Emergency department use by recently diagnosed cancer patients in California

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Abstract

Background—Improving the quality of cancer care and reducing preventable health system use are goals of increasing importance to health practitioners and policy makers. Emergency department (ED) visits are often cited as a source of preventable health system use, however, few studies have described the incidence of ED use by recently diagnosed cancer patients in population-based samples, and no study has addressed the full spectrum of cancer types.

Objective—To describe ED use by recently diagnosed cancer patients.

Methods—California Office of Statewide Health Planning and Development data and the California Cancer Registry were used to describe ED use in the year after a cancer diagnosis (2009–2010). The incidence of ED use was tabulated by cancer type. Logistic regression and recycled predictions were used to examine ED use adjusting for confounding factors.

Results—Most ED visits (68%) occurred within 180 days of diagnosis. The incidence of ED use for all cancer types examined was 17% within 30 days, 35% within 180 days and 44% within 365 days of diagnosis. ED use varied by cancer type (5%–39% within 30 days of diagnosis; 14% –62% within 180 days; and 22%–69% within 365 days). Patterns of ED use by cancer type remained similar after accounting for demographic and socioeconomic factors.

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Limitations—Those common to administrative and registry datasets. Specifically, we were unable to account for ED visits in relation to cancer treatment dates and comorbid conditions.

Conclusions—Cancer patients use EDs at higher rates than previously reported, with considerable variability by cancer type. Future research should examine reasons for ED visits by cancer type and identify predictors of ED use, including treatment and comorbid conditions.

In 2017 there will be nearly 1.7 million new cancer cases diagnosed, and over 600,000 cancer deaths in the Unites States.[1] A 2013 Institute of Medicine report highlighted problems with the current quality of cancer care, including high costs and fragmentation of care.[2] Other national reports have called for improvements in the overall quality of care and for reducing costly and possibly avoidable use of health services such as emergency department (ED) visits.[3–6] Reduction of avoidable ED visits is often cited as a pathway to reduce costs by avoiding unnecessary tests and treatments that occur in the ED and subsequent hospital admissions.[7,8]

ED crowding, long waits, and unpredictable treatment environments can also make an ED visit an unpleasant experience for the patient. ED visits during cancer treatment can be particularly troubling and present health concerns for patients who are immunocompromised. In particular, cancer patients in the ED have been found to experience delays in the administration of analgesics, antiemetics, or antibiotics.[9]

Few studies have examined ED use or its associated predictors among cancer patients. Reports to date that have described ED use have focused on different cancers, which makes comparisons across studies difficult.[10] Moreover, the time frames of interest and the type of event after which ED use is evaluated (ie, diagnosis or treatment) are inconsistent in the existing literature.[10] Some studies quantifying ED use excluded patients admitted to the hospital after an ED visit.[11,12] Taken together, these studies do not provide a clear overview of the extent of ED use by cancer patients or the amount of cancer-related care provided by EDs.

Patterns of ED use among cancer patients derived from large and generalizable samples may help inform providers about true risk factors for ED use. In addition, prioritizing new interventions and focusing future research on groups of patients who are at higher risk for preventable ED use could also improve overall care. To address these issues, accurate estimates of ED use among cancer patients are required.

To our knowledge, this is the first study to describe ED use across a range of cancers in a large population-based sample and to consider the timing of ED visits in relation to initial diagnosis. The findings could provide benchmark comparison data to inform future efforts to identify the subset of possibly preventable ED visits and to design interventions to address preventable ED use.

Material and methods

Data source

California's Office of Statewide Health Planning and Development (OSHPD) manages the patient discharge dataset (PDD) and the emergency department use (EDU) dataset, providing a high-quality source of information on inpatient and ED use in the state.[13] A principal diagnosis and up to 24 secondary diagnoses are recorded in OSHPD datasets. The EDU dataset was used to identify treat-and-release ED visits, and the PDD was used to identify hospitalizations initiated in the ED. The California Cancer Registry (CCR) obtains demographic and diagnosis information for every new invasive cancer diagnosed in California, and data collected by the registry are considered to be complete.[14] CCR-OSPHD-linked data provide high-quality health care use information for cancer patients in California.[15,16] Using an encrypted version of the social security number called the record linkage number (RLN), we linked the CCR records to the corresponding OSHPD files from 2009–2010.

