

# NAACCR Annual Conference POSTER ABSTRACTS

*Discovering Gems Using Cancer  
Surveillance Data*

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# POSTER PRESENTATIONS

## A Data Infrastructure to Study Cancer Outcomes in Persons Insured by Medicaid

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### Background

Cancer patients insured by Medicaid have heightened vulnerability to poor outcomes. Data infrastructures to support detailed analysis of cancer outcomes among those Medicaid insured are sorely lacking, resulting in a significant knowledge gