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BACKGROUND

- The risk of cancer increases with age; over 1 million of the 1.7 million new cancer cases are estimated to be diagnosed in individuals over the age of 65¹
- Cancer is the leading cause of death in adults 65-74 years of age²
- Efficient diagnostic pathways for patients with cancer enable timely and more effective care
- In the Medicare-aged population, liver, ovarian and pancreatic cancers:
 - Represent intra-abdominal cancers
 - Have an incidence of 34-73/100,000³
 - Are associated with high mortality
 - May often be associated with no or vague symptoms
 - Rely on multiple tests for diagnosis

OBJECTIVE

- To quantify use of diagnostic testing and time to a cancer diagnosis in Medicare beneficiaries

KEY RESULTS: DIAGNOSTIC WORK-UP DURATION WAS PROLONGED IN A NOTABLE SUBSET OF PATIENTS; WORK-UPS REFLECTED HIGH USE OF IMAGING, BIOPSY AND ENDOSCOPY DIAGNOSTIC TESTS

Diagnostic Work-up Duration

- Median diagnostic work-up duration, index date to cancer diagnosis date, ranged between 43 to 56 days (Table 1)
- One-quarter to one-third of patients had diagnostic work-up duration that exceeded 90 days (Figure 2)

Table 1. Diagnostic Work-up Duration

	Median (interquartile interval)	Mean (standard deviation)
Liver cancer	56 (24, 109) days	87.3 (100.4) days
Ovarian cancer	47 (20, 91) days	69.5 (76.5) days
Pancreatic cancer	43 (16, 89) days	68.7 (81.5) days

Percentages of patients with diagnostic work-up duration >90 days is shown in Figure 2

Healthcare Resource Utilization

- High variability across diagnostic test modalities and between cancers for some diagnostic test modalities (Figure 1)
- Substantial overlap in use of both CT and MRI during diagnostic work-up
 - Liver cancer: 38.6%
 - Ovarian cancer: 14.1%
 - Pancreatic cancer: 32.3%
- Multiple E&M visits; mean number of visits ranged between 4.7 to 5.4 visits in the diagnostic work-up period (Table 2)