Institutional review board approval for this study was obtained from the University of California, Davis, Human Subjects Committee and the State of California Committee for the Protection of Human Subjects.

Analysis

ED visits.—Visits were included if they occurred on or up to 365 days after the date of cancer diagnosis recorded in the CCR. The visits were coded in mutually exclusive groups as occurring within 30, 31–180, and 181–365 days of diagnosis. Subsequently, we flagged each person as having any ED visit (Yes/No) within 180 days and within 365 days of diagnosis, and we tallied the total number of visits occurring within these time frames for each person.

Cancer type.—We used relevant site and histology codes to classify cancer type into 24 mutually exclusive categories using the Surveillance Epidemiology and End Result's International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3) Recode Definitions[17–19] (Suppl Figure 1).

Individual-level variables.—Sociodemographic information for each person was collected from the CCR including gender, age, race/ethnicity, marital status, health insurance status, rural residence, survival time in months, neighborhood socio-economic (SES) status based on the Yang index, and the American Joint Committee on Cancer (AJCC) stage.[20,21]

Data analysis

Demographic information was analyzed for the cohort using descriptive statistics (frequencies, proportions, means, standard deviations, and ranges) and evaluated for correlations. Fewer than 20 observations had missing data and we removed those observations from our analyses on an item-specific basis.

We tabulated ED visits by cancer type and time from diagnosis and then collapsed visit-level data by RLN to determine the number of ED visits for each person in the sample. The number of days from diagnosis to first ED visit was also tabulated. The cohort was stratified by cancer type and cumulative rates of ED visits were tabulated for individuals with ED visits within 0–180 and 0–365 days from diagnosis. To test the robustness of the findings adjusting for confounding factors known to impact ED use, we used logistic regression to model any ED use (Yes/No) as a function of age, gender, race/ethnicity, cancer stage, insurance status, marital status, urban residence, and Yang SES. After model estimation, we used the method of recycled predictions controlling for the confounding variables to compute the marginal probabilities of ED use by cancer type.[22] To adjust for the possible impact of survival on ED use, we performed sensitivity analyses and estimated predicted probabilities adjusting for survival. Separate analyses were performed first adjusting for whether the patient died during the course of each month after diagnosis and then adjusting for whether or not the patient died within 180 days of diagnosis. All analyses were conducted using Stata 13.1.[23]

Results

The CCR identified 222,087 adults with a new primary cancer diagnosis in 2009–2010. After excluding those with Stage 0 cancer (n = 21,154) and nonmelanoma skin cancer (n = 1,031), for whom data are inconsistently collected by CCR, a total of 199,872 individuals were included in the analytic sample. Of those patients (Table 1), most were white non-Hispanic (62%), women (51%), holders of private insurance (53%), married (56%), and urban residents (86%). Most were older than 50 years and had either Stage I or Stage II cancer. The most common cancer types were breast (17%), prostate (16%), lung (11%), and colon (9%; results not shown). In unadjusted comparisons, the incidence of ED use was significantly higher among those who were older, of non-Hispanic black race/ethnicity, uninsured, in the lowest SES group, widowed, or diagnosed with Stage IV cancer (Table 1).

ED visits

Within 365 days after initial cancer diagnosis, 87,025 cancer patients made a total of 197,886 ED visits (not shown in tables). Of those visits, 68% (n = 134,556) occurred within 180 days of diagnosis, with 22% (n = 43,535) occurring within the first 30 days and 46% (n = 91,027) occurring within 31–180 days after diagnosis (Figure). Given that most of the visits occurred within 180 days of diagnosis, we used that time frame in subsequent analyses. Among all ED visits within 180 days of diagnosis (Table 2), the largest proportions of visits were made by those with lung cancer (16%), breast cancer (11%), and colon cancer (10%).

About 51% of visits resulted in admission to the hospital and 45% in discharge (Table 2). For some cancers (lung, colon, non-Hodgkin lymphoma, pancreatic, digestive, liver, stomach, leukemia, and myeloma) most of the visits resulted in admission to the hospital (Table 2). Among visits resulting in admission, the top three principal diagnoses were: septicemia (8%), cardiovascular problems (7%), and complications from surgery (5%) (not shown in tables). Among visits resulting in a discharge home, the three top principal

diagnoses were abdominal pain (7%), cardiovascular problems (6%), and urinary, kidney, and bladder complaints other than a urinary tract infection (5%) (results not shown).

