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Antineoplastic drugs prescription during visits by adult cancer patients with comorbidities: findings from the 2010–2016 National Ambulatory Medical Care Survey

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Abstract

Purpose: Cancer treatment may be affected by comorbidities; however, studies are limited. The purpose of this study is to examine the frequency of comorbidities at visits by patients with breast, prostate, colorectal, and lung cancer and to estimate frequency of a prescription for antineoplastic drugs being included in the treatment received at visits by patients with cancer and concomitant comorbidities.

Methods: We used nationally representative data on visits to office-based physicians from the 2010–2016 National Ambulatory Medical Care Survey and selected visits by adults with breast, prostate, colorectal, or lung cancer ($n=4,672$). Nineteen comorbid conditions were examined. Descriptive statistics were calculated for visits by cancer patients with 0, 1, and ≥ 2 comorbidities.

Results: From 2010–2016, a total of 10.2 million physician office visits were made annually by adult patients with breast, prostate, colorectal, or lung cancer. Among US visits by adult patients with breast, prostate, colorectal, or lung cancer, 56.3% were by patients with ≥ 1 comorbidity. Hypertension was the most frequently-observed comorbidity (37.7%), followed by hyperlipidemia (19.0%) and diabetes (12.3%). Antineoplastic drugs were prescribed in 33.5% of the visits and prescribed at a lower percentage among visits by cancer patients with COPD (21.3% versus 34.3% of visits by cancer patients without COPD) and heart disease (22.7% versus 34.2% of visits by cancer patients without heart disease).

Conclusion: Our study provides information about comorbidities in cancer patients being treated by office-based physicians in an ambulatory setting.

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Conflict of interest:

The authors state no conflict of interest.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Center for Health Statistics, Centers for Disease Control and Prevention.

Keywords

Ambulatory health care; cancer visits; comorbidities; antineoplastic drugs prescription

Introduction

Cancer is the second leading cause of death in the United States(1). In 2018, 1,735,350 new cancer cases and 609,640 cancer deaths were projected to occur in the United States(1). Approximately 70% of patients with cancer are ≥ 65 years(2). With the number of adults ≥ 65 expected to increase from 35 million in 2000 to 72 million by 2030(2), an increasing number of older patients are expected to be diagnosed with cancer, require treatment, and have comorbidities (i.e., coexisting medical conditions distinct from the principal cancer diagnosis)(3). Data from Medicare beneficiaries in the United States show that 25% of patients with the most common cancer diagnoses, namely, breast, prostate, lung and colorectal cancer, have ≥ 1 chronic condition besides the cancer diagnosis, and 15% have ≥ 2 chronic conditions(4).

Cancer patients with comorbidities are often not included or underrepresented in clinical trials, and guidelines may not exist to inform chemotherapy treatment decisions in cancer patients with various comorbidities, which could lead to over- or under-treatment(2, 5–7). Yet the decision-making process for chemotherapy treatment in cancer patients with comorbidities must weigh the benefits of chemotherapy with the risks of toxicity, patient tolerability and future quality of life(8). Multiple studies have demonstrated that comorbidities are relevant to the prognosis of cancer patients, and considering comorbid conditions in the management of a patient's cancer treatment may be important for prolonging overall survival and improving quality of life(9–12). The majority of studies investigating the impact of comorbidities on the administration of chemotherapy for the treatment of cancer report that patients with comorbidities were less likely to receive chemotherapy(10, 13–18). A few studies found no difference(9, 19–21), and in one study, men with diabetes were more likely to receive chemotherapy for prostate cancer than men without comorbidities(22). However, the majority of cancer-comorbidity studies did not assess the effect of specific comorbidities, but evaluated the collective effect of comorbidities by using a score(8). Moreover, the majority of the studies are based on population-based cancer registries linked to administrative data which might lack information on common comorbidities, such as hypertension or hyperlipidemia(4). Therefore, there are gaps in the literature regarding the description of cancer and specific comorbidities, and the receipt of chemotherapy, in particular no recent data are available on characteristics of outpatient visits made by patients with cancer and comorbidities. A recent study, using data from the Medical Expenditure Panel Survey has shown that among

cancer patients, ambulatory care visits accounted for the largest portion of health care expenditures (23). Due to the resources invested in cancer care in the outpatient office setting, it is important to examine the characteristics of visits and care provided at visits made by patients with cancer.

In this study, we use nationally-representative data on visits to physician offices from 2010–2016 to evaluate the frequency of comorbidities at visits by patients with breast, prostate, colorectal, and lung cancer. Finally, we estimate frequency of a prescription for antineoplastic drugs being included in the treatment received at visits by patients with cancer and concomitant comorbidities.

Methods

Data used in this study are from the 2010–2016 National Ambulatory Medical Care Survey (NAMCS), an annual survey conducted by the National Center for Health Statistics (NCHS). It is representative of ambulatory patient visits made to nonfederal, office-based physicians in the United States (i.e., 50 states and the District of Columbia). Weighted NAMCS physician participation rates, calculated by dividing the physicians who provided data on at least one patient visit by the total number of in-scope physicians, and multiplying by 100, ranged from 47.5% in 2016 to 59.3% in 2010. Detailed information regarding the survey instrument is available elsewhere (<https://www.cdc.gov/nchs/ahcd/>). To increase sample size and improve reliability, NAMCS data from the years 2010–2016 were merged.

