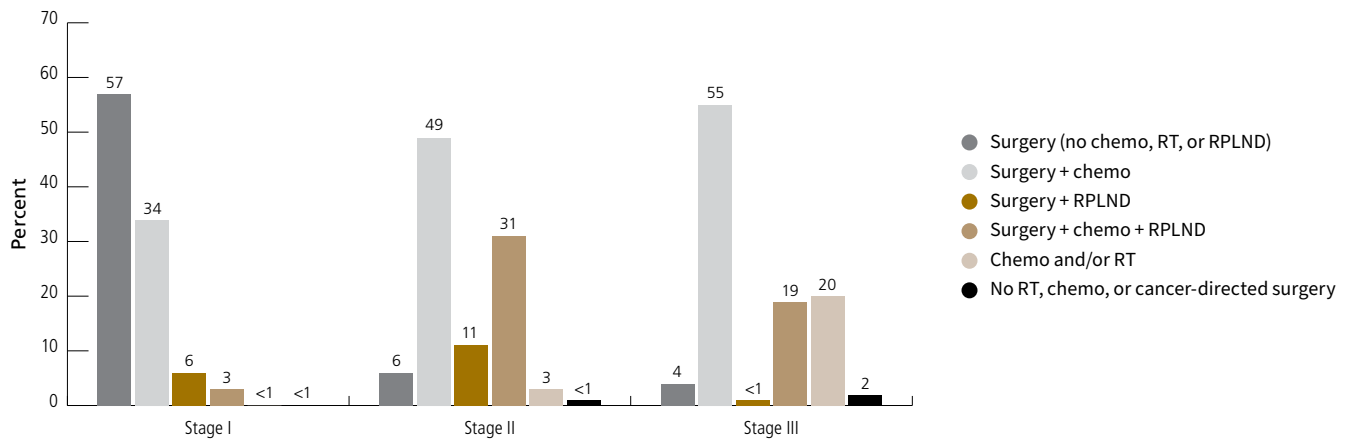


Chemo = chemotherapy, and includes some targeted therapies; RT = radiation therapy.

Source: National Cancer Data Base, 2021.

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Figure 12. Treatment Patterns for Nonseminomatous Testicular Germ Cell Tumors, 2014-2018



Chemo = chemotherapy, and includes targeted therapy and immunotherapy drugs; RPLND= retroperitoneal lymph node dissection.

Source: National Cancer Data Base, 2021.

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(in their late teens to early 40s) and, along with mixed tumors, tend to be more aggressive. Seminomas are slow-growing and are most often diagnosed in men in their late 30s to early 50s.

Treatment and survival

Treatment of almost all TGCTs begins with surgery to remove the testicle in which the tumor developed. Postsurgery active surveillance has become an increasingly preferred treatment strategy for patients with stage I seminomas¹⁶⁰ that is supported by long-term study results.¹⁶¹ Approximately 78% of stage I seminomas are treated with surgery alone, whereas adjuvant chemotherapy, with or without radiation, is the most common treatment for stage II (66%) and stage III (70%) disease (Figure 11).

Although mixed tumors include both cell types, treatment is similar to nonseminomas due to their shared higher risk of progression. Treatment for men with nonseminomas may involve retroperitoneal lymph node dissection (RPLND), which may be recommended after surgery in high-risk cases to reduce the likelihood of recurrence. For men with stage I nonseminomas, more than half (57%) are treated with surgery alone, whereas the majority of stage II patients receive adjuvant treatment, including chemotherapy (49%), RPLND (11%), or both (31%) (Figure 12).

Men with metastatic nonseminomas are usually treated with chemotherapy after surgery, with or without RPLND.

Five-year relative survival for testicular cancer increased from 83% in the mid-1970s to 95% for patients diagnosed in the most recent time period, largely due to the success of chemotherapy regimens for advanced disease. However, survival is lower for nonseminomas (90%) than for mixed TGCTs (94%) and seminomas (98%), regardless of age.⁵⁶ More than half (59%) of patients with testicular cancer are diagnosed at stage I because of a lump on the testicle (Figure 4); 5-year relative survival for this stage is 99%.⁵⁶ Even cancers diagnosed at stage III are often successfully treated, with a 5-year relative survival of 75%.

Short- and long-term health effects

Although most men with one healthy testicle produce sufficient male hormones and sperm to continue sexual relations and father children, consultation about fertility risks and sperm banking is recommended prior to treatment.⁶⁹ When cancer occurs in both testicles, lifelong hormone replacement is required. Men treated with chemotherapy are also at increased risk of coronary artery disease as they age and should be particularly mindful of additional risk factors such as high cholesterol, high blood pressure, obesity, and smoking.

Thyroid

It is estimated that there were nearly 1.1 million people – more than two-thirds of whom were women – living with a past diagnosis of thyroid cancer in the US as of January 1, 2022, and an additional 43,800 cases will be diagnosed in 2022. Incidence rates are 3 times higher in women than in men, and the disease is diagnosed younger than most cancers, with a median age at diagnosis of 51 (55 for men and 50 for women).⁵⁵

Treatment and survival

Most thyroid cancers are either papillary or follicular carcinomas, both of which are highly curable. About 3% of thyroid cancers are either medullary or anaplastic carcinoma,¹⁰⁷ which tend to be more difficult to treat because they do not respond to radioactive iodine treatment.¹⁶² These types of thyroid cancer also typically grow more quickly and have often metastasized by the time of diagnosis.

The first choice of treatment in nearly all cases is surgery, with patients receiving either total (81%) or partial (15%) thyroidectomy (removal of the thyroid gland).¹³¹ More than half of surgically treated patients with well-differentiated (papillary or follicular) thyroid cancer receive radioactive iodine (I-131) after surgery to destroy any remaining thyroid tissue.¹⁶³ However, a recent clinical trial of low-risk thyroid cancer patients comparing treatment with and without radioiodine after surgery found no benefit at 3 years.¹⁶⁴ If the thyroid has been removed completely, thyroid hormone replacement therapy is required to maintain normal metabolism, and is often given in doses high enough to keep the body from making thyroid-stimulating hormone to decrease the likelihood of cancer recurrence.

Total thyroidectomy is the main treatment for patients with medullary carcinoma of the thyroid, as I-131 is not absorbed by the cancer cells. External beam radiation therapy may be offered after surgery for cancers with a high risk of local or regional recurrence.¹⁶⁵ For medullary carcinomas that cannot be treated with surgery, targeted drugs or chemotherapy may be offered. Anaplastic thyroid

cancers are often widespread at the time of diagnosis, making surgery difficult or impossible. Radiation therapy and/or chemotherapy may be used to treat these cancers, as well as targeted drugs for cancers with BRAF mutations, but response rates are generally poor.

The 5-year relative survival rate for thyroid cancer has exceeded 90% since at least the mid-1970s and is 98% overall,^{55, 85} 90% for medullary carcinoma, and 7% for anaplastic carcinoma.⁵⁶ Five-year survival for stages I, II, and III disease approaches 100%, but drops to 73% for those diagnosed with stage IV tumors.