Individuals

The cumulative incidence of at least one ED visit was 35% (n = 70,813) within 180 days after diagnosis (Table 3). Visit rates varied by cancer type: individuals with pancreatic (62%), brain (60%), and lung (55%) cancers had the highest cumulative incidences of ED use within 180 days of diagnosis (Table 3). Those with melanoma (14%), prostate (17%), and eye (18%) cancers had the lowest cumulative incidences of ED visits (Table 3).

Recycled predictions from logistic regression models, accounting for potential confounding factors, yielded substantively similar results for the cumulative incidence of ED use across cancer types (Table 4). Results did not differ substantially after accounting for survival. Differences in the predicted probability of an ED visits adjusting for death within 180 days of diagnosis were noted to be 2% or greater from estimates reported in Table 4 for only four cancers. Estimates of having any ED visits for those with lung cancer decreased from 46% to 44% (95% CI: 43.0–44.4%), pancreatic cancer from 53% to 49% (95% CI: 48–51%), liver cancer from 51% to 47% (95% CI: 49–53%), and those with eye cancers increased from 20% to 22% (95% CI: 18–26%) (not shown in tables).

For patients with certain cancers (eg, lung, pancreas, leukemia) the proportion of individuals with an initial ED visit was highest in the first 30 days after diagnosis (Table 3). For individuals with other cancers (eg, breast, prostate, melanoma) the proportion of individuals with an initial ED visit increased by more than 5% during the 31–181–day time period. Those with the remaining cancers had less than 5% change in cumulative ED use between the two time periods.

The number of visits per person ranged from 0–44 during the first 180 days after diagnosis (results not shown in tables). Of all patients diagnosed with cancer, 20% (n = 39,429) had one ED visit, 8% (n = 16,238) had two visits, and 7% (n = 14,760) had three or more visits. Of those patients having at least one ED visit within 180 days of diagnosis, 44% (n = 31,080) had two or more visits and 21% (n = 14,760) had 3 or more visits.

Discussion

This study extends previous research by describing ED use for more than 20 cancer types by time from diagnosis in a large, heterogeneous and population-based sample of recently diagnosed adults in California. We found that 16% of newly diagnosed individuals with cancer used the ED within 30 days of diagnosis, 35% within 6 months of diagnosis, and 44% within 1 year of diagnosis. These findings suggest that ED use by cancer patients is more than double that of the US general population and is higher than previously estimated for cancer patients.[10,24] In 2010, about 21% of the US population visited the ED, compared with 44% of cancer patients in the same time period.[24] Although persons with greater medical need, such as those with cancer, inevitably require more health services, new approaches are needed to explore the extent to which some of these visits by cancer patients could be prevented by providing care in other settings.

Few studies have examined ED use by cancer patients, but previous findings suggest that 1%
−12% of cancer patients use the ED within 30 days of diagnosis, and 15%−25% use the ED
within a year of diagnosis.[10,25,26] One study did report higher rates of ED use by cancer
patients, but attributed the increased use to changes in Medicaid copayments.[27] The finding
that ED use is higher among cancer patients than previously considered is important for
several reasons. First, high rates of ED use may reflect excessive fragmentation in cancer
care, or patients' inability to access providers when acute concerns arise. Furthermore,
providers and policymakers may be particularly interested in populations with high ED use
because reducing potentially preventable ED use is often cited as one of the goals of care
coordination and alternative health care model programs.[2,28,29]

The number of newly diagnosed cancer patients with multiple ED visits is also substantial.
We found 15% of recently diagnosed cancer patients had two or more ED visits within 180
days of diagnosis, compared with 8% of the general US population having two or more ED
visits in all of 2010.[24] Among cancer patients with at least one ED visit, 44% visited more
than once. Repeat visits may represent worsening health status, continued unmet health
needs, or new complications that might have been prevented or treated in other health care
settings. In addition, there may be opportunities to identify cancer patients at risk for
multiple visits at their initial ED visit. A better understanding of the reasons for ED visits
and the factors driving unmet need – such as inadequate patient education, limited access to
specialty services, or failure to admit a patient to resolve a problem appropriately (eg, pain,
infection) – may help to identify which visits are potentially preventable. Ultimately, failure
to adequately describe the number of cancer patients that visit the ED and the number of
times they visit may result in a lost opportunity for improvement in care, the patient
experience and cost reduction in cancer care.

