**Methods:**

Data source

We used data from the National Ambulatory Medical Care Survey (NAMCS) from 2016-2018. The NAMCS is an annual national probability sample of ambulatory visits made to nonfederal, office-based physician practices and is conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention. It excludes specialties including anesthesiology, pathology, or radiology. The NAMCS uses a multistage sample design for data collection. The first stage sample includes 112 geographic primary sampling units (PSUs). The second stage is the selection of practicing physicians from these PSUs. The third and final stage is the selection of patient visits from the practices of physicians. Data are primarily collected by census field representatives, physicians or staff via automated survey tool or medical charts. Each record contains a patient visit sampling weight, which ensures all estimates are weighted nationally (cite - A). The data collected on patients by NAMCS includes patient demographics, vitals, reasons for their visit, prior diagnoses, medications, and services (such as examinations, lab tests, diagnostic imaging, and procedures) the patient will receive. More information about this survey, how it is administered, and what data it collects can be found at <https://www.cdc.gov/nchs/ahcd/ahcd_scope.htm>.

As these databases are de-identified and publicly available, the study was exempt from review by the Mount Sinai Institutional Review Board.

Study cohort

Our study cohort included all participants in the NAMCS.

Outcome measures

Our outcomes were specific healthcare services that were provided to the participants. The healthcare services included: audiometry, mental health therapy (excluding psychotherapy), psychotherapy, diabetes education, physical therapy, durable medical equipment (such as a cane or wheelchair), EKG, stress management, retinal exam, substance abuse counseling, exercise counseling, weight reduction counseling, diet/nutrition counseling, foot exam, injury prevention screening, spirometry, tobacco education, colonoscopy, depression screening, neurologic exam, alcohol abuse screening, other services not listed, growth/development counseling, pelvic exam, rectal exam, substance abuse screening, breast exam, cryosurgery/destruction of tissue, skin exam, and wound care. All services that are ordered or provided for each patient are marked down by either the physician or the field representative from a list of 84 services. Up to five other services can be specified and written down if they are not on the list.

Study measures

Our key independent variable was the presence of cancer (yes or no) at the time of visit. A cancer diagnosis was identified if the answer to the question “Regardless of the diagnoses previously entered, does the patient now have: cancer?” was marked affirmative.

Other variables of interest that were examined included patient demographic information, such as age, sex (male, female), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic and non-Hispanic other), primary payer (private, Medicare, Medicaid and others e.g. self-pay, charity, no charge), services provided to patients, major reason for visit, physician specialty type (primary, surgical, or medical), the number of chronic conditions a patient has, and the number of hospital visits a patient has made in the last 12 months.

Statistical Analysis

Descriptive analyses were performed to examine differences in patient demographics and presence of cancer. Bivariate analysis was conducted to identify the relationship between different health care services and presence of cancer and also insurance status of the individuals. Logistics regression analysis were conducted to examine the association between the presence of cancer and different type of healthcare services. All analyses took survey weights (PATWT), strata (CSTRATM) and PSUs (CPSUM) into consideration and was conducted using SAS Enterprise Guide 7.1 (SAS, Inc., Cary, NC).

**Results**:

According to NAMCS 2016-2018, there were approximately 1,744,110,764 patient visits, among which 125,294,620 (7%) recorded a cancer diagnosis. Table 1 compares baseline statistics between patients with and without cancer. Patients with cancer diagnoses were significantly older (66 years old vs 46, p<0.001). non-Hispanic whites (81% vs 69%, p<0.001), on Medicare (52% vs 24%, P<0.001) and had a higher number of comorbidities (2.7 vs 1, p<0.001).

For both groups, the most common reason for a visit was a routine check-up for a chronic problem. However, patients without cancer were more likely to be at a visit with a doctor of a primary care specialty (54.8% vs 27.6%) while visits of patients with cancer were more likely to be at a doctor with a medical care specialty (44.7% vs 24.4%, p<0.001)