Short- and long-term health effects

Thyroid cancer surgery can damage nerves to the larynx and lead to voice changes.¹⁶⁶ In addition, patients requiring thyroid hormone replacement therapy must have their hormone levels monitored to prevent hypothyroidism, which can cause cold intolerance and weight gain. For those treated with I-131, there is a low risk of temporary loss of or change in taste, as well as early- or late-onset effects such as dry mouth, dental caries, and damage to the salivary glands, which may also include difficulty swallowing. Genetic testing is recommended for people diagnosed with medullary thyroid cancer because about one-quarter of cases are the result of a rare hereditary syndrome called multiple endocrine neoplasia type 2 (MEN2), which is also associated with increased risk for two other types of endocrine tumor.¹⁶²

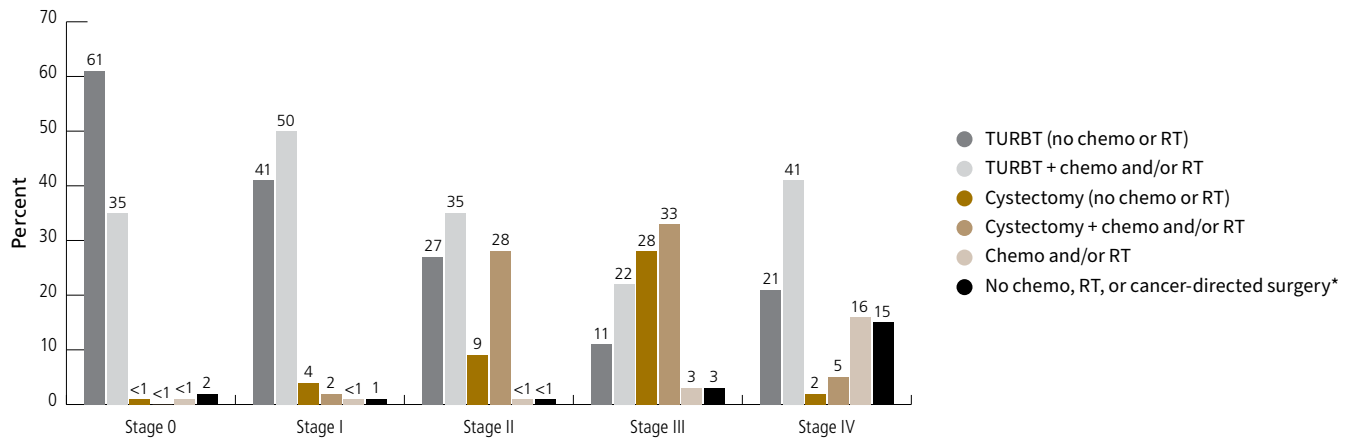
Urinary Bladder

It is estimated that there were 789,730 urinary bladder cancer survivors living in the US as of January 1, 2022, and an additional 81,180 cases will be diagnosed in 2022. The majority of bladder cancer survivors are men because incidence is about 3 times higher in men than in women. The median age at diagnosis is 73.⁵⁵

Treatment and survival

Treatment of urinary bladder cancer varies by tumor stage and patient age. About 70% of patients with bladder cancer are diagnosed with non-muscle-invasive disease

Figure 13. Urinary Bladder Cancer Treatment Patterns, 2018



Chemo = chemotherapy and includes targeted therapy and immunotherapy drugs; cystectomy = surgery that removes all or part of the bladder, as well as the surrounding fatty tissue and lymph nodes; RT = radiation therapy; TURBT = transurethral resection of the bladder tumor. *These patients may have received a surgical diagnostic procedure to determine staging.

Source: National Cancer Data Base, 2021.

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(i.e., stages 0-I, including both in situ and invasive cancer that is present only in the very inner layers of bladder cells).¹⁰⁷ Stage 0 urinary bladder cancer is further divided into noninvasive papillary carcinoma, which can have a high or low risk of progression, and carcinoma in situ, which is generally high risk. Most non-muscle-invasive bladder cancer patients are diagnosed and treated with a minimally invasive procedure called transurethral resection of the bladder tumor (TURBT) (Figure 13). This endoscopic surgery may be followed by intravesical treatment (injected directly into the bladder) with either a chemotherapy drug or immunotherapy with bacillus Calmette-Guerin (BCG) to reduce the risk of recurrence.¹⁶⁷

For muscle-invasive disease (stages II-IV), surgery may involve cystectomy, in which all or part of the bladder is removed, along with the surrounding fatty tissue and lymph nodes. About one-third (36%) of stage II patients and more than one-half (61%) of stage III patients receive cystectomy, with or without chemotherapy and/or radiation (Figure 13). In appropriately selected low-risk, muscle-invasive cases, TURBT followed by combined chemotherapy and radiation is as effective as cystectomy at preventing recurrence.^{168, 169} Previous studies have documented substantial disparities in receipt of guideline-concordant care among Black patients with

non-metastatic muscle-invasive disease, with patients in one study up to 85% less likely to receive optimal treatment.¹⁷⁰ Chemotherapy is usually the first treatment for cancers that have spread to other organs, but in recent years, immunotherapy with checkpoint inhibitors has also become an important option for advanced cancers, either following or in place of chemotherapy.¹⁶⁷

For all stages combined, the 5-year relative survival rate is 77%,⁵⁵ up from 72% for patients diagnosed in the mid-1970s.⁸⁵ Stage 0 urinary bladder cancer is diagnosed in 47% of cases (Figure 4), for which 5-year survival is 96%.⁵⁶

Short- and long-term health effects

Posttreatment surveillance is crucial given the high rate of bladder cancer recurrence, ranging from 50% to 90%.¹⁶⁷ Surveillance can include cystoscopy (examination of the bladder with a small scope), urine cytology, and other urine tests for tumor markers. Patients with muscle-invasive disease may have additional tests, such as computed tomography scans of the chest, abdomen, and pelvis.

Partial cystectomy results in a smaller bladder, sometimes causing more frequent urination. Patients undergoing cystectomy in which the entire bladder is removed require

urinary diversion with either a “new” bladder (known as a neobladder), created by connecting a small part of the intestine to the urethra, or a urostomy, which is a tube that empties into a bag worn outside of the abdomen or uses an internal valve (requiring self-catheterization). Those with a neobladder retain most of their urinary continence after appropriate rehabilitation.¹⁷¹ However, creation of a neobladder remains much less common than a urostomy (9% versus 91%), largely due to the fact that the procedure is technically complex and often only offered at large hospitals with experienced surgeons.¹⁷² Younger, healthier patients and those who are male are also more likely to undergo the procedure. Most patients with muscle-invasive disease treated with TURBT combined with chemotherapy and radiotherapy maintain full bladder function and good quality of life.¹⁷³ However, patients require careful surveillance with regular cystoscopy and a complete cystectomy if the cancer recurs.

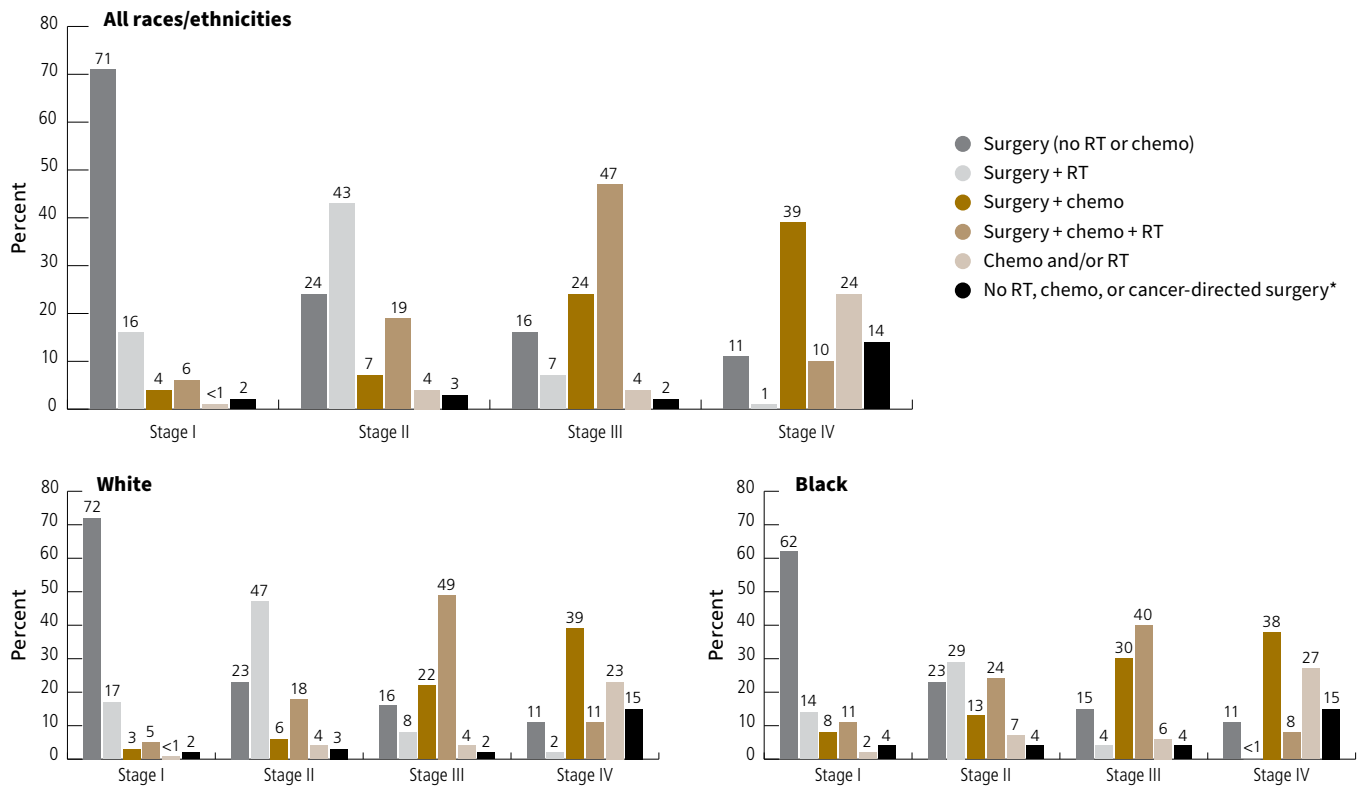
Uterine Corpus (Endometrium)