Figure 1. Diagnostic Test Use

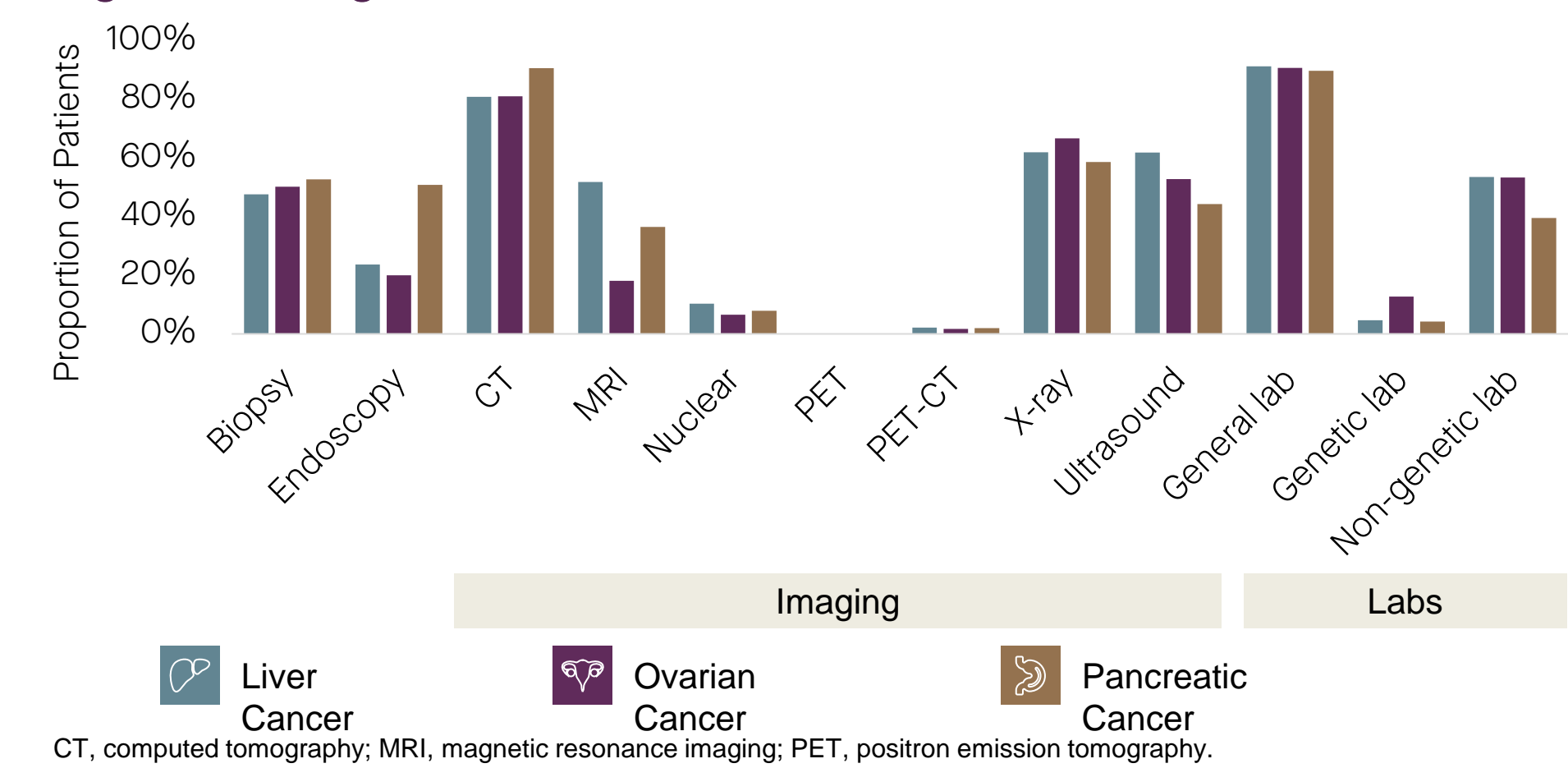


Figure 2. Diagnostic Work-up Duration

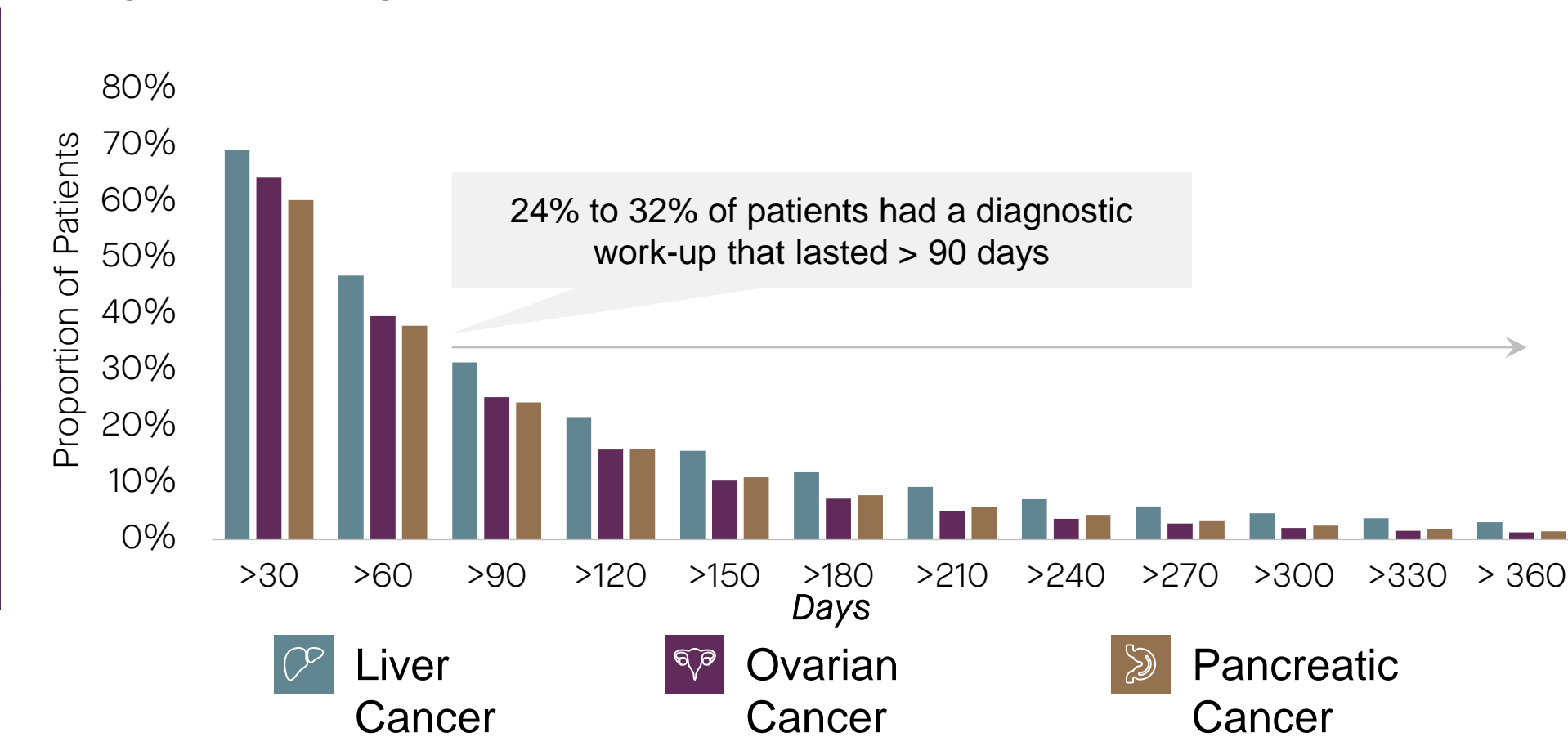


Table 2. Evaluation and Management Visits

	Median (interquartile interval) visits	Mean (standard deviation) visits
Liver cancer	3 (1, 6) visits	5.4 (7.2) visits
Ovarian cancer	3 (2, 6) visits	4.7 (5.5) visits
Pancreatic cancer	3 (1, 6) visits	4.7 (6.1) visits