To identify mutually-exclusive visits with breast, prostate, colorectal, and lung cancer diagnosis, we selected records in which the primary diagnosis field was coded as ICD-9-CM 174–175 and ICD-10-CM C50.0–C50.9 (breast cancer), ICD-9-CM 185 and ICD-10-CM C61 (prostate cancer), ICD-9-CM 153–154 and ICD-10-CM C18.0–C18.9, C19, C20 (colorectal cancer), or ICD-9-CM 162 and ICD-10-CM C34.00, C34.01, C34.02, C34.10, C34.11, C34.12, C34.2, C34.30, C34.31, C34.32, C34.80, C34.81, C34.82, C34.90, C34.91, C34.92 (lung cancer). Only visits by adult patients aged ≥ 18 years were included in our sample ($n=4,672$). We considered a cancer visit as any visit in which the primary diagnosis was breast, prostate, colorectal, or lung cancer, regardless of the patient's chief complaint at the visit. The demographic variables used in the analyses were age, sex, and race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic). The physician specialty variable was divided into two categories: oncologists and non-oncologists as cancer patients may see non-oncologists as they are often treated for prolonged periods of time, have frequent follow-ups and may have comorbidities that require a multidisciplinary care approach(24). Moreover, some current chemotherapy treatments are administered in ambulatory settings by nurses(25). Finally, all expected sources of payment listed in the medical chart were combined into three mutually exclusive insurance groups: private insurance, Medicare or Medicaid, and other/unknown (includes worker's compensation, self-pay, no charge/charity, and other sources of payment). For visits with more than one expected source of payment, a single expected source of payment is used based on the following hierarchy: Medicare, Medicaid/CHIP, private insurance, worker's compensation, self-pay, no charge/charity, other, and unknown.

NAMCS medications were coded using Lexicon Plus®, a proprietary database of Cerner Multum, Inc. Antineoplastic drugs were considered prescribed/administered if visits were included in the Cerner Multum's Lexicon first-level therapeutic category code "20 antineoplastics". More than one prescription for the same chemotherapy cycle may be

recorded during the same visit. A list of medications included in this category is provided in Supplementary Table 1.

Nineteen comorbid conditions, defined as coexisting medical conditions distinct from the principal cancer diagnosis, were included. We selected conditions that are part of the Charlson index (26, 27) as well as additional conditions (hypertension, hyperlipidemia, depression, osteoporosis, and asthma) included in NAMCS. In addition to the diagnoses codes, NAMCS asks about whether certain conditions are currently present using a checkbox (yes/no) format. Twelve of the conditions of interest for this analysis are included under this checkbox format: arthritis, asthma, chronic kidney disease, chronic obstructive pulmonary disease, congestive heart failure, ischemic heart disease (coronary artery disease, ischemic heart disease or history of myocardial infarction), depression, diabetes, hyperlipidemia, hypertension, osteoporosis, and stroke. A checked box (i.e., response of yes) for any of these conditions on NAMCS indicates that the medical record contains documentation that the patient currently has the condition, although it did not necessarily have to be diagnosed during the current visit. As described previously, NAMCS also separately collects up to five diagnoses for the current visit, indicated by ICD-9-CM codes (NAMCS 2010–2015) and ICD-10-CM codes (NAMCS 2016). We used these diagnosis codes for the conditions included in Charlson index that do not have a checkbox (Supplementary Table 2). We grouped similar conditions from the Charlson index together (e.g., liver disease [mild] and liver disease [moderate/severe]; diabetes and diabetes with complications). Finally, a trichotomous measure was created signifying: cancer and no comorbidity (i.e., absence of all the 19 chronic conditions listed above; but still could include some other diagnosis), cancer and one comorbidity, and cancer and ≥ 2 comorbidities.

Descriptive estimates were generated, including overall percentages of a prescription for antineoplastic drugs being included in the treatment received at visits by cancer patients, types of cancer, comorbid conditions, and potential confounders among visits by adult patients with cancer and zero and ≥ 1 comorbidity. Percentages for the most common comorbidities by adult patient cancer types were also examined. Differences among subgroups were evaluated with 2-tailed t test by using $P < .05$ as the level of significance. One-sample t-test was performed to compare visits by patients with cancer with no comorbidity versus visits by patients with cancer with ≥ 1 comorbidity in Table 2 and Table 3.

Data are weighted to produce national estimates that account for the stratified complex sample design of NAMCS. All estimates presented are annual averages. Percentages were suppressed if they did not meet the NCHS standards for presentation of proportions(28) and weighted population counts were flagged if their relative standard errors were $> 30\%$. Data analyses were performed using the statistical packages SAS version 9.4 (SAS Institute, Cary, N.C.) and SAS-callable SUDAAN version 11.0 (RTI International, Research Triangle Park, N.C.).

Results

For our analysis, we selected the most common cancers in our sample: breast, prostate, colorectal and lung cancer. A total of 10.2 million physician office visits were made annually by adult patients with breast, prostate, colorectal, or lung cancer (Table 1), hereafter referred to as “cancer visits.” Visits by adults with breast, prostate, colorectal, and lung cancer represented 41.2%, 25.4%, 16.8% and 16.6% of the total visits with cancer selected for our analysis, respectively. The mean age of patients making a cancer visit was 65.8 years. Overall, more visits by cancer patients were made by women than men (57.2% vs. 42.8%, $P<.001$). More visits were made by non-Hispanic white, than non-Hispanic black and Hispanic adults (77.7% vs 9.5%, $P<.001$ and 77.7% vs 9.0%, $P<.001$).