It is estimated that there were 891,560 uterine corpus cancer survivors living in the US as of January 1, 2022, and an additional 65,950 women will be diagnosed in 2022. Uterine cancer is the second most prevalent cancer among female cancer survivors, following breast cancer. More than 90% of cases occur in the endometrium (lining of the uterus); the majority of the remaining cases are uterine sarcomas.¹⁰⁷ The median age at diagnosis is 63.⁵⁵

Treatment and survival

Uterine cancers are usually treated with surgery, radiation, hormonal therapy, and/or chemotherapy, depending on stage and cancer type. Surgery consists of hysterectomy (removal of the uterus, including the cervix), often along with bilateral salpingo-oophorectomy (removal of both ovaries and fallopian tubes). Surgery without chemotherapy or radiation is used to treat most

Figure 14. Uterine Corpus (Endometrial) Cancer Treatment Patterns by Stage, 2018



White and Black race excludes persons of Hispanic ethnicity. Chemo = chemotherapy and includes targeted therapy and immunotherapy drugs; RT = radiation therapy. *Some of these patients may have received hormonal therapy.

Source: National Cancer Data Base, 2021.

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(71%) patients with stage I disease (Figure 14). About two-thirds (69%) of stage II patients and 78% of stage III patients receive surgery followed by radiation and/or chemotherapy (Figure 14). Clinical trials are currently assessing the most appropriate regimen of radiation, hormone therapy, and chemotherapy for women with metastatic or recurrent endometrial cancers.

Black patients are more likely to receive chemotherapy after surgery, with or without radiation, for non-metastatic disease (Figure 14), reflecting the higher proportion of Black women diagnosed with high-risk disease (e.g., non-endometrioid subtypes). When stratified by disease subtype, receipt of guideline-concordant therapy in hospital-based studies was lower among Black women than among White women for endometrioid subtypes, but similar among patients with non-endometrioid cancer.¹⁷⁴ However, population-based studies of patients ≥65 years of age have reported that Black patients are more likely than White patients to have treatment delays and less likely to receive adjuvant therapy regardless of histology, particularly for advanced-stage disease.^{175, 176}

The 5-year relative survival for cancer of the uterine corpus is 81% and has remained relatively unchanged

since the mid-1970s, largely reflecting lack of progress in treatment advances.⁵⁵ More than two-thirds of patients are diagnosed at stage I (usually because of postmenopausal bleeding) (Figure 4), for which the 5-year survival is 95%.⁵⁶ However, Black women are more likely to be diagnosed at a later stage (Figure 4), which partly contributes to the substantially lower 5-year survival in Black women (63%) than in White women (84%). Although Black women have a higher burden of aggressive tumor subtypes,¹⁷⁷ survival in Black women is also lower regardless of histology or stage,^{56, 178} pointing to substantial disparities in equitable treatment receipt.

Short- and long-term health effects

Any hysterectomy causes infertility. Bilateral salpingo-oophorectomy causes menopause in premenopausal women, which can result in symptoms such as hot flashes, night sweats, vaginal dryness, and osteoporosis. Sexual dysfunction is commonly reported among uterine cancer survivors.^{68, 179} About half of patients who have lymph nodes in the pelvis removed develop a buildup of fluid in the legs (lymphedema) compared to about one-third treated with hysterectomy alone.¹⁸⁰ Radiation and higher BMI also increase risk.

Navigating the Cancer Experience: Treatment and Supportive Care

Newly diagnosed cancer patients and their loved ones face numerous challenges and difficult decisions. The following section provides information and resources for navigating the cancer experience from the time of diagnosis through long-term survivorship.

Choosing a Doctor and Treatment

Typically, the doctor who diagnoses the cancer will recommend appropriate specialists, including specialized surgeons, medical oncologists, hematologists, and radiation oncologists. Some cancers, such as skin and prostate, may be treated by clinicians who specialize in

specific body systems (i.e., dermatologists and urologists, respectively) rather than oncologists. Help with choosing a doctor and treatment center, as well as information to prepare patients for meeting with their treatment team for the first time, is available on cancer.org (cancer.org/treatment/finding-and-paying-for-treatment/choosing-your-treatment-team.html).

There is also information available online to assist patients and families in communicating with each other and their care team at prepareforyourcare.org. For help in making treatment decisions, including a list of questions to ask, visit cancer.org/treatment. For specific

treatment information by cancer type, visit cancer.org/cancer.html. It is important that patient preferences, needs, and desires are a fundamental part of the treatment decision-making process.

Cancer Rehabilitation

Patient referral to cancer rehabilitation services (e.g., physiatrists; physical, occupational, and speech therapists; and/or cognitive psychologists) should occur as early as possible.¹⁸¹ Cancer survivors may have health issues during or after treatment, including muscular weakness or paralysis, swallowing or speech problems, cognitive challenges, lymphedema (swelling caused by removal of or damage to lymph nodes during initial treatment), or physical disability because of surgery. Cancer rehabilitation is the diagnosis and treatment of these difficulties and may substantially improve functioning and quality of life.^{4, 182} For some patients, providing targeted interventions before treatment begins (prehabilitation) may also be useful for improving recovery.¹⁸³ Despite the high prevalence of cancer-related disability, only 1% to 2% of survivors receive rehabilitation.¹⁸⁴ Further research is needed on the best way to integrate these services, which are typically offered in the outpatient setting, into inpatient oncology care.^{4, 185}

Psychosocial Care

Cancer patients may have preexisting psychological or psychiatric conditions that impede their ability to cope with cancer or develop psychological distress as a result of the diagnosis.¹⁸⁶ Up to one-half of cancer patients show a significant level of emotional distress.¹⁸⁷ Early diagnosis and management of symptoms improve adherence to cancer treatment and communication between the patient and medical team. Evidence from randomized trials shows that psychological interventions may improve cancer survival,¹⁸⁶ although less than half of distressed cancer patients are identified and referred to a professional. Barriers to distress management include underrecognition of symptoms, lack of knowledge about resources, and perceived stigma associated with psychological distress. The National Comprehensive Cancer Network's Distress Management panel has proposed recommendations for recognizing and managing distress in cancer patients.¹⁸⁶

Palliative Care

The goal of palliative care is to alleviate pain and other physical symptoms and emotional distress associated with cancer and its treatment using family and patient communication to determine goals.¹⁸⁸ Similar to cancer rehabilitation, palliative care improves quality of life for cancer patients and their families and has also been shown to improve survival when combined with other treatments.¹⁸⁹ It is increasingly recommended alongside curative treatment for all newly diagnosed cancer patients, regardless of stage. Palliative care is provided in hospitals and community cancer centers, long-term care facilities, and in the home, as well as during hospice care. However, palliative care remains substantially underutilized in the United States; in one large study, only 10% of patients with solid tumors received palliative care.¹⁹⁰

The American Cancer Society Cancer Action NetworkSM, the American Cancer Society's nonprofit, nonpartisan advocacy affiliate, is working to improve access to palliative care for all adults and children facing cancer and other serious illnesses. Visit acscan.org/qualityoflife and patientqualityoflife.org for more information. Visit the American Cancer Society website at cancer.org/treatment/treatments-and-side-effects/palliative-care.html and getpalliativecare.org to learn more about palliative care or to find palliative care professionals.