CONCLUSIONS

- Diagnostic work-up duration was long, exceeding 90 days, for sizeable portions of Medicare beneficiaries with cancer
- High and variable use of imaging, biopsy and endoscopy diagnostic tests
 - Suggests potential redundancy, e.g., high overlap of receipt of both CT and MRI
- Sizeable burden of clinician E&M visits during the diagnostic work-up (although not all of these may have been related to cancer diagnosis)
- Medicare beneficiaries could benefit from more efficient diagnostic process and shorter time to diagnosis

STRENGTHS

- Large population base
- Fee-for-service (FFS) Medicare covers nearly half of all individuals aged 65+
- Nearly all U.S. providers accept patients with Medicare coverage
- Comprehensive healthcare resource utilization derived from billing data

LIMITATIONS

- Medicare data systems were designed for administrative purposes and lack clinical detail
 - No information on histopathological detail regarding cancer diagnosis confirmation and staging at diagnosis
- Diagnostic tests were identified via billing codes
 - It is not possible to identify the purpose of the test in these data
 - Tests were tracked only up until the date of the first claim with a cancer diagnosis code and do not include subsequent tests afterwards
 - Potential explanations for biopsies not being reported for all patients include patients being labeled as having cancer by radiology findings alone and biopsy claims being submitted after date of the first claim with a cancer diagnosis (i.e., "cancer diagnosis date") was reported
- Generalizability beyond fee-for-service Medicare may be limited
- The sample reflects confirmed cancer cases only and omits surveillance and suspected-but-ruled-out cases
- The study is descriptive in nature and does not identify drivers of diagnostic work-up duration or test use

METHODS

Data & Sample

- Data source: 100% fee-for-service Medicare enrollment and claims for Parts A (hospital) and B (physician) services during 01 October 2015 - 31 December 2021
- WCG IRB (#1-1409624-1) deemed this study exempt from review and provided a HIPAA authorization
- Overall sample consisted of Medicare beneficiaries with
 - A new diagnosis of one of 22 cancers
 - ≥2 (outpatient facility or Carrier) claims ≥30 days apart OR ≥1 inpatient hospital claim
 - Use of at least one diagnostic test within 60 days before cancer diagnosis
 - Continuous enrollment in Medicare Parts A and B for 24 months leading to cancer diagnosis
- This study is limited to liver, ovarian and pancreatic cancers

Study Design

- The start of diagnostic workup was identified by looking back in time at the sequence of diagnostic tests occurring before the cancer diagnosis date and were separated by ≤60 days between consecutive tests
- The earliest test in the sequence was deemed the first diagnostic test
- Index date was defined as the latest office visit date before the first diagnostic test OR date of the first diagnostic test if no office visit met criteria

Measures & Analysis

- Diagnostic tests were identified by billing (CPT) codes and categorized as one of:
 - Biopsies
 - Endoscopies
 - Included GI endoscopy, bronchoscopy, and laparoscopy
 - Imaging
 - Lab tests
- Patient characteristics at index date, diagnostic workup duration from index date to cancer diagnosis date, diagnostic tests received, and clinician evaluation and management (E&M) visits were tracked and reported by cancer