Oncologists were seen at 51.4% of cancer visits, not different from the percentage of cancer visits made to non-oncologists (48.6%). The expected source of payment was Medicare/Medicaid for 55.8% of the visits, followed by private insurance (36.0%) ($P<.001$).

Patients making a breast cancer visit were younger (61.7 years) than patients making prostate, colorectal or lung cancer visits (Supplementary Table 3). More visits were made by non-Hispanic white, than non-Hispanic black and Hispanic adults across all cancer types. Oncologists were seen more frequently than other providers among visits made by patients with breast, colorectal and lung cancer whereas the opposite pattern was observed for visits by patients with prostate cancer. The expected source of payment was Medicare/Medicaid for most visits, followed by private insurance, across all cancer type.

Approximately 44% of cancer visits were by patients with cancer and no comorbidities, 23% of visits were by patients with cancer and one comorbidity, and 33.0% of visits by patients with cancer and ≥ 2 comorbidities.

The percentage of visits by patients with breast cancer was higher than the percentage of visits made by patients with prostate, colorectal or lung cancer across all three comorbidity groups ($P<.001$) (Table 1). The average patient age was 62.5 years for visits by patients with no comorbidities, 66.4 years for visits by patients with one comorbidity and 69.8 years for visits by patients with ≥ 2 comorbidities. There was no significant difference in the percentage of visits made to oncologists and non-oncologists across all three comorbidity groups. Oncologists were seen at 53.9% of visits by patients with cancer and no comorbidity, 48.6% of visits by patients with cancer and one comorbidity and 50.0% of visits by patients with cancer and ≥ 2 comorbidities. Medicare and Medicaid were the primary expected sources of payment for visits by patients with one comorbidity and by patients with ≥ 2 comorbidities, whereas no significant difference between Medicare/Medicaid and private insurance among visits by patients with cancer and no comorbidity.

Among visits by patients with breast cancer, 20.9% had one comorbidity while 29.0% had ≥ 2 comorbidities ($p=0.001$). Among visits by adults with prostate cancer, 25.3% had one comorbidity and 35.8% had ≥ 2 comorbidities ($p=0.002$). Among visits by colorectal cancer patients, 22.2% had one comorbidity and 32.9% were made by patients with ≥ 2 comorbidities ($p=0.01$). Among visits by adults with lung cancer, 27.5% had one comorbidity and 38.6% had ≥ 2 comorbidities ($p=0.03$) (Figure 1). Overall, hypertension was

the most frequently-observed comorbidity, found in 37.7% of the visits by patients with cancer. This was followed by hyperlipidemia (19.0%), diabetes (12.3%), arthritis (11.4%), and depression (7.7%) (Figure 2). Regardless of cancer type, hypertension was the most frequently-observed comorbidity.

When comparing visits by adult cancer patients with no comorbidities versus visits by adult cancer patients with ≥ 1 comorbidities, more visits were made by cancer patients with ≥ 1 comorbidities than by cancer patients with no comorbidities. Among visits by non-Hispanic white adults, 58.0% of the visits were made by cancer patients with ≥ 1 comorbidities. Among visits by cancer patients to non-oncologists, 58.6% were by patients with ≥ 1 comorbidities. Among visits in which the expected source of payment was Medicare/Medicaid, 62.1% were made by cancer patients with ≥ 1 comorbidities (Table 2).

Antineoplastic drugs were prescribed in approximately 3.4 million (or 33.5%) of visits by cancer patients. Precisely 5.4% of the visits in which antineoplastic drugs were prescribed also had radiation therapy prescribed or administered (data not shown). Cancer patients with ≥ 1 comorbidities made 57.1% of the visits with prescription for antineoplastic drugs (Table 3). Among visits with a prescription for antineoplastic drugs, visits made by cancer patients with ≥ 1 comorbidities were higher compared to visits made by cancer patients with no comorbidities across all subgroups with the exception of visits with private insurance and other/unknown as expected source of payment, for which no differences were found. Among visits with a prescription for antineoplastic drugs, 2.6 million of the visits were made to oncologists (76.0%).

In analysis by specific comorbidities, the percentage of visits with a prescription for antineoplastic drugs was significantly higher for visits by cancer patients with depression compared to visits by cancer patients without depression (43.7 versus 32.7% $P=.02$). We also found that antineoplastic drugs were prescribed less often among cancer patients with chronic obstructive pulmonary disease (COPD) than among cancer patients without COPD (21.3% vs 34.3% $P=.005$), and among cancer patients with ischemic heart disease than cancer patients without ischemic heart disease (34.2% versus 22.6% $P=.02$). Renal disease, cerebrovascular disease, congestive heart failure, peripheral vascular disease, peptic ulcer disease, hemiplegia or paraplegia, dementia, liver disease, and AIDS were not shown because the corresponding proportions do not meet standards of precision (Figure 3).

Discussion

This study found that over half (56.3%) of the visits by cancer patients were by patients with ≥ 1 comorbidities. Edwards et al. reported US Medicare beneficiaries ≥ 66 years with breast and prostate cancers had similar prevalence of comorbidity as non-cancer patients (30%–32%), patients with colorectal cancer had higher prevalence (41%), and lung cancer patients had the highest prevalence of comorbidities (53%)(4). Although it is recognized that comorbidities are common among cancer patients, comparing comorbidity prevalence data across cancer studies is made difficult by the large variability of conditions used, as comorbidity varies based upon the measure used, the study population, and the cancer type. Comorbidities appear to be more common in studies restricted to older patients and less

common in studies based on claims data, cancer registries or self-report(29)(8). Although these studies are not easily comparable to ours because the unit of analysis is different, a higher proportion of our study population had comorbidities compared to Edwards et al. This could be explained by the inclusion of additional comorbidities, common in the population, in our analysis, such as hypertension, hyperlipidemia, depression, asthma and osteoporosis.