Transitioning to Long-term Survivorship

After primary treatment ends, most cancer patients transition to the recovery phase of survivorship. Challenges during this time may include the lingering effects of illness and treatment (e.g., fatigue, pain, bowel or bladder changes, sexual dysfunction); worry about recurrence; difficulty returning to former roles, such as that of parent or employee; anxiety about medical bills (see Financial Hardship among Cancer Survivors, [page 27](#)); and decisions about which provider to see for various health care needs. Regular medical care following primary cancer treatment is important because of the potential for lingering effects of treatment, as well as the risk of recurrence and new cancer diagnoses.

To aid primary care and other clinicians in survivor care, the American Cancer Society has issued several evidence- and consensus-based cancer-specific comprehensive survivorship care guidelines^{181, 64, 104, 191, 192} as well as guidelines for cancer survivors regarding physical activity and nutrition. However, it is currently unclear whether survivorship care plans are effective as currently

implemented, and research is ongoing to identify how to optimize the transition into long-term survivorship.¹⁹³ For example, studies indicate that although survivorship care plans appear to increase clinician knowledge about the late effects of cancer and may improve patient satisfaction, they do not improve patient self-reported quality of life.^{194, 195}

Long-term Survivorship

The following section discusses common issues related to cancer survivors' quality of life, risk of recurrence and subsequent cancers, financial burden, and health behaviors. Survivors are remarkably resilient, but may have challenges finding a “new normal.”

Quality of Life

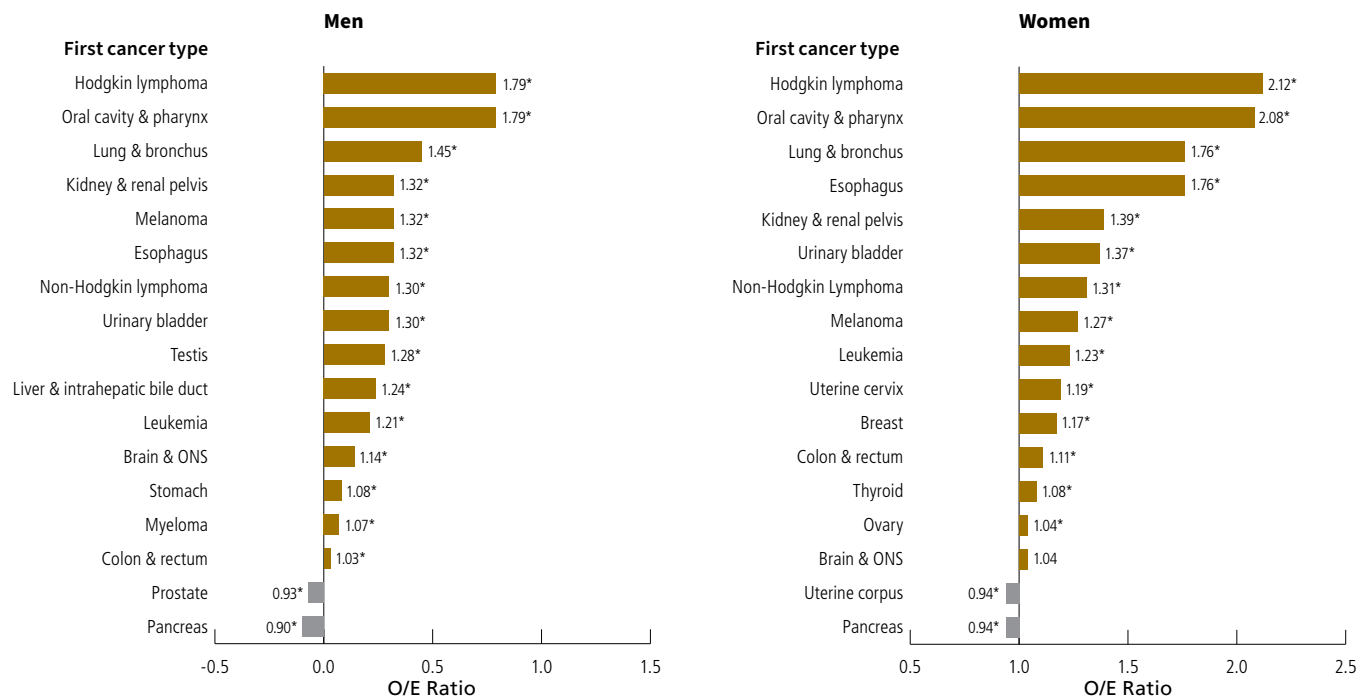
Quality of life is a broad, multidimensional concept that considers a person's physical, emotional, social, and spiritual well-being. Emotional and physical well-being among cancer survivors is comparable to that of those with no history of cancer,¹⁹⁶ although poorer overall physical well-being and social functioning have been reported among long-term (5 years or more) survivors in some studies.^{197, 198} Not surprisingly, individuals who are older and/or have a history of more invasive or aggressive treatments tend to report poorer functioning and quality of life in the long term.¹⁹⁸ Certain groups of survivors, especially those with less access to high-quality care, also report greater difficulty regaining quality of life.^{199, 200} In addition, survivors diagnosed at a younger age tend to have poorer emotional functioning, whereas older age at diagnosis is often associated with poorer physical functioning.²⁰¹ Many survivors of childhood cancer have cognitive or functional deficits that impact their ability to successfully complete their education and find employment, which in turn can impact psychological and financial well-being and lower quality of life.^{202, 203}

Risk of Recurrence and Subsequent Cancers

Even after treatment appears to have been effective, cancer cells may persist and grow, which is referred to as recurrence. Recurrence can occur near the site of the original cancer (local recurrence), in lymph nodes near the original site (regional recurrence), or elsewhere in the body (distant recurrence or metastasis). Although national estimates of recurrence are not available because this information is not collected by cancer registries, studies show that recurrence rates vary depending on cancer type, tumor characteristics, stage of disease, and treatment. For example, triple-negative breast cancer is more likely to recur than hormone-receptor positive disease.²⁰⁴ For some types of cancer, such as hormone receptor-positive breast cancer, tests such as the Oncotype DX assay are available to estimate the risk of recurrence and can help guide treatment to further reduce risk.

A subsequent primary cancer is a new cancer that is biologically distinct from the original cancer. Whether a cancer is a new primary or a recurrence is an important distinction because it determines treatment and prognosis. The risk of developing a subsequent primary cancer varies by the type of cancer first diagnosed (referred to as the first primary), treatment (e.g., radiation), age at diagnosis, patient risk factors (e.g., smoking status), and other factors. Ratios of the observed-to-expected number of cancer cases (O/E) among cancer survivors in population-based cancer registries are used to describe the risk for a subsequent cancer diagnosis, with the number expected based on

Figure 15. Observed-to-expected (O/E) Ratios for Subsequent Cancers by Primary Site and Sex, Ages 20 and Older, 1975-2018



ONS = Other nervous system. *The ratio of the number of subsequent cancers observed among cancer survivors to the number of cancers expected is statistically significant ($p < 0.05$). Note: Observed-to-expected ratio is the number of cancers that were observed among cancer survivors in the SEER 9 areas, divided by the number of cancers expected in this population, calculated using the population-based age-specific incidence rates in the SEER 9 areas.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, 9 SEER Registries, National Cancer Institute.

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cancer occurrence in the general population. As a whole, cancer survivors have a higher chance of being diagnosed with a new cancer compared to the general population.²⁰⁵ Risk is higher for those with a history of childhood cancer,²⁰⁶ as well as for adult survivors of Hodgkin lymphoma and tobacco-related cancers (e.g., oral cavity and pharynx, lung and bronchus, kidney and renal pelvis, esophagus, and urinary bladder) (Figure 15).²⁰⁷ For example, adult survivors of childhood or adolescent Hodgkin lymphoma treated with radiation to the chest are at particularly increased risk of developing lung and female breast cancers.^{206, 208} However, risk of subsequent primary cancers in survivors of childhood cancer has decreased since the 1970s, as treatments have become increasingly more targeted and less invasive.²⁰⁹ In addition to the carcinogenic effects of cancer treatment and shared risk factors, genetic susceptibility also influences risk.²¹⁰

The American Cancer Society’s survivorship care guidelines include recommendations for clinicians regarding appropriate surveillance for recurrent and new primary cancers.^{64, 104, 190, 191} Cancer survivors who have completed treatment should ask their provider about the appropriate timing and types of follow-up tests recommended to look for recurrent or new cancer. Health strategies to reduce the risk of recurrence and additional cancers, as well as improve survivor health and quality of life, are provided in *Regaining a Healthy Lifestyle*, page 28.