Figure 3. Study Design⁴

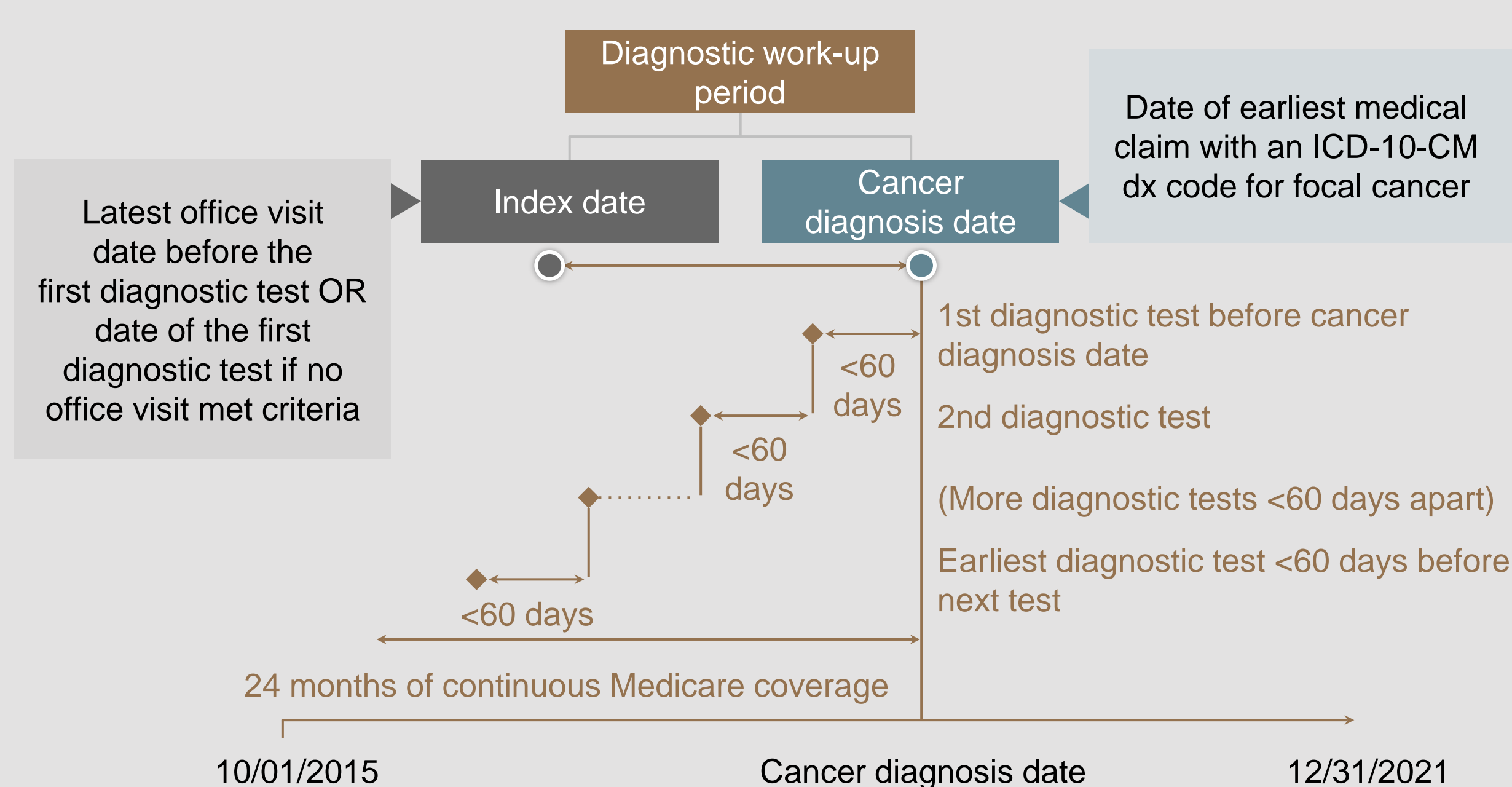


Figure adapted from Gitlin M. *Journal of Managed Care & Specialty Pharmacy*. 2023 Jun;29(6):659-70.

Table 3. Patient Characteristics

	Liver Cancer	Ovarian Cancer	Pancreatic Cancer
N	16,022	10,590	32,878
Age at cancer dx date, mean (SD)	75.8 (6.9)	76.6 (7.3)	77.8 (7.4)
Age at cancer dx date, median (IQR)	74 (70; 80)	75 (71; 81)	77 (72; 83)
Sex, n (%)			
Male	9,577 (59.8)	<11	14,011 (42.6)
Female	6,445 (40.2)	>10,579	18,867 (57.4)
Race and ethnicity category, n (%)			
White Non-Hispanic	11,714 (73.1)	8,986 (84.9)	26,880 (81.8)
Black/African-American	1,118 (7.0)	624 (5.9)	2,524 (7.7)
Hispanic/Other/Unknown	3,190 (19.9)	980 (9.3)	3,474 (10.6)

SD, standard deviation; IQR, interquartile interval.

References

- U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2022 submission data (1999-2020): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; <https://www.cdc.gov/cancer/dataviz>, released in November 2023. 2. Shiels MS, et al. *JAMA Intern Med*. 2022;182(8):883-886. 3. https://seer.cancer.gov/statistics-network/explorer/application.html?site=40&data_type=9&graph_type=2&compareBy=rate_type&chk_rate_type_1=1&chk_rate_type_2=2&chk_rate_type_3=3&sex=1&race=1&age_range=157&hdn_stage=101&advopt_precision=1&advopt_show_ci=on&hdn_view=0&advopt_show_apc=on&advopt_display=2#resultsRegion0. 4. Gitlin M, et al. *Journal of Managed Care & Specialty Pharmacy*. 2023 Jun;29(6):659-70.

Disclosures

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