In our analysis, the most common comorbid condition found in visits by adult cancer patients was hypertension, which is consistent with Piccirillo et al. who found hypertension was present in 37% of cancer patients(30). This finding is consistent with the high prevalence of hypertension in the general population(31).

We found that among cancer visits with a prescription for antineoplastic drugs, the percentage of visits made by patients with ≥ 1 comorbidities was higher compared to visits made by cancer patients with no comorbidities. A possible explanation is that people with multiple comorbidities may access the health care system more frequently, have a need to better manage their conditions (including cancer), and subsequently might receive more treatment. (32–34) (35, 36). It is also possible that patients with comorbidities receive modified cancer treatment that requires more frequent visits.(37, 38) Finally, since cancer stages influence treatment, and surgery and radiotherapy could be alternatives to chemotherapy (e.g., in patients with localized prostate cancer), (39, 40) it is also possible that patients with no comorbidities have cancers at stages that would not benefit from antineoplastic drugs administration.

We found that the percentages of visits with a prescription for antineoplastic drugs by cancer patients with COPD were significantly lower than the percentages of visits with prescription for antineoplastic drugs by cancer patients without COPD. In previous studies COPD has been shown to be associated with less adherence to chemotherapy in breast, prostate, colon and lung cancer(8, 15, 19, 22). We found that the percentages of visits with prescription for antineoplastic drugs by cancer patients with ischemic heart disease were significantly lower than the percentages of visits with a prescription for antineoplastic drugs by cancer patients without ischemic heart disease. It has been shown that acute coronary events can be precipitated by infusion of several chemotherapeutic agents(41–44). The percentages of visits with a prescription for antineoplastic drugs by cancer patients with depression were significantly higher than the percentages of visits with prescription for antineoplastic drugs by cancer patients without depression. Previous studies have found that, at least subclinical depression, was present in approximately 29% of cancer patients(45). In particular, some studies found high prevalence of depression in cancer patients prior to chemotherapy and increased depressive disorders triggered by chemotherapy(46, 47), which might explain our findings. We did not find any significant difference between cancer visits with and without hypertension and cancer visits with and without diabetes for prescription for antineoplastic drugs. Some studies have shown that breast cancer patients with diabetes still receive chemotherapy, although modified breast cancer treatment regimens were the preferred options(13, 48, 49). We also did not find any significant difference between the percentage of visits with a prescription for antineoplastic drugs in cancer visits with and without hyperlipidemia, arthritis, osteoporosis, or asthma.

Our study has limitations that can affect the interpretation of the results. First, stage of cancer and time since diagnosis is unknown and both factors may influence cancer treatment or chemotherapy suitability. Also, because time since diagnosis is unknown and follow-up visits for cancer can continue long after the diagnosis, it is possible that visits made by cancer patients with cancer in remission could be included. However, we excluded codes listing a personal history of cancer, including only visits with ICD-9-CM and ICD-10-CM codes denoting a first listed, primary diagnosis of breast, colon, or colorectal cancer.

Second, our study is cross-sectional, and therefore causation cannot be inferred. It is possible that the comorbidities were a consequence of the chemotherapy; therefore, limiting further access to treatment. Third, subgroup analysis by specific comorbidities and cancer type could not be conducted due to small sample size. Fourth, although from 2010–2016 there was an increasing trend in the percentage of visits by adult cancer patients with ≥ 2 comorbidities, and a decreasing trend in the percentage of visits by adult cancer patients with no comorbidities (data not shown), we combined these data and presented a time-averaged association. Fifth, only ambulatory data (i.e., non-inpatient) are included in this analysis, therefore patients with more severe comorbidities or advanced cancer stage may not be captured by this analysis. Finally, the unit of analysis for NAMCS is an ambulatory care visit to a physician in the United States; thus, the number of visits rather than the number of people are measured, so it may be difficult to interpret the data at patient level as it is possible for the same person to be counted multiple times. However, the reporting period of the NAMCS is only one week, decreasing the likelihood of repeated office visits by the same patient during this period.

Our study also has several strengths. NAMCS is nationally-representative and provides data abstracted from patient medical records, which may result in more complete collection of data. Although the impact of comorbidities on cancer prognosis and treatment decision has been investigated in several studies (8, 11, 12, 37), many questions about specific comorbidities remain unanswered. Previous studies were based on cancer registries linked to administrative data, which may underestimate comorbidities because there is limited information on common chronic conditions such as hypertension, depression, or asthma. Our study also included comorbidities that are not listed in the Charlson index. The Charlson Index is an accepted measure of comorbidities and was shown to predict 1-year all-cause mortality(26); however, it does not account for the mentioned chronic conditions, which are expected to affect overall patient health, quality of life, and access to healthcare, especially in older patient populations(4).