The distinction between cancer types that account for the most ED visits and cancer types
with the highest cumulative incidences of ED use is informative. For instance, lung cancer
patients accounted for the largest number of ED visits and over half of those with lung
cancer visited the ED within 180 days of diagnosis. However, although more than 60% of
individuals with pancreatic cancer visited an ED within 180 days of diagnosis; they
accounted for only 5% of all ED visits by cancer patients during the same time period. This
in part reflects the relative frequency of these cancers. However, prostate cancer, which has a
high incidence rate, represents about 8% of all ED visits by cancer patients, yet only 17% of
all prostate cancer patients visit the ED within 180 days of diagnosis.

One approach to reduce the absolute number of ED visits by cancer patients would be to
target the most frequent users of the ED such as lung, breast, prostate, and colon cancer
patients. These cancers are the most common in the general population, so proportionate
reduction in ED visits in these groups would have a large overall impact on ED use.
Alternatively, patients with cancers that have high rates of ED use could be targeted with
interventions to better address their needs. Additional studies of ED use among cancer
patients, including understudied cancers, are needed to determine whether care provided in
the ED could be provided in alternate clinical settings. Such research can also support
training of emergency department staff to manage the full range of cancer-related conditions
presenting to the ED.

Another approach to identifying potentially avoidable ED visits is to explore visits that result in admission to the hospital compared with those that result in discharge from the ED. In some circumstances, visits that result in discharge home may not have been true medical emergencies, and therefore might have been preventable. It is also true that even an acute problem requiring admission may have been preventable with timely outpatient management. While we found that 45% of visits ended in discharge home, over half of cancer patients who visit the ED are admitted to the hospital. This is higher than admission rates from the ED for the U.S. population overall (11%–15%),[30–32] and even higher than the estimated rate of individuals with chronic conditions, such as diabetes (42%), who visit the ED and then are subsequently admitted to the hospital.[33]

Relatively high rates of admissions may indicate that cancer patients seeking care in the ED require increased medical attention; however, it is possible that other explanations exist. For instance, ED physicians may be uncomfortable with complex cancer cases and may admit patients to be evaluated by a specialist. As such, it is possible that some of these admissions could have been appropriate for outpatient follow up. It is also possible that patients are referred to the ED for admission to the hospital. In these situations the ED visit may be entirely preventable through a direct admission process, although such processes are not available at all institutions and may vary by the admitting provider. For instance, if a hospitalist is overseeing the hospital stay, they may prefer the admission to occur through the ED, whereas a primary care provider or oncologist may be more likely to facilitate a direct admission. Future research could address the extent to which admissions from the ED may be avoidable by examining reasons for and length of admission following an ED visit. While this study found top reasons for admission (principal diagnosis) to be septicemia, cardiovascular complaints and complications from surgery, cumulatively these diagnosis accounted for less than 20% of admissions from the ED. Examining frequent diagnoses by cancer type will also provide insight into potentially avoidable ED use, which may vary by disease course and treatment regimen.

The distribution of days from diagnosis to the first ED visit also varied by cancer type. This variation is likely attributable, at least in part, to differences in condition-specific treatment regimens, severity of illness, and stage at diagnosis. For example, patients with ED visits within 30 days of diagnosis may be those with advanced stage cancers who are at higher risk of complications, or they may be visiting the ED for post-surgical problems. Likewise, individuals who incur visits during later time periods may be undergoing longer treatment regimens. Further research is warranted to explore site-specific predictors of ED use and high-risk periods, accounting for cancer treatment and the timing of treatments.

In summary, ED use among cancer patients is substantial and higher than previously reported. Most ED visits occur within the first 180 days after diagnosis, suggesting focus on the first 30 days after hospital discharge may be misguided. Time frames for ED measurement in future research should be selected with careful attention to cancer-specific periods within which most ED use occurs and the outcomes of interest. Furthermore, better models identifying cancer-specific predictors of ED use, which account for treatment and comorbidities, will facilitate the development of interventions focused on high-risk segments

of this population. Research is needed to explore cancer-specific reasons for ED visits and which ED admission diagnoses may be potentially preventable.