**Table 1: Baseline characteristics by cancer status in the 2016-18 NAMCS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Overall** | **Patients without cancer** | **Patients with cancer** | **p** |
| **No.** | 1,744,110,764.30 | 1,618,816,143.70 | 125,294,620.60 |  |
| **Age** | 47.1 (25.1) | 45.6 (25.1) | 66.2 (15.7) | **<0.001** |
| **Sex** | 724,796,622.1 (41.6) | 670,174,918.2 (41.4) | 54,621,704.0 (43.6) | 0.348 |
| **Race/ethnicity** |  |  |  | **<0.001** |
| White, non-Hispanic | 1,210,740,753.7 (69.4) | 1,108,924,626.2 (68.5) | 101,816,127.5 (81.3) |  |
| Black, non-Hispanic | 150,457,289.4 (8.6) | 143,908,722.5 (8.9) | 6,548,567.0 (5.2) |  |
| Hispanic | 274,675,311.3 (15.7) | 263,891,839.2 (16.3) | 10,783,472.1 (8.6) |  |
| Other | 108,237,409.9 (6.2) | 102,090,955.8 (6.3) | 6,146,454.1 (4.9) |  |
| **Major reason for visit** |  |  |  | **<0.001** |
| Left blank | 41,981,396.6 (2.4) | 39,677,268.9 (2.5) | 2,304,127.7 (1.8) |  |
| New problem | 495,841,944.2 (28.4) | 467,184,631.2 (28.9) | 28,657,312.9 (22.9) |  |
| Chronic prob., routine | 549,837,591.1 (31.5) | 497,437,732.0 (30.7) | 52,399,859.1 (41.8) |  |
| Chronic prob., flare-up | 127,037,679.5 (7.3) | 116,025,348.3 (7.2) | 11,012,331.2 (8.8) |  |
| Pre-surgery | 34,912,159.8 (2.0) | 30,818,590.4 (1.9) | 4,093,569.4 (3.3) |  |
| Post-surgery | 94,127,492.9 (5.4) | 83,157,236.9 (5.1) | 10,970,256.0 (8.8) |  |
| Preventive care | 400,372,500.2 (23.0) | 384,515,335.9 (23.8) | 15,857,164.3 (12.7) |  |
| **Physician Specialty** |  |  |  | **<0.001** |
| Primary Care | 922,117,770.4 (52.9) | 887,480,657.8 (54.8) | 34,637,112.5 (27.6) |  |
| Surgical Care | 371,209,895.4 (21.3) | 336,601,057.6 (20.8) | 34,608,837.8 (27.6) |  |
| Medical Care | 450,783,098.5 (25.8) | 394,734,428.2 (24.4) | 56,048,670.3 (44.7) |  |
| **Pay Type** |  |  |  | **<0.001** |
| Blank | 45,013,689.8 (2.6) | 41,446,382.4 (2.6) | 3,567,307.4 (2.8) |  |
| Unknown | 55,357,936.7 (3.2) | 50,176,644.7 (3.1) | 5,181,292.0 (4.1) |  |
| Private insurance | 855,657,534.6 (49.1) | 813,340,729.3 (50.2) | 42,316,805.3 (33.8) |  |
| Medicare | 456,013,468.5 (26.1) | 390,633,410.6 (24.1) | 65,380,057.9 (52.2) |  |
| Medicaid or CHIP | 223,151,377.7 (12.8) | 216,600,237.7 (13.4) | 6,551,140.0 (5.2) |  |
| Worker’s Compensation | 7,975,149.1 (0.5) | 7,940,274.9 (0.5) | 34,874.3 (0.0) |  |
| Self-pay | 77,834,610.3 (4.5) | 76,775,032.5 (4.7) | 1,059,577.8 (0.8) |  |
| No change/charity | 4,906,329.5 (0.3) | 4,906,329.5 (0.3) | 0.0 (0.0) |  |
| Other | 18,200,668.2 (1.0) | 16,997,102.3 (1.0) | 1,203,565.9 (1.0) |  |
| **# of Chronic Conditions** | 1.1 (2.2) | 1.0 (2.2) | 2.7 (1.7) | **<0.001** |
| **Past visits in last 12 months** | 2.9 (6.8) | 2.8 (6.8) | 3.2 (6.7) | 0.406 |
| **Legend:** | | | | |

Table 2 compared which services are provided to cancer and non-cancer patients. For 17 of the 22 services examined, there were no significant differences between the services that patients with or without cancer received. Cancer patients were more likely to get cryosurgery (3.6% vs 1.2%, p<0.001), wound care (4.2% vs 1.4%, p<0.001), domestic violence screening (1.1% vs 0.5%, p=0.012), and skin exams (29.1% vs 18.5%, P<0.001). However, patients with cancer were less likely to receive diet/nutrition counseling (8.1% vs 12.8%, p=0.004).