As a nationally-representative study of office-based ambulatory medical care, our study provides information about comorbidities in visits by adult cancer patients and antineoplastic drugs prescription received during these visits. These findings complement the literature regarding cancer and comorbidities among adult patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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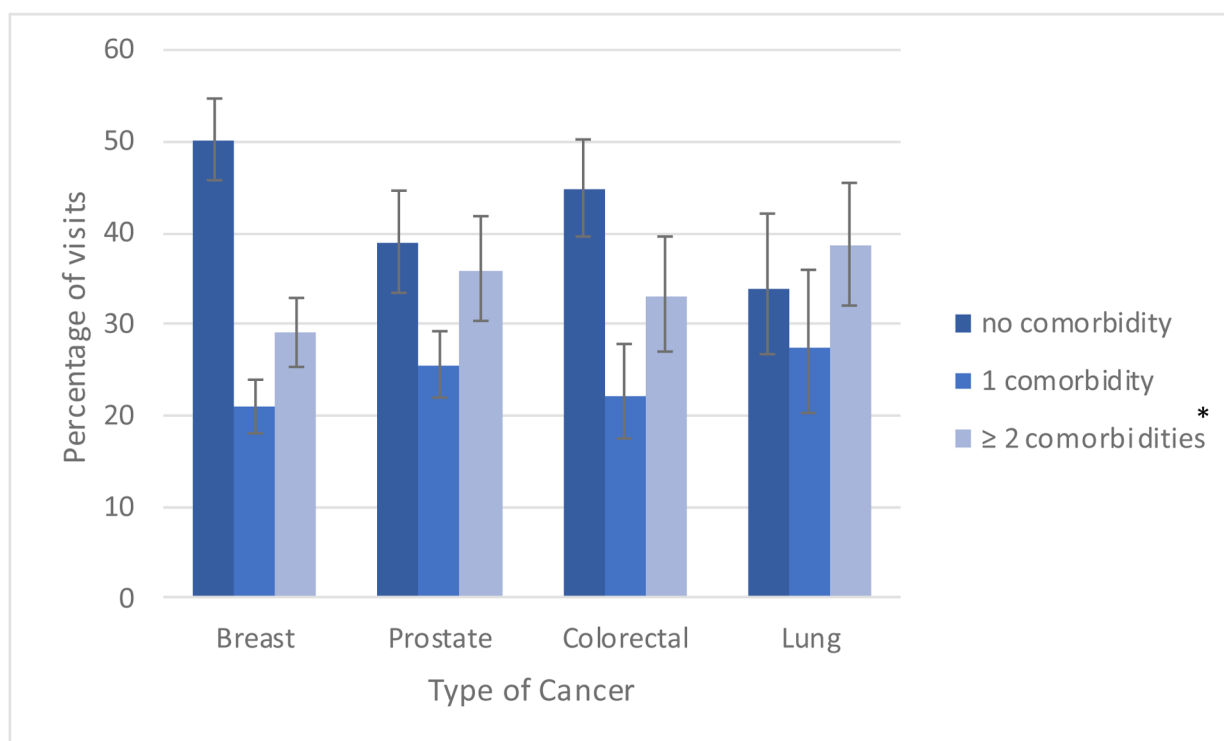


Figure 1. Percentage of physician office visits by adult patients by number of comorbidities and cancer type: United States, 2010–2016

Percentage of physician office visits by adult patients by number of comorbidities and cancer type: United States, 2010–2016

Note: Error bars represent KornGraubard 95% confidence interval. *Significantly higher than 1 comorbidity group in all cancer type. Source: National Ambulatory Medical Care Survey 2007–2016 (n=4,672)

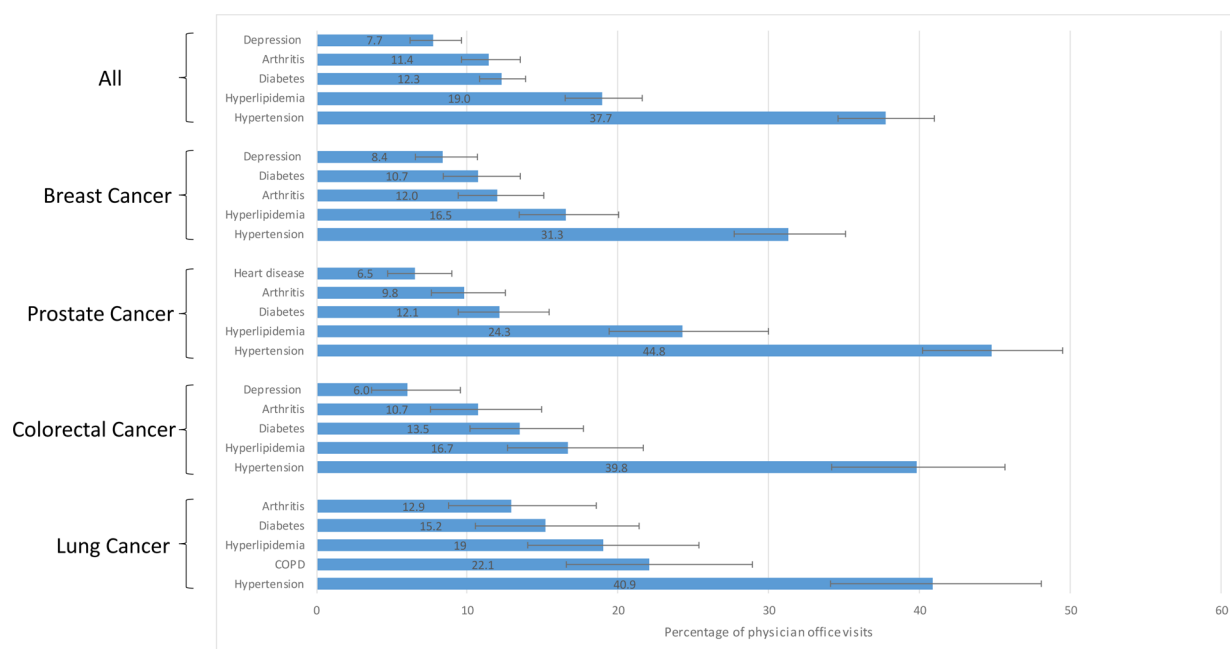


Figure 2. Five most frequently-observed comorbidities among physician office visits by adult patients with breast, prostate, colorectal and lung cancer by cancer type: United States, 2010–2016