Limitations

The limitations of this study include those common to use of administrative and registry data and the CCR and OSHPD data in particular. While CCR data are known to be complete with respect to demographic and cancer information, treatment data is less robust and specific treatment dates are not available.[14,34] As a result, we were unable to analyze ED use in relation to receipt of outpatient treatment. As we included all ED visits on or up to a year after the day of diagnosis, it is possible that our analysis includes diagnoses that occurred in conjunction with an ED visits. However, it is unlikely a reporting hospital would report a cancer diagnosis to the CCR without a corresponding hospital admission. Therefore, we assume such cases to be rare.

Lastly, California had lower prevalence of health insurance coverage and higher market penetration by health maintenance organizations, relative to the national average, which may limit the generalizability of the results to other states.[35] At the same time, CCR-OSHPD linked data offer the advantage of providing complete data to enumerate ED visits among patients whether they were discharged home or subsequently admitted to hospital.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgment

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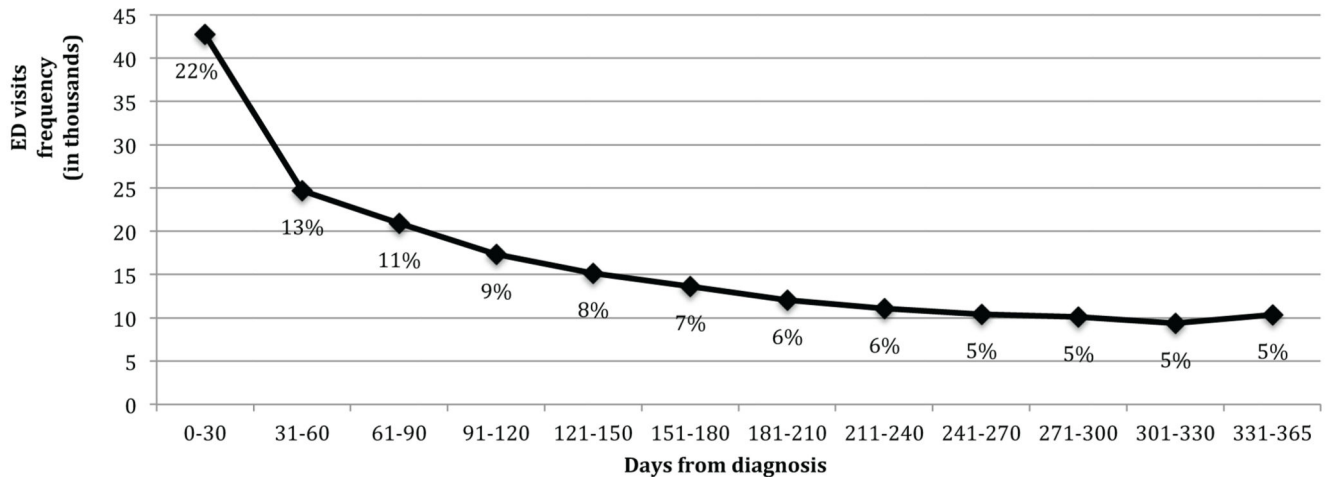
FIGURE.
Distribution of days from diagnosis to emergency department visit, for all visits occurring within 365 days from diagnosis (n = 197,886 visits).
ED, emergency department

TABLE 1

Cohort characteristics (n = 199,872 patients)