Financial Hardship among Cancer Survivors

Cancer survivors experience greater financial hardship than the general population for many reasons, including the inability to work.²¹¹ In one study, nearly one-fifth of cancer survivors switched to part-time employment or a less demanding job following a cancer diagnosis;²¹² those

who changed jobs were more likely to be younger, female, and non-White. Cancer survivors also have higher out-of-pocket medical costs compared to people without a history of cancer, even for many years after treatment, partly reflecting rising costs of anticancer therapies and increased intensity and duration of regimens.²¹¹ Finally, patients are increasingly bearing a larger portion of medical costs, including rises in high-deductible insurance plans, copayments, and coinsurance rates.²¹³ In total, the national patient economic burden associated with cancer care was estimated to be over \$21 billion in 2019.²¹⁴

Manifestations of financial hardship may be material (e.g., problems paying medical bills, medical debt, and bankruptcy), psychological (e.g., stress or worry about paying medical bills), or behavioral (e.g., delaying or forgoing necessary medical care because of cost). The economic burden of cancer is more profound in survivors who are younger or were diagnosed in childhood, underinsured or uninsured, and have lower incomes.^{202, 203, 215-217} In one study, 35% of cancer survivors ages 18-49 years reported difficulty in paying medical bills compared to 25% in those without a history of cancer; this gap narrowed substantially in ages 50-64 years, 27% versus 23%, respectively.²¹⁶ The COVID-19 pandemic has likely exacerbated the economic burden of cancer among survivors due to disruptions in employment and health insurance. (See COVID-19 and Cancer Survivors, [page 5](#).)

The passage of the Affordable Care Act (ACA) in 2010 was intended to improve health insurance coverage options and population health. Provisions of the ACA include the introduction of the Health Insurance Marketplace, which allows individuals to enroll in private plans; dependent coverage expansion, which allows young adults to remain covered under a parent's private health insurance up until 26 years of age; expansion of Medicaid eligibility thresholds for low-income adults with and without children in some states; and protection of health insurance coverage for people with preexisting medical conditions such as cancer. Between 2010 and 2014, the percentage of non-elderly cancer patients (<65 years of age) who were uninsured at diagnosis significantly decreased, especially among Medicaid expansion states.²¹⁸ The ACA has also been associated with declines in the percentage

of survivors reporting delaying medical care and inability to afford medications,²¹⁹ as well as declines in overall out-of-pocket costs.²²⁰

Regaining a Healthy Lifestyle

Survivors who minimize their exposure to cancer risk factors can reduce the risk of recurrence, progression, and additional cancers. For example, early-stage lung cancer survivors who do not smoke cigarettes after diagnosis have a lower risk of disease progression than those who continue to smoke²²¹⁻²²³ and may have a lower risk of recurrence.²²⁴ In addition, healthy behaviors may improve survivor functioning and quality of life.^{225, 226} Exercise can improve heart and lung function and reduce cancer-related fatigue among survivors.^{227, 228} The American Cancer Society recently released updated guidelines for physical activity and nutrition during and after treatment.¹⁸¹

Smoking cessation. Smoking is particularly hazardous for people diagnosed with cancer because it not only increases the risk of recurrence and new diagnosis for 12 different cancers (as well as many other diseases),²²⁹ but also interferes with some common cancer treatments. Nevertheless, a large number of cancer survivors, particularly those who are young and uninsured, continue to smoke after their diagnosis.²³⁰⁻²³² In one study, about 10% of survivors were still smoking 9 years after diagnosis.²³³

Smoking prevalence among cancer survivors overall has declined from 20% in 1992 to 13% in 2019, similar to trends in the general population. However, rates are higher in survivors who are ages 18-44 years, 25% versus 16% in the US population in 2019. Smoking cessation efforts are often most successful when initiated soon after diagnosis²³⁴ and when survivors have adequate social and emotional support.²³⁵ Increasing access to cessation aids, developing tailored interventions, and adopting the 5 A's evidence-based model for treating tobacco dependence (Ask, Advise, Assess, Assist, Arrange) are likely to reduce smoking among cancer survivors. For more information on American Cancer Society resources for smoking cessation, visit cancer.org/healthy/stay-away-from-tobacco/guide-quitting-smoking.html.

Physical activity. Although adult cancer survivors are more likely to meet physical activity guidelines than people without a history of cancer after adjusting for other lifestyle behaviors (e.g., smoking) and socioeconomic and other demographic factors, the proportion of cancer survivors who meet guideline recommendations remains low.²³² Physical activity is paramount for cancer survivors for whom it is safe and feasible, as it can hasten recovery from the immediate side effects of treatment and prevent some long-term side effects, and may also reduce the risk of recurrence and increase survival for some cancers.²³⁶ In observational studies among breast cancer survivors, moderate physical activity has been associated with reduced risk of death from all causes and breast cancer, and may be especially beneficial among women with *BRCA1/2* mutations.^{237,238} Similar benefits have been observed among colon cancer survivors.²³⁹ Intervention studies have shown that exercise can improve fatigue, anxiety, depression, self-esteem, happiness, and general quality of life in cancer survivors.²³⁶

Exercise recommendations should be tailored to the survivor's capabilities and environment. Physical impairments that would limit safe activity should be assessed by rehabilitation professionals before general exercise recommendations are made.

Nutrition, alcohol consumption, and maintaining a healthy body weight. Although the overall prevalence of obesity is higher in cancer survivors than in the general population, it is generally similar after adjusting for differences in sociodemographic factors.²³² Numerous studies have shown that obesity and weight gain in breast cancer survivors lead to a greater risk of recurrence and decreased survival; the evidence is less clear for colorectal and other cancers.²⁴⁰ Obesity may also increase the risk of some treatment-related side effects, such as lymphedema and fatigue.²⁴¹ Obesity has also been associated with substantial excess health care expenditures among younger (ages 18-64 years) cancer survivors.²⁴² A diet plentiful in fruit, vegetables, and whole grains with limited amounts of fat, red and processed meat, and simple sugars, as well as limited alcohol consumption, may reduce the risk of developing both subsequent cancers and other chronic diseases.²⁴³ Studies have shown an increased risk of breast cancer recurrence

among survivors who consume three to four alcoholic drinks per week.²⁴⁴ Survivors of oral cavity and pharyngeal cancers should also be particularly advised to limit alcohol consumption because more than 40% of these new cases are due to excess alcohol intake.¹⁹⁰ However, one recent study reported that alcohol use remains common among cancer survivors in general, and those diagnosed with head and neck, cervical, and testicular cancers and melanoma are more likely to binge drink than other survivors.²⁴⁵

Skin care behaviors. Skin cancer survivors and patients who have undergone radiation therapy are all at an increased risk of subsequent skin cancer, especially survivors of childhood and adolescent cancers.²⁴⁶⁻²⁴⁸ Thus, behaviors that decrease skin cancer risk, such as wearing sunscreen and protective clothing and avoiding sunbathing and artificial tanning, should be particularly encouraged in these individuals.

Cancer screening. In addition to recommended surveillance for subsequent cancers or recurrence, it is important for cancer survivors to resume recommended screening for cancers for which they are at average risk of developing. Screening can detect cancer earlier, when treatment is usually more successful, or, in the case of colorectal and cervical cancer, prevent cancer through the removal of precancerous lesions. In one meta-analysis, cancer survivors were about 20% more likely to report receiving screening for breast, cervical, and colorectal cancer compared with people without a history of cancer.²⁴⁹ However, there is some evidence that overscreening among people with a history of cancer, particularly those with advanced disease, may lead to more harm than benefit.²⁵⁰

Concerns of Caregivers and Families

As hospital space becomes more limited to acute care and cancer treatments are delivered more frequently in outpatient settings, the tremendous responsibility of picking up where the health team leaves off increasingly rests with survivors' loved ones. As such, effective integration of informal cancer caregivers into health care delivery teams is essential for optimizing outcomes for both survivors and their caregivers.²⁵¹

Tools for Cancer Survivors and Caregivers

A number of tools to help survivors and caregivers have been developed through collaborations between the American Cancer Society and other institutions, including the George Washington University Cancer Institute, the Centers for Disease Control and Prevention, and the National Cancer Institute. These include:

Life After Treatment Guide – This quick, easy-to-read information guide helps cancer survivors and their caregivers understand the various aspects of the survivorship journey. The guide includes trusted resources for survivorship information and tips on how to communicate with health care providers. Visit cancer.org/survivorshipguide for a copy of the guide, as well as a version tailored to American Indian and Alaska Native individuals.