**Table 2** - **Service provided by cancer status in the 2016-2018 NAMCS study**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Overall** | **Patients without cancer** | **Patients with cancer** | **p** |
| **Colonoscopy** | 22,776,808.5 (1.3) | 21,115,403.2 (1.3) | 1,661,405.3 (1.3) | 0.972 |
| **Cryosurgery/destruction of tissue** | 23,171,833.3 (1.2) | 18,624,298.2 (1.2) | 4,547,535.2 (3.6) | **<0.001** |
| **EKG/ECG** | 68,184,607.2 (3.9) | 63,593,262.4 (3.9) | 4,591,344.8 (3.7) | 0.771 |
| **Physical Therapy** | 36,999,632.0 (2.2) | 35,449,392.9 (2.2) | 1,550,239.2 (1.2) | 0.114 |
| **Wound Care** | 28,060,855.7 (1.4) | 22,831,812.8 (1.4) | 5,229,042.9 (4.2) | **<0.001** |
| **Alcohol Abuse Counseling** | 32,853,668.3 (1.8) | 29,787,233.5 (1.8) | 3,066,434.8 (2.4) | 0.305 |
| **Breast Exam** | 55,578,254.2 (3.1) | 50,562,923.1 (3.1) | 5,015,331.1 (4.0) | 0.247 |
| **Depression Screening** | 75,227,618.3 (4.2) | 68,481,463.8 (4.2) | 6,746,154.6 (5.4) | 0.295 |
| **Domestic Violence Screening** | 9,695,307.8 (0.5) | 8,300,770.8 (0.5) | 1,394,537.0 (1.1) | **0.012** |
| **Foot Exam** | 51,364,845.8 (3.0) | 47,798,020.7 (3.0) | 3,566,825.2 (2.8) | 0.905 |
| **Neurologic Exam** | 209,951,201.4 (11.8) | 190,870,014.6 (11.8) | 19,081,186.8 (15.2) | 0.208 |
| **Pelvic Exam** | 72,070,038.9 (4.2) | 67,343,400.5 (4.2) | 4,726,638.5 (3.8) | 0.668 |
| **Rectal Exam** | 29,324,423.0 (1.7) | 26,768,257.3 (1.7) | 2,556,165.8 (2.0) | 0.424 |
| **Retinal Exam** | 254,827,101.5 (14.6) | 236,665,102.6 (14.6) | 18,161,999.0 (14.5) | 0.967 |
| **Skin Exam** | 335,206,570.0 (18.5) | 298,738,617.5 (18.5) | 36,467,952.5 (29.1) | **<0.001** |
| **Substance abuse screening** | 22,950,527.4 (1.3) | 20,662,088.7 (1.3) | 2,288,438.8 (1.8) | 0.256 |
| **Diabetes Education** | 30,632,862.3 (1.8) | 29,266,913.1 (1.8) | 1,365,949.2 (1.1) | 0.084 |
| **Diet/Nutrition** | 216,890,076.6 (12.8) | 206,683,059.2 (12.8) | 10,207,017.3 (8.1) | **0.004** |
| **Exercise counseling** | 141,100,033.2 (8.2) | 133,247,031.3 (8.2) | 7,853,001.9 (6.3) | 0.055 |
| **Injury prevention counseling** | 47,676,936.7 (2.8) | 45,952,648.5 (2.8) | 1,724,288.2 (1.4) | 0.066 |
| **Tobacco use/exposure counseling** | 51,581,723.6 (3.0) | 48,499,123.2 (3.0) | 3,082,600.3 (2.5) | 0.478 |
| **Weight Reduction** | 55,307,220.1 (3.2) | 51,014,622.2 (3.2) | 4,292,597.9 (3.4) | 0.774 |
| **Other services not listed** | 677,977,008.4 (38.5) | 622,516,134.0 (38.5) | 55,460,874.4 (44.3) | 0.056 |
| **Legend:** | | | | |

Table 3 looked at access to services among cancer patients of different payment types and in 20 of the 22 services examined, there were no significant differences between groups.