Five most frequently-observed comorbidities among physician office visits by adult patients with breast, prostate, colorectal and lung cancer by cancer type: United States, 2010–2016
 Abbreviation: COPD, chronic obstructive pulmonary disease. Note: Error bars represent KornGraubard 95% confidence interval. Source: National Ambulatory Medical Care Survey, 2010–2016 (n=4,672).

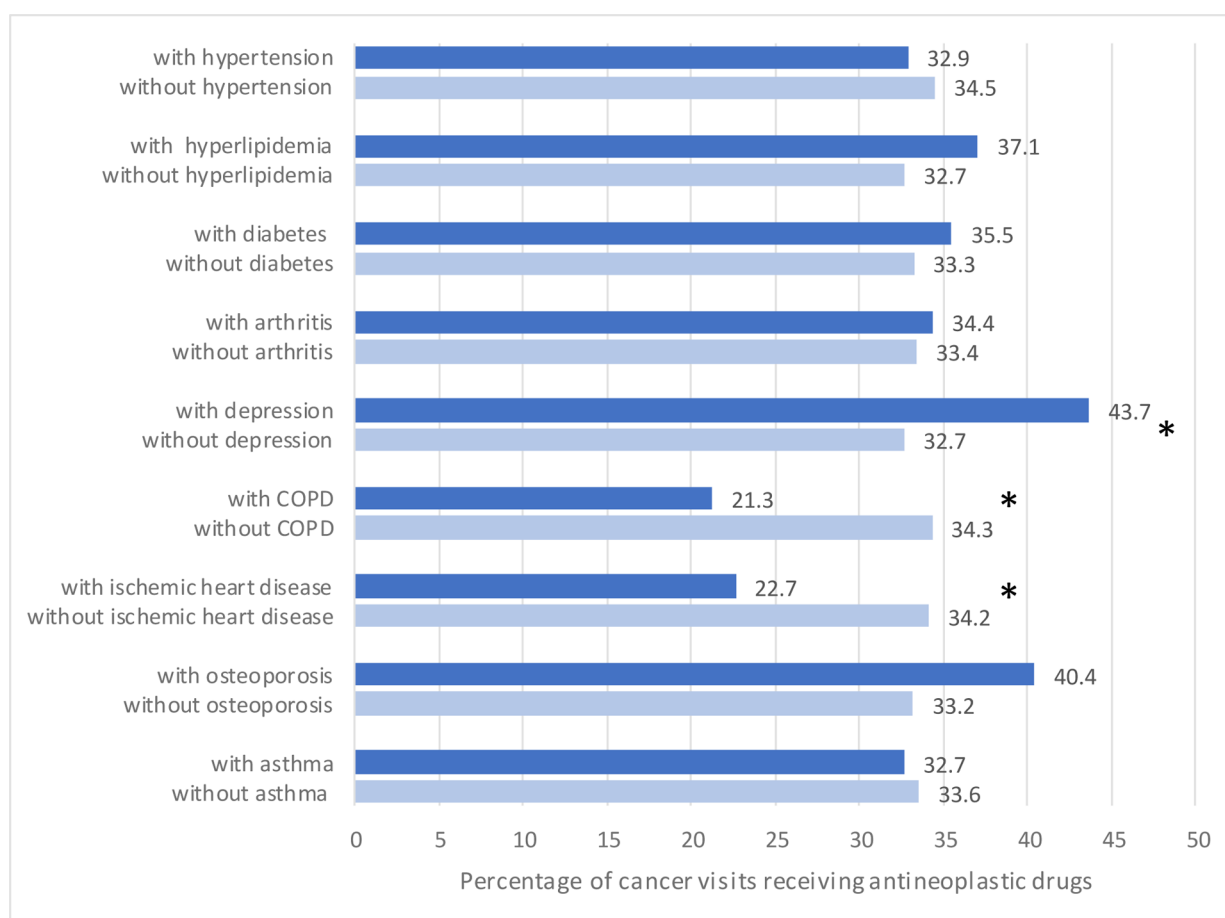


Fig. 3.

Percentage of physician office visits by adult patients with breast, prostate, colorectal, or lung cancer with antineoplastic drugs prescription, by presence or absence of specific comorbidities: USA, 2010–2016. The percentage of visits with a prescription for antineoplastic drugs was significantly higher for visits by cancer patients with depression compared to visits by cancer patients without depression. Antineoplastic drugs were prescribed less often among cancer patients with chronic obstructive pulmonary disease (COPD) than among cancer patients without COPD, and among cancer patients with ischemic heart disease than cancer patients without ischemic heart disease

* $P < .05$ Abbreviation: COPD, chronic obstructive pulmonary disease. Note: Renal disease, cerebrovascular disease, congestive heart failure, peripheral vascular disease, peptic ulcer disease, hemiplegia or paraplegia, dementia, liver disease, and AIDS were not shown because the proportion do not meet NCHS standards of precision. Source: National Ambulatory Medical Care Survey 2010–2016 (n=1,578)

Table 1.