Caregiver Resource Guide – The American Cancer Society is committed to providing much-needed support to the family members and friends who provide care to their loved one with cancer. As part of this commitment, targeted information, education, and support has been developed to meet their needs. Our *Caregiver Resource Guide* is designed to improve their: a) confidence in their role as a caregiver; b) caregiving skills in key areas; c) ability to manage their own health and wellness (psychosocial and physical); and d) access to services through multiple modalities and channels. Visit cancer.org/caregiverguide to download the guide.

Caregiver Support Video Series – Caregivers often feel unprepared to care for their loved one. Our *Caregiver Support Video Series* was developed to provide educational support to caregivers as they assist with the everyday needs of cancer patients and provide self-care techniques to improve their quality of life. Topics include: a) caregiver self-care (nutrition, physical activity, stress management and coping, dealing with fear of recurrence, and deep breathing/meditation); b) advocacy, or how to effectively communicate the patient's needs; and c) physical care training (drain care, lifting, pain management, medication management, symptom/side effect management, and identifying signs of infection). Visit cancer.org/caregivervideos to watch the series in English or cancer.org/videoseriecuidadores to watch in Spanish.

Tools for Health Care Professionals

Tools to help health care professionals deliver better survivorship care include:

Adult Posttreatment Cancer Survivorship Care Guidelines – Guidelines for survivors of prostate, female breast, colorectal, and head and neck cancers are available to assist primary care providers and other clinicians as they provide long-term, clinical follow-up care. Visit cancer.org/professionals for copies of the guidelines and bit.ly/SurvivorshipCenter for an overview of this ongoing work. To facilitate delivery of this care, a toolkit was developed that includes resources to help clinicians implement these guidelines, along with information about provider training opportunities and patient materials. (Visit bit.ly/NCSRCToolkit for copies of the toolkit.)

Moving Beyond Patient Satisfaction: Tips to Measure Program Impact Guide – This brief guide details indicators and outcome measures that can be used to monitor the success of survivorship programs. Visit cancer.org/survivorshipprogramevaluation for a copy.

Guide for Delivering Survivorship Care – This guide provides health care professionals with the knowledge, tools, and resources to deliver high-quality cancer survivorship care to cancer survivors. Visit smhs.gwu.edu/gwci/survivorship/ncsrc/guidequalitycare for a copy.

Cancer Survivorship E-Learning Series for Primary Care Providers – This free online continuing education program is designed to educate primary care providers on the care needs of cancer survivors, and on the cancer survivorship care guidelines to help them provide clinical follow-up care for cancer survivors. Visit cancersurvivorshipcentereducation.org to access the series.

Survivorship Care Guidelines App for Clinicians – This free mobile app is available to house content from the breast, colorectal, head and neck, and prostate cancer survivorship care guidelines. The app makes this content available for clinicians as a tool for use in the clinical encounter. Visit cancer.org/health-care-professionals/national-cancer-survivorship-resource-center/tools-for-health-care-professionals.html.

Tools for Cancer Advocates and Policy Makers

Cancer Survivorship: A Policy Landscape Analysis – This white paper is designed to educate policy makers on survivorship issues and describe the priority areas for improving cancer survivorship care. Visit cancer.org/survivorshippolicydocuments for a copy of the paper.

Although increasing attention has been given to the need for greater surveillance of these caregivers and their needs,²⁵² contemporary estimates of caregiver prevalence in the US varies widely, ranging from 1.1 million to 6.1 million.²⁵³ Most caregivers are the spouse, partner, or offspring of cancer patients and are more likely to be women than men.²⁵⁴ Caregiver responsibilities can include gathering information to advise treatment decisions, attending to treatment side effects, coordinating medical care, managing financial issues, and providing emotional support. One study found that even more than a year after cancer diagnosis, caregivers were still spending an average of 8 hours per day providing some form of care, especially for lung cancer patients.²⁵⁵ Research on the financial burden of informal cancer caregiving has been identified as a priority area of investigation, as it is likely currently underestimated as a contribution to the total economic burden of cancer.²⁵⁶

Caregivers report a variety of persistent unmet needs over the course of their caregiving experience, particularly those who provide end-of-life care or are bereaved.^{254, 257, 258} In one study, about 40% of caregivers reported that they found caregiving emotionally difficult, and 12% reported experiencing depression.²⁵⁷ In a national survey, caregivers were more likely to smoke and slept fewer hours than non-caregivers.²⁵⁹ Caregivers may feel unprepared and overwhelmed in their role, which can result in deterioration of their mental and physical health and a decline in quality of life, including an increased risk of developing chronic disease, depression, and anxiety.²⁶⁰ Social support programs aimed at teaching effective coping skills can help buffer the negative consequences of caregiver stress.²⁶¹⁻²⁶³ Consultation with palliative care teams has also been shown to help ease family caregiver

burdens. A systematic review suggested that caregivers benefit most from problem-solving and communication skills interventions.²⁶³ Web-based interventions have also shown promising results in reducing caregiver burden and improving mood.²⁶² In addition, studies have shown that both survivors and their caregivers can benefit from the cancer experience through the restoration of personal relationships, increased empathy, and adoption of a more positive self-view.^{264, 265}

The Future of Cancer Survivorship in the United States

As the population of cancer survivors in the US continues to grow and become more diverse, the importance of optimizing short- and long-term survivorship care and outcomes and understanding the needs of caregivers is increasingly recognized. Several organizations have proposed recommendations for furthering progress in cancer survivorship in the US via innovative and standardized care delivery models.^{251, 266} However, a recent report from the National Cancer Institute identified several persistent gaps in the funding of survivorship research for cancers other than female breast and for older and minority survivors.²⁶⁷ The American Cancer Society has set forth three priority areas for improving quality of life for long-term cancer survivors and their caregivers, including: 1) implementing routine needs assessment of survivors and caregivers; 2) facilitating personalized information and referrals from diagnosis onward for both survivors and caregivers; and 3) disseminating and supporting the implementation of new care methods and interventions.²⁵¹

The American Cancer Society

What Is the American Cancer Society Doing about Cancer?

More than 100 years after the American Cancer Society was founded, we are still working relentlessly to create a world without cancer by funding and conducting research, sharing expert information, supporting patients, and

working to reduce long-standing disparities in cancer prevention, diagnosis, and treatment. In addition, our advocacy affiliate, the American Cancer Society Cancer Action NetworkSM (ACS CAN), actively pursues evidence-based public policies at the local, state, and federal levels that seek to reduce cancer suffering, death, and disparities

for all individuals, regardless of race, ethnicity, gender, age, sexual orientation, socioeconomic status, or ZIP code. (For more information on these initiatives, see the Advocacy section on [page 35](#).)

This work could not be accomplished without the strength of our dedicated volunteers to drive every part of our mission. With the support of our professional staff, volunteers raise funds to support innovative research, provide rides to treatment for people with cancer, and offer peer-to-peer support to those facing a cancer diagnosis – and that’s just the beginning. Thanks in part to our contributions, 3.2 million cancer deaths have been averted in the US since 1991, when cancer death rates were at their peak.

Patient and Caregiver Services

The American Cancer Society provides patients and caregivers with resources that can help improve – and even save – lives. From free rides to treatment and other cancer-related appointments, places to stay when treatment is far from home, and our 24/7 helpline, we’re here for everyone with cancer questions and concerns, when and where they need us.