Cancer patients on Medicaid/state-based programs were more likely to receive exercise counselling (18.6%) than those on private insurance or Medicare (4.4% and 5.6% respectively, p=0.007). Patients who self-paid or were identified as no charge/charity also had higher rates of receiving exercise counseling (14.6% and 23.2% respectively) Lastly, those who were self-paid were significantly less likely to receive a skin exam relative to any other group (p=0.036)

**Table 3 - Comparison of Service provided among Cancer Patients by Payer Type in the 2016-2018 NAMCS Study**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Overall** | **Blank** | **Unknown** | **Private** | **Medicare** | **Medicaid** | **Work Comp** | **Self-Pay** | **No charge/ charity** | **p** |
| **Colonoscopy** | 1,661,405.3 (1.3) | 0.0 (0.0) | 0.0 (0.0) | 520,642.4 (1.2) | 1,041,068.7 (1.6) | 99,694.2 (1.5) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.954 |
| **Cryosurgery/ destruction of tissue** | 4,547,535.2 (3.6) | 0.0 (0.0) | 176,477.7 (3.4) | 1,089,290.8 (2.6) | 3,182,267.4 (4.9) | 58,961.0 (0.9) | 0.0 (0.0) | 11,573.4 (1.1) | 28,964.8 (2.4) | 0.510 |
| **EKG/ECG** | 4,591,344.8 (3.7) | 529,356.8 (14.8) | 558,542.2 (10.8) | 838,606.1 (2.0) | 2,615,043.9 (4.0) | 30,864.0 (0.5) | 18,931.8 (54.3) | 0.0 (0.0) | 0.0 (0.0) | 0.121 |
| **Physical Therapy** | 1,550,239.2 (1.2) | 0.0 (0.0) | 23,389.2 (0.5) | 863,385.5 (2.0) | 521,904.9 (0.8) | 141,559.5 (2.2) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.761 |
| **Wound Care** | 5,229,042.9 (4.2) | 47,070.7 (1.3) | 72,718.5 (1.4) | 1,985,568.3 (4.7) | 2,943,275.3 (4.5) | 122,960.6 (1.9) | 0.0 (0.0) | 28,833.8 (2.7) | 28,615.6 (2.4) | 0.516 |
| **Alcohol Abuse Counseling** | 3,066,434.8 (2.4) | 0.0 (0.0) | 0.0 (0.0) | 1,477,122.3 (3.5) | 1,155,168.4 (1.8) | 434,144.1 (6.6) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.743 |
| **Breast Exam** | 5,015,331.1 (4.0) | 0.0 (0.0) | 0.0 (0.0) | 1,922,574.8 (4.5) | 2,127,617.7 (3.3) | 527,114.9 (8.0) | 0.0 (0.0) | 409,059.0 (38.6) | 28,964.8 (2.4) | 0.159 |
| **Depression Screening** | 6,746,154.6 (5.4) | 0.0 (0.0) | 0.0 (0.0) | 2,073,800.5 (4.9) | 3,930,210.6 (6.0) | 311,893.1 (4.8) | 0.0 (0.0) | 78,081.1 (7.4) | 352,169.3 (29.3) | 0.548 |
| **Domestic Violence Screening** | 1,394,537.0 (1.1) | 0.0 (0.0) | 0.0 (0.0) | 1,101,403.0 (2.6) | 216,026.8 (0.3) | 77,107.2 (1.2) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.630 |
| **Foot Exam** | 3,566,825.2 (2.8) | 0.0 (0.0) | 0.0 (0.0) | 1,538,242.9 (3.6) | 2,028,582.2 (3.1) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.890 |
| **Neurologic Exam** | 19,081,186.8 (15.2) | 153,651.8 (4.3) | 87,503.2 (1.7) | 8,507,336.4 (20.1) | 8,800,239.7 (13.5) | 1,444,420.5 (22.0) | 0.0 (0.0) | 0.0 (0.0) | 88,035.2 (7.3) | 0.098 |
| **Pelvic Exam** | 4,726,638.5 (3.8) | 0.0 (0.0) | 0.0 (0.0) | 2,846,041.5 (6.7) | 1,783,867.5 (2.7) | 96,729.4 (1.5) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.520 |