Characteristics of physician office visits by adult patients with breast, prostate, colorectal, and lung cancer, with and without comorbidities: United States, 2010–2016

	Visits by adults with breast, prostate, colorectal, and lung cancer						
	Total	with no comorbidity			with 1 comorbidity		with ≥2 comorbidities
	No. (Weighted No. in 1000s)	% (SE)	No. (Weighted No. in 1000s)	% (SE)	No. (Weighted No. in 1000s)	% (SE)	No. (Weighted No. in 1000s)
Total	4672 (10155)	2239 (4439)	43.7 (1.7)	1114 (2368)	23.3 (0.9)	1319 (3348)	33.0 (1.6)
Type of cancer							
Breast ^a	1944 (4189)	41.2 (1.7)	1023 (2102)	47.3 (2.1)	446 (874)	36.9 (2.7)	475 (1213)
Prostate ^b	1297 (2576)	25.4 (1.8)	578 (1001)	22.5 (2.1)	325 (653)	27.6 (2.6)	394 (922)
Colorectal ^c	760 (1702)	16.8 (1.0)	382 (763)	17.2 (1.4)	170 (378)	15.9 (1.9)	208 (561)
Lung	671 (1688)	16.6 (1.3)	256 (573)	12.9 (1.4)	173 (464)	19.6 (3.4)	242 (652)
Sex							
Female ^d	2630 (5812)	57.2 (1.9)	1326 (2683)	60.4 (2.4)	626 (1373)	58.0 (3.0)	678 (1756)
Male	2042 (4343)	42.8 (1.9)	913 (1756)	39.6 (2.4)	488 (995)	42.0 (3.0)	641 (1592)
Age (Mean) (SE)	65.8 (0.3)		62.5 (0.7)		66.4 (0.6)		69.8 (0.5)
MEDIAN (IQR)	66.4 (57.2–74.4)		62.9 (52–72)		66.5 (59–74.3)		69.8 (62.1–76.3)
Race/Ethnicity¹							
Non-Hispanic White ^e	3773 (7888)	77.7 (2.0)	1787 (3310)	74.6 (2.9)	901 (1884)	79.5 (2.2)	1085 (2695)
Non-Hispanic Black	450 (966)	9.5 (0.9)	220 (463)	10.4 (1.3)	108 (225)	9.5 (1.4)	122 (278)
Hispanic	310 (916)	9.0 (1.3)	170 (458)	10.3 (2.0)	75 (209)	8.8 (1.8)	65 (249)
Provider							
Oncologist ²	2518 (5216)	51.4 (3.5)	1264 (2393)	53.9 (3.3)	570 (1150)	48.6 (3.9)	684 (1673)
Other	2154 (4939)	48.6 (3.5)	975 (2045)	46.1 (3.3)	544 (1218)	51.4 (3.9)	635 (1675)
Expected source of payment³							
Private insurance ^f	1825 (3657)	36.0 (1.6)	1009 (1898)	42.8 (2.7)	428 (899)	38.0 (2.5)	388 (859)
							25.6 (2.2)

	Visits by adults with breast, prostate, colorectal, and lung cancer						
	with no comorbidity		with 1 comorbidity		with ≥2 comorbidities		
	No. (Weighted No. in 1000s)	%(SE)	No. (Weighted No. in 1000s)	%(SE)	No. (Weighted No. in 1000s)	%(SE)	%(SE)
Total							
	No. (Weighted No. in 1000s)	%(SE)	No. (Weighted No. in 1000s)	%(SE)	No. (Weighted No. in 1000s)	%(SE)	%(SE)
Medicare/Medicaid	2519 (5668)	55.8 (2.1)	1055 (2149)	48.4 (2.6)	617 (1266)	53.5 (2.8)	67.3 (3.2)
Other/Unknown	328 (830) *	*	175 (391)	8.8 (2.3)	69 (203) *	*	*

* Estimate does not meet NCHS standards of reliability.

¹ Non-Hispanic other not shown (n=139)

² Oncologist includes gynecological oncology, musculoskeletal oncology, hematology/oncology, medical oncology, and surgical oncology

³ Expected source of payment is based on a hierarchy because more than one insurance could be selected as expected source of payment (see Methods section for more information)

^a Significantly different from the other cancer types overall and across all comorbidity groups;

^b Significantly different from the other cancer types overall and among visits with no comorbidity and with ≥2 comorbidities; significantly different from colorectal cancer among visit with 1 comorbidity;

^c Significantly different from lung cancer among visits with no comorbidity;

^d Significantly different from male overall, among visits with no comorbidity and with 1 comorbidity;

^e Significantly different from the Non-Hispanic Black and Hispanic overall and across all comorbidity groups;

^f Significantly different from Medicare/Medicaid and other/unknown overall, among visits with 1 comorbidity, and among visits with ≥2 comorbidities.

Abbreviations: No., unweighted sample size; SE, standard error; IQR, interquartile range.

Source: National Ambulatory Medical Care Survey 2010–2016 (n=4,672). Numbers may not add to totals due to rounding.

Table 2.