Cancer Information

Caring, trained American Cancer Society staff connect people with answers about a cancer diagnosis, health insurance assistance, American Cancer Society programs and services, and referrals to other services through our 24/7 helpline at 1-800-227-2345. Our website, [cancer.org](#), offers reliable and accurate cancer information and news, including current information on treatments and side effects, and programs and services available nearby. We can also help people who speak languages other than English or Spanish find the assistance they need at [cancer.org/cancer-information-in-other-languages](#).

The American Cancer Society also publishes a wide variety of pamphlets and books that cover a multitude of topics, from patient education, quality-of-life, and caregiving issues to healthy living. Visit [cancer.org/bookstore](#) for a complete list of books that are available for order. Our books are also available from all major book retailers

such as Amazon and Barnes & Noble. Call 1-800-227-2345 or visit [cancer.org](#) for brochures.

Survivorship. The American Cancer Society’s survivorship work aims to help people living with and beyond cancer from diagnosis through long-term survivorship to the end of life. Efforts focus on helping survivors understand and access treatment; manage their ongoing physical, psychosocial, and functional problems; and engage in healthy behaviors to optimize their wellness. Our posttreatment survivorship care guidelines are designed to promote survivor health and quality of life by facilitating the delivery of high-quality, comprehensive, coordinated clinical follow-up care. Our survivorship research efforts focus on understanding the impact of cancer on multiple facets of survivors’ lives and on developing and testing interventions to help survivors actively engage in their health care and improve their health and well-being through and beyond treatment. Through the National Cancer Survivorship Resource Center, a collaboration between the American Cancer Society and the George Washington University Cancer Center funded by the Centers for Disease Control and Prevention, we created the Cancer Survivorship E-Learning Series for Primary Care Providers. The free e-learning program is designed to teach clinicians how to care for survivors of adult-onset cancers.

Support for caregivers. Contemporary estimates of caregiver prevalence range between 1.1 million and 6.1 million individuals, and the American Cancer Society is committed to meeting their information, education, and support needs. We support the notion that cancer is not isolated only to the individual diagnosed, but also impacts an entire family unit and network of close friends. One of the informational tools we offer caregivers is our *Caregiver Resource Guide* ([cancer.org/caregiverguide](#)), which can help them: learn to care for themselves as a caregiver, better understand what their loved one is going through, develop skills for coping and caring, and take steps to help protect their own health and well-being. Also, our *Caregiver Support Video Series* ([cancer.org/caregivervideos](#)) provides educational support to caregivers as they assist

with the everyday needs of people with cancer and provide self-care techniques to improve their quality of life.

Help navigating the health care system. Learning how to navigate the cancer journey and the health care system can be overwhelming for anyone, but it is particularly difficult for those who are medically underserved, those who experience language or health literacy barriers, and those with limited resources. The American Cancer Society aims to reach those most in need through our National Cancer Information Center (NCIC), where we can help find transportation to treatment and other cancer-related appointments; assist with medical financial issues, including insurance navigation; identify resources; and provide information on a patient's cancer diagnosis and treatment process.

Transportation to treatment. Lack of transportation can be one of the biggest barriers to getting cancer treatment. The American Cancer Society offers transportation solutions that remove barriers to quality health care through our Road To Recovery® program, where volunteers provide patients transportation to treatment. Other community transportation programs may also be available in certain areas.

Lodging during treatment. The American Cancer Society Hope Lodge® program provides a free home away from home for people facing cancer and their caregivers. Hope Lodge guests don't just find a place to heal, they find a community of support and an emotional connection with others facing the same journey.

Breast cancer support. The American Cancer Society Reach To Recovery® program connects people facing breast cancer with trained volunteers who are breast cancer survivors. These volunteers provide one-on-one support to help people cope with their breast cancer diagnosis, treatments, side effects, and more. Visit reach.cancer.org for more information.

Hair-loss and mastectomy products. The American Cancer Society "tlc" *Tender Loving Care*® program offers products for women coping with breast cancer or any

cancer treatment that causes hair loss, as well as advice on how to use these products. Products include wigs, hairpieces, hats, turbans, breast forms, mastectomy bras, post-surgical support and mastectomy swimwear. The *tlc*™ mission is to help women facing cancer treatment cope with the appearance-related side effects of cancer by making these hard-to-find products affordable and readily available for purchase from the privacy of their own homes. To order products or catalogs, call 1-800-850-9445 or visit tlcdirect.org.

Finding hope and inspiration. People with cancer and their loved ones do not have to face their experience alone. The American Cancer Society Cancer Survivors Network® is an online community where patients, survivors, and caregivers can connect with others impacted by cancer, sharing information and support. At csn.cancer.org, members can participate on discussion boards, join a chat room, and build their own support network from among the members.

Support after treatment. The end of treatment does not mean the end of a cancer journey. Cancer survivors may experience long-term or late effects resulting from the disease or its treatment. The *Life After Treatment: The Next Chapter in Your Survivorship Journey* guide may help cancer survivors as they begin the next phase of their journey. Visit cancer.org/survivorshipguide to download a free copy of the guide.

Other Sources of Survivor Information and Support

CancerCare

1-800-813-HOPE or 1-800-813-4673

cancer.org

CancerCare provides professionally facilitated support services for anyone affected by cancer, including a toll-free counseling line, various support groups (online, telephone, or face-to-face), and Connect Education Workshops.

Cancer Support Community

1-888-793-9355

cancersupportcommunity.org

Through a nonprofit network of cancer support worldwide, Cancer Support Community (CSC) offers free support services through professionally led community-based centers, hospitals, community oncology practices, and online communities. The CSC is focused on providing essential, but often overlooked, services, including support groups, counseling, education, and healthy lifestyle programs. In collaboration with the LIVESTRONG Foundation, the CSC developed the Cancer Transitions program for posttreatment cancer survivors, which covers the benefits of exercise, nutrition, relaxation, emotional support, and medical management.

LIVESTRONG Foundation

1-855-220-7777

livestrong.org

The LIVESTRONG Foundation fights to improve the lives of people affected by cancer. Created in 1997, the foundation provides free services and resources that help improve patient and survivor outcomes and address the practical, emotional, employment and financial challenges that come with cancer. LIVESTRONG has also partnered with the YMCA to provide a 12-week program promoting physical activity after a cancer diagnosis (livestrong.org/what-we-do/program/livestrong-at-the-ymca).

National Coalition for Cancer Survivorship

1-877-NCCS-YES or 1-877-622-7937

canceradvocacy.org

The National Coalition for Cancer Survivorship offers free publications and resources that empower people to become strong advocates for their own care or the care of others. The coalition's flagship program is the award-winning *Cancer Survival Toolbox*, a self-learning audio series developed by leading cancer organizations to help people develop crucial skills to understand and meet the challenges of their illness.

National Alliance for Caregiving (NAC)

1-301-718-8444

caregiving.org

The National Alliance for Caregiving (NAC) is a nonprofit coalition of national organizations focusing on advancing family caregiving through research, innovation, and advocacy. The alliance conducts research, does policy analysis, develops national best-practice programs, and works to increase public awareness of family caregiving issues.

Patient Advocate Foundation

1-800-532-5274

patientadvocate.org

The Patient Advocate Foundation (PAF) is a national nonprofit organization that seeks to safeguard patients through effective mediation, assuring access to care, maintenance of employment, and preservation of financial stability. The PAF serves as an active liaison between patients and their insurer, employer, and/or creditors to resolve insurance, job retention, and/or debt crisis matters relative to their diagnosis through professional case managers, doctors, and health care attorneys.

Research

Research is at the heart of the American Cancer Society's mission. For more than 70 years, we have invested in innovative research, all to find the causes, preventions, and better treatments for cancer, as well as ways to help people thrive during and after treatment. The top-tier facilities and programs we fund study everything from nutrition to genetics to environmental and even behavioral factors to find answers that lead to understanding, resulting in more effective treatments.

As of March 2022, the American Cancer Society is funding more than \$103.7 million in cancer treatment research and approximately \$98 million in cancer control, survivorship, and outcomes research. Since 2010, we have awarded 108 grants in symptom management and palliative care focused on patient, survivor, and

quality of life research. Of those, 64 grants were funded through a partnership with the National Palliative Care Research Center.