| **Rectal Exam** | 2,556,165.8 (2.0) | 0.0 (0.0) | 0.0 (0.0) | 1,016,868.0 (2.4) | 1,336,695.1 (2.0) | 202,602.6 (3.1) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.916 |
| **Retinal Exam** | 18,161,999.0 (14.5 | 89,865.5 (2.5) | 124,211.0 (2.4) | 7,896,315.2 (18.7) | 8,922,070.2 (13.6) | 1,012,275.9 (15.5) | 0.0 (0.0) | 35,020.7 (3.3) | 82,240.4 (6.8) | 0.181 |
| **Skin Exam** | 36,467,952.5 (29.1) | 252,840.6 (7.1) | 651,356.4 (12.6) | 14,034,296.1 (33.2) | 18,873,499.4 (28.9) | 2,063,293.8 (31.5) | 0.0 (0.0) | 74,818.2 (7.1) | 517,848.0 (43.0) | **0.036** |
| **Substance abuse screening** | 2,288,438.8 (1.8) | 0.0 (0.0) | 0.0 (0.0) | 1,042,148.1 (2.5) | 1,136,082.2 (1.7) | 110,208.5 (1.7) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.935 |
| **Diabetes Education** | 1,365,949.2 (1.1) | 41,761.6 (1.2) | 0.0 (0.0) | 140,235.8 (0.3) | 1,034,733.6 (1.6) | 125,680.3 (1.9) | 0.0 (0.0) | 23,537.9 (2.2) | 0.0 (0.0) | 0.726 |
| **Diet/Nutrition** | 10,207,017.3 (8.1) | 107,258.3 (3.0) | 65,150.8 (1.3) | 2,938,077.4 (6.9) | 5,436,728.6 (8.3) | 1,202,233.1 (18.4) | 0.0 (0.0) | 178,143.4 (16.8) | 279,425.7 (23.2) | 0.115 |
| **Exercise counseling** | 7,853,001.9 (6.3) | 107,258.3 (3.0) | 552,430.2 (10.7) | 1,872,094.6 (4.4) | 3,665,942.1 (5.6) | 1,221,245.5 (18.6) | 0.0 (0.0) | 154,605.5 (14.6) | 279,425.7 (23.2) | **0.007** |
| **Injury prevention counseling** | 1,724,288.2 (1.4) | 0.0 (0.0) | 0.0 (0.0) | 498,333.4 (1.2) | 712,931.1 (1.1) | 513,023.8 (7.8) | 0.0 (0.0) | 0.0 (0.0) | 0.0 (0.0) | 0.379 |
| **Tobacco use/exposure counseling** | 3,082,600.3 (2.5) | 0.0 (0.0) | 257,378.1 (5.0) | 1,019,497.3 (2.4) | 1,613,219.5 (2.5) | 157,427.4 (2.4) | 0.0 (0.0) | 23,537.9 (2.2) | 11,540.1 (1.0) | 0.905 |
| **Weight Reduction** | 4,292,597.9 (3.4) | 0.0 (0.0) | 0.0 (0.0) | 2,011,107.3 (4.8) | 1,424,907.2 (2.2) | 754,964.4 (11.5) | 0.0 (0.0) | 101,619.0 (9.6) | 0.0 (0.0) | 0.439 |
| **Other services not listed** | 55,460,874.4 (44.3) | 2,680,406.1 (75.1) | 3,336,190.0 (64.4) | 18,538,794.6 (43.8) | 27,861,118.7 (42.6) | 2,324,783.3 (35.5) | 0.0 (0.0) | 342,167.2 (32.3) | 377,414.4 (31.4) | 0.156 |
| **Legend** | | | | | | | | | | |

Forest plot:

After controlling for other factors such as age and insurance status, cancer patients had higher odds of receiving services compared to patients without cancer (OR 1.21, 95% CI 1.06-1.38). They were specifically more likely to receive wound care (OR 3.98, 95% CI: 2.97-5.33), skin exams (OR 2.02, 95% CI:1.79-2.27), cryosurgery (OR 1.97, 95% CI:1.56-2.50), breast exams (OR 1.91, 95% CI: 1.41-2.60), and other services not listed (OR 1.18, 95% CI: 1.06-1.31) as compared to those who did not have cancer.

Chart

Description automatically generated

References:

1. Centers for Disease Control and Prevention: National Center for Health Statistics. Ambulatory health care data. October 2022. <https://www.cdc.gov/nchs/ahcd/ahcd_scope.htm>