Percentages of physician office visits by adult patients with breast, prostate, colorectal and lung cancer with no comorbidities and ≥ 1 comorbidities, by selected patient characteristics: United States, 2010–2016

	Total	Visits by adults with breast, prostate, colorectal, and lung cancer				P value No comorbidity vs. ≥ 1 comorbidities
		No.(Weighted No. in 1000s)	% (SE)	with no comorbidity % (SE)	with ≥ 1 comorbidities % (SE)	
Total	4672 (10155)		100	43.7 (1.7)	56.3 (1.7)	<.001
Sex						
Female	2630 (5812)		57.2 (1.9)	46.2 (2.3)	53.8 (2.3)	0.03
Male	2042 (4343)		42.8 (1.9)	40.4 (2.1)	59.6 (2.1)	<.001
Age (Mean) (SE)	65.8 (0.4)			62.5 (0.8)	68.4 (0.4)	
MEDIAN (IQR)	66.4 (57.2–74.4)			62.9 (52–72)	68.6 (60.5–75.8)	
Race/ethnicity¹						
Non-Hispanic White	3773 (7888)		77.7 (2.0)	42.0 (1.9)	58.0 (1.9)	<.001
Non-Hispanic Black	450 (966)		9.5 (0.9)	47.9 (4.5)	52.1 (4.5)	>0.05
Hispanic	310 (916)		9.0 (1.3)	50.0 (6.1)	49.9 (6.1)	>0.05
Provider						
Oncologist ²	2518 (5216)		51.4 (3.5)	45.9 (3.0)	54.1 (3.0)	<.001
Other	2154 (4939)		48.6 (3.5)	41.4 (1.9)	58.6 (1.9)	<.001
Expected source of payment³						
Private insurance	1825 (3657)		36.0 (1.6)	51.9 (2.4)	48.1 (2.4)	>0.05
Medicare/Medicaid	2519 (5668)		55.8 (2.1)	37.9 (2.5)	62.1 (2.5)	<.001
Other/Unknown	328(830)*		*	47.1 (5.2)	52.9 (5.2)	>0.05

* Estimate does not meet NCHS standards of reliability.

¹Non-Hispanic other not shown (n=139)

²Oncologist includes gynecological oncology, musculoskeletal oncology, hematology/oncology, medical oncology, and surgical oncology

³Expected source of payment is based on a hierarchy because more than one insurance could be selected as expected source of payment (see methods section for more information)
Percentages of total visits are presented as distributions for patient characteristics. Percentages of visits with no comorbidity and with ≥ 1 comorbidity are presented as row percentages.

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Abbreviations: No., unweighted sample size; SE, standard error; IQR, interquartile range.
Source: National Ambulatory Medical Care Survey 2010–2016 (n=4,672). Numbers may not add to totals due to rounding.

Table 3.

Percentage of physician office visits with antineoplastic drugs prescription by adult patients with breast, prostate, colorectal, or lung cancer with no comorbidities and ≥ 1 comorbidities: United States, 2010–2016

	Visits by adults with breast, prostate, colorectal, and lung cancer receiving antineoplastic drugs				P value No comorbidity vs ≥ 1 comorbidities
	Total	No.(Weighted No. in 1000s)	% (SE)	with no comorbidity %(SE)	with ≥ 1 comorbidities %(SE)
Total		1578 (3406)	100	42.9 (2.5)	57.1 (2.5)
Sex					
Female	1023 (2207)		64.8 (2.45)	42.9 (3.3)	57.1 (3.3)
Male	555 (1199)		35.2 (2.45)	42.9 (3.3)	57.1 (3.3)
Age (Mean) (SE)		65.0(0.6)		61.1 (1.6)	68.0 (0.6)
MEDIAN (IQR)		66.2 (56.1–73.4)		62.5(50.8–71.2)	68.3 (60.2–75.6)
Race¹					
Non-Hispanic White	1250 (2597)		76.2 (2.6)	42.4 (3.1)	57.6 (3.1)
Non-Hispanic Black	157 (312)		9.2 (1.1)	44.4 (7.1)	55.6 (7.1)
Hispanic	123 (333)		9.8 (1.5)	36.7 (8.1)	63.3 (8.1)
Provider					
Oncologist ²	1243 (2588)		76.0 (3.5)	43.5 (3.1)	56.5 (3.1)
Other	335 (818)		24.0 (3.5)	40.7 (4.2)	59.3 (4.2)
Expected source of payment³					
Private insurance	648 (1263)		37.1 (2.3)	53.8 (3.8)	46.2 (3.8)
Medicare/Medicaid	817 (1870)		54.9 (2.6)	35.0 (4.3)	65.0 (4.3)
Other/Unknown	113 (274)*		*	46.2 (7.3)	53.8 (7.3)

* Estimate does not meet NCHS standards of reliability.

¹ Non-Hispanic other not shown (n=48)

² Oncologist includes gynecological oncology, musculoskeletal oncology, hematology/oncology, medical oncology, and surgical oncology

³ Expected source of payment is based on a hierarchy because more than one insurance could be selected as expected source of payment (see methods section for more information)

Percentages of total visits with antineoplastic drugs prescription are presented as distributions for patient characteristics. Percentages of visits with no comorbidity and with ≥ 1 comorbidity are presented as row percentages.

Abbreviations: No., unweighted sample size; SE, standard error; IQR, interquartile range.

Source: National Ambulatory Medical Care Survey 2010–2016 (n=1,578). Numbers may not add to totals due to rounding.