Specific examples of ongoing and recent intramural and extramural research include:

- Optimizing treatments for chemotherapy-induced peripheral neuropathy
- Developing a novel insomnia treatment for pediatric cancer patients
- Providing communication training for caregivers to promote advanced care planning
- Improving palliative care health literacy and utilization
- Developing wearable biosensors for point of care personalization of cancer drugs
- Advancing family-centered care nursing practices in inpatient oncology care
- Delivering an mHealth symptom management intervention for people with colorectal cancer
- Monitoring financial toxicity among cancer survivors during the COVID-19 pandemic
- Examining changes in stage at diagnosis and insurance status as a result of Medicaid expansion

Advocacy

Saving lives from cancer is as much a matter of public policy as scientific discovery. Lawmakers at the local, state, and federal level play a critical role in enacting policies that help save lives – from increasing funding for cancer research and programs; helping communities prevent cancer and promote good health; ensuring access to quality, affordable health care for all Americans; and improving quality of life for patients and their families.

Created in 2001, the American Cancer Society Cancer Action Network (ACS CAN), the nonprofit, nonpartisan advocacy affiliate of the American Cancer Society, empowers advocates across the country to make their

voices heard and influence evidence-based public policy change, as well as legislative and regulatory solutions that will reduce the cancer burden. ACS CAN is the force behind a powerful grassroots movement uniting and empowering people with cancer, survivors, caregivers, and their families to save lives from cancer.

ACS CAN's advocacy priorities on behalf of people facing cancer and their families are outlined in the following sections.

Access to Care

ACS CAN advocates to ensure consumers have access to comprehensive, affordable health care, including eliminating insurance coverage exclusions, preventing preexisting condition exclusions, eliminating annual and lifetime benefit caps, maintaining essential health benefit coverage requirements, providing tax credits and subsidies for certain individuals to purchase health insurance, and ensuring access to preventive services without cost-sharing. The organization is actively working with states to improve access to comprehensive biomarker testing and to expand eligibility for Medicaid programs, allowing millions of low-income individuals and families to gain access to comprehensive and affordable health care coverage.

ACS CAN is also advocating for other important patient protections, including:

- The prohibition of short-term limited-duration plans, association health plans, and other plans that do not cover comprehensive benefits or protect patients against high needs and costs
- Full federal funding for community health centers, which provide community-oriented primary care in underserved areas
- Establishing a cap for Medicare enrollees' out-of-pocket costs for their outpatient prescription drugs
- Preventing surprise medical bills, and addressing other factors that contribute to people with cancer falling into medical debt

Accelerating Cures

ACS CAN is a leader in the effort to ensure full funding for the nation's public cancer research institutions, including the National Institutes of Health and its National Cancer Institute. Each year, nearly \$5 billion in grant funding for cancer research is distributed to investigators working in cancer centers, universities, and labs in every state of the country. Federal budget pressures threaten this funding every year, and ACS CAN views this driver of the research pipeline to be of prime importance in the search for cures, and works not only to protect this funding, but also to expand it.

In addition to advocating for cancer research funding, ACS CAN works to increase access for people facing cancer to innovative therapies by removing barriers to clinical trial enrollment. Clinical trials are the key step in advancing potential new cancer treatments from the research setting to the cancer care clinic, and patient participation in trials is crucial to their success. Around 20% of cancer clinical trials fail due to insufficient patient enrollment despite high interest on the part of patients. To improve enrollment, ACS CAN, in collaboration with other cancer stakeholders, identified and is working on a set of consensus recommendations to reduce patient barriers to and diversify clinical trial enrollment.

Prevention and Early Detection

ACS CAN is supporting policies that focus on the prevention and early detection of cancer by ensuring access to evidence-based prevention and early-detection services, reducing tobacco use and exposure to secondhand smoke, promoting healthy eating and active living, and increasing uptake of the HPV vaccination to help prevent cancer.

Quality of Life

ACS CAN supports balanced pain policies at the federal and state levels that ensure continued patient and survivor access to pain treatments. The organization also supports the enactment of the Palliative Care and Hospice Education and Training Act to assure that people with cancer have full access to palliative care services, along with curative treatment, from the point of diagnosis through treatment and survivorship or end of life as needed. The legislation provides for increased training and professional development in palliative care, a nationwide public and provider education campaign to disseminate information about the benefits of palliative care, and additional research on pain and symptom management with the intent of improving patient care.

Sources of Statistics

Prevalence. Cancer prevalence was projected using the Prevalence, Incidence Approach Model, a method that calculates prevalence from cancer incidence, cancer survival, and all-cause mortality.²⁶⁸ Briefly, national incidence and survival were modeled by cancer type, sex, and age group using malignant cancer cases diagnosed during 1975-2018 from registries in the Surveillance, Epidemiology, and End Results (SEER) program (2020 data submission). Incident cases included the first diagnosed cancer for a specific cancer type from 1975 to 2018. Mortality data for 1975 to 2018 were obtained from the National Center for Health Statistics. Population

estimates and projections through 2022 were obtained from the US Bureau of Census. Projected US incidence and mortality were calculated by applying 2016-2018 average rates to the respective US population projections by age, sex, race, and year. Survival, incidence, and all causes of mortality were assumed to be constant from 2019 through 2022. Because cancer occurrence statistics used for the projection are for data years prior to 2020, estimates do not reflect the impact of the COVID-19 pandemic on cancer prevalence. For more information on this method, please see publications by Mariotto et al.²⁶⁹

State-level estimates were calculated using 10-year limited duration cancer prevalence data as of January 1, 2018, for 45 states participating in the North American Association of Central Cancer Registries. Prevalence for states with missing data was approximated using average prevalence by age, sex, and race from neighboring states with similar incidence rates. To obtain estimates for January 1, 2022, estimated complete prevalence proportions were then calculated for 2018 applied to the 2022 national estimate.

New cancer cases. The number of new cancer cases in the US in 2022 was published previously.¹³ The estimates were calculated using a spatiotemporal model based on incidence data from 49 states and the District of Columbia for 2004 to 2018 that met the North American Association of Central Cancer Registries' high-quality data standard for incidence. This method considers geographic variations in sociodemographic and lifestyle factors, medical settings, and cancer screening behaviors as predictors of incidence, and also accounts for expected delays in case reporting.

Survival. This report presents relative survival rates to describe cancer survival for selected cancers. Relative survival adjusts for normal life expectancy (and events such as death from heart disease, accidents, and diseases of old age) by comparing survival among cancer patients to that of people not diagnosed with cancer who are of the same age, race, and sex. Five-year survival statistics for all stages combined presented in this publication are available from the SEER Explorer web tool (SEER*Explorer ([cancer.gov](https://seer.cancer.gov))). Current survival estimates are based on cases diagnosed during 2011 to 2017 and followed through 2018 from the 18 SEER registries.⁵⁶ Historical 5-year relative survival rates prior to this time period were based on cases diagnosed in the 9 SEER registries. These survival statistics are generated using the National Cancer Institute's SEER*Stat software version 8.3.9.²⁷⁰

National Cancer Data Base. The National Cancer Data Base (NCDB) is a hospital-based cancer registry jointly sponsored by the American Cancer Society and the American College of Surgeons and includes more than 70% of all malignant cancers in the United States from more than 1,500 facilities accredited by the American College of Surgeons' Commission on Cancer (CoC). The NCDB contains standardized data regarding patient demographics, cancer type, and staging, as well as first course of treatment. The NCDB also collects detailed treatment information on radiation and systemic therapies, which is limited or unavailable in population-based registry data. Visit the SEER-Rx website, seer.cancer.gov/tools/seerrx, for further information regarding the classification of anticancer drugs into the categories of chemotherapy, immunotherapy, hormonal therapy, and targeted therapy.

Although the NCDB is a useful tool in describing cancer treatment at a national level, it may not be fully representative of all cancer patients treated in the United States. Data are only collected for patients diagnosed or treated at CoC-accredited facilities, which are more likely to be located in urban areas and tend to be larger centers compared to non-CoC-accredited facilities. Additionally, cancers that are commonly treated and diagnosed in non-hospital settings (e.g., melanoma, prostate cancer, and nonmuscle invasive bladder cancer) are less likely to be captured by the NCDB because it is a hospital-based registry. Visit facs.org/quality-programs/cancer-programs/national-cancer-database/ for more information about the NCDB.

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