Characteristic	n (%)	% ED visit within 180 d of diagnosis	X^2 *P* value
Age group, y			<.01
18–30	4,597 (2.3)	36.2	
31–40	8,503 (4.3)	32.2	
41–50	22,821 (11.4)	33.2	
51–60	45,066 (22.5)	33.4	
61–70	53,953 (27.0)	32.9	
71–80	40,517 (20.3)	38.1	
>80	24,415 (12.2)	43.4	
Race/ethnicity			<.01
White, non-Hispanic	123,672 (61.9)	33.6	
Black, non-Hispanic	13,325 (6.7)	45.4	
Hispanic	35,894 (18.0)	40.6	
Asian	22,425 (11.2)	34.4	
Other	4,556 (2.3)	20.6	
Sex			.029
Women	101,660 (50.9)	35.2	
Men	98,212 (49.1)	35.7	
Health insurance			<.01
Private	104,841 (52.5)	30.9	
Medicare	34,194 (17.1)	35.7	
Medicaid	15,543 (7.8)	53.2	
Medi-Medi	11,361 (5.7)	47.6	
Medi-Medi NOS	19,518 (9.8)	39.4	
Uninsured	3,669 (1.8)	48.1	
Other/unknown	10,746 (5.4)	28.7	
SES quintile[a]			<.01
1st	28,802 (14.4)	44.1	
2nd	36,790 (18.4)	39.9	
3rd	41,353 (20.7)	36.5	
4th	45,192 (22.6)	33	
5th	47,718 (23.9)	28.1	
Residence[b]			.899
Urban	172,419 (86.3)	35.4	
Rural/non-urban	27,436 (13.7)	35.4	
Marital status			<0.01
Married	111,963 (56.0)	32.6	
Never married	33,846 (16.9)	40	
Divorced	19,432 (9.7)	41.3	
Widowed	23,592 (11.8)	43.3	

Characteristic	n (%)	% ED visit within 180 d of diagnosis	X^2 *P* value
Unknown	11,039 (5.5)	23.3	
Disease stage[c]			<0.01
I	58,205 (29.1)	22.5	
II	47,968 (24.0)	25.8	
III	27,340 (13.7)	40.8	
IV	35,864 (17.9)	58.2	
Unknown	30,495 (15.3)	43.7	
Initial treatment[d]			
Chemotherapy	62,780 (31.4)	44	<.01
Surgery	117,507 (58.8)	46.8	<.01
Radiation	55,966 (28.0)	27.1	<.01
Hormone	26,050 (13.0)	9.5	<.01

Medi-Medi, Medicaid with Medicare supplement or Medicare with Medicaid eligibility; Medi-Medi NOS, Medicare and or Medicaid not otherwise specified; SES, socio-economic status

[a]SES is reported by the California Cancer Registry (CCR) using the Yang SES and is reported at the block level, the lowest quintile representing lower SES status. This method accounts for seven aspects of socioeconomic status, including: proportion with a blue-collar job, proportion in workforce unemployed, median household income, percent below 200% poverty level, median rent, median value of owner occupied houses, and education,[21] 17 observations missing.

[b]Rural versus urban residence designations are based on the Medical Service Study Area of residence and California Health Manpower Policy Commission, 2010 US Census, 17 observations missing.

[c]Cancer stage is defined using the commonly-used American Joint Committee on Cancer Tumor Node Metastasis (TNM) criteria. Cancers classified as Stage 0 were excluded, the CCR does not consistently track information on these cancers.

[d]Treatment is defined as receiving type of treatment as part of initial therapy as reported by the CCR, groups are not mutually exclusive.

TABLE 2

Emergency department visits by cancer type (n = 134,556 visits)[a]

Cancer type[b]	% of all of visits by cancer patients within 180 d of diagnosis	% visits resulting in admission to the hospital
All	100	51
Lung	16	59
Breast	11	36
Colon	10	55
Prostate	8	32
Female genital	7	45
Non-Hodgkin lymphoma	5	56
Pancreas	5	60
Digestive	4	59
Urinary	4	47
Liver	4	57
Leukemia	3	64
Stomach	3	59
Oral	3	43
Brain	2	51
Bladder	2	47
Myeloma	2	56
Endocrine	2	27
Melanoma	2	34
Respiratory	1	45
Hodgkin lymphoma	1	44
Male genital	1	39
Eye	<1	20

[a] Represents all emergency department visits (including repeat visits by the same individual) within 180 days of diagnosis.

[b] See online appendix for complete list of cancer type groups. Female genital cancers include cervical and ovarian. Digestive cancers include esophagus, small intestine, anus, and other biliary. Urinary cancers include kidney, renal pelvis and ureter. Respiratory cancers include non-lung cancers such as nasal cavity, trachea and larynx. Male genital cancers are those other than prostate. Other/unknown cancers not shown.

TABLE 3

Timing of first emergency department visit by cancer type (n = 199,872 patients)[ab]

Cancer type	Total	First ED visit, n (%)		Cumulative, % patients with at least 1 ED visit	
		Within 30 d of diagnosis	31–180 d of diagnosis	1–180 d of diagnosis	1–365 d of diagnosis
All	199,872	33,080 (16.6)	37,733 (18.9)	35.4	43.5
Lung	20,894	6,347 (30.4)	5,199 (24.9)	55.3	63.8
Breast	33,502	1,727 (5.2)	5,750 (17.2)	22.3	30.7
Colon	18,097	3,625 (20.0)	3,718 (20.5)	40.6	49.3
Prostate	32,183	1,760 (5.5)	3,824 (11.9)	17.4	24.9
Female genital	13,468	2,298 (17.1)	2,551 (18.9)	36.0	43.9
Non-Hodgkin lymphoma	8,887	1,982 (22.3)	1,890 (21.3)	43.6	50.9
Pancreas	5,206	1,943 (37.3)	1,280 (24.6)	61.9	69.1
Digestive	5,171	1,327 (25.7)	1,467 (28.4)	54.0	62.0
Urinary	6,808	1,442 (21.2)	1,191 (17.5)	38.7	46.9
Liver	4,617	1,329 (28.8)	1,157 (25.1)	53.8	62.9
Leukemia	4,740	1,234 (26.0)	909 (19.2)	45.2	53.3
Stomach	3,759	1,027 (27.3)	1,036 (27.6)	54.9	63.3
Oral	4,880	589 (12.1)	1,320 (27.0)	39.1	48.0
Brain	2,864	1,109 (38.7)	621 (21.7)	60.4	67.8
Bladder	3,522	742 (21.1)	792 (22.5)	43.6	53.9
Myeloma	2,717	754 (27.8)	693 (25.5)	53.3	62.8
Endocrine	6,862	455 (6.6)	843 (12.3)	18.9	25.3
Melanoma	8,188	383 (4.7)	794 (9.7)	14.4	22.0
Respiratory	1,984	366 (18.4)	490 (24.7)	43.1	52.1
Hodgkin lymphoma	1,303	236 (18.1)	321 (24.6)	42.7	46.4
Male genital	1,864	302 (16.2)	224 (12.0)	28.2	35.9
Eye	369	22 (6.0)	45 (12.2)	18.2	26.0
Other	4,874	960 (19.7)	1,100 (22.6)	42.3	52.8
Ill-defined/unknown	3,113	1,121 (36.0)	518 (16.6)	52.7	56.7

ED, emergency department

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[a] The proportion of individuals with any ED visit by time from diagnosis to first ED visit. 112,847 (57%) of the sample had no visits within 365 days of diagnosis.

[b] See online appendix for complete list of cancer type groups. Female genital cancers include cervical, ovarian. Digestive cancers include esophagus, small intestine, anus, other biliary. Urinary cancers include kidney, renal pelvis and ureter. Respiratory cancers include non-lung cancers such as nasal cavity, trachea, larynx. Male genital cancers are those other than prostate.

TABLE 4

Adjusted estimated for emergency department visits by cancer type[a]

Cancer type[b]	Predicted probability, %	95% CI
Lung	46	45–47
Breast	26	26–27
Colon	38	37–39
Prostate	20	19–20
Female genital	38	37–39
Non-Hodgkin lymphoma	38	37–39
Pancreas	53	52–54
Digestive	49	48–50
Urinary	40	39–41
Liver	51	49–52
Leukemia	53	51–55
Stomach	48	46–49
Oral	34	32–35
Brain	60	58–62
Bladder	45	43–47
Myeloma	52	50–54
Endocrine	23	22–25
Melanoma	21	20–22
Respiratory	39	37–42
Hodgkin lymphoma	39	36–41
Male genital	32	30–34
Eye	20	17–25

CI, confidence interval

[a]Adjusted for age, gender, race/ethnicity, cancer stage, insurance status, marital status, urban residence and Yang socio-economic status.

[b]See online appendix for complete list of cancer type groups. Female genital cancers include cervical, ovarian. Digestive cancers include esophagus, small intestine, anus, other biliary. Urinary cancers include kidney, renal pelvis and ureter. Respiratory cancers include non-lung cancers such as nasal cavity, trachea, larynx. Male genital cancers are those other than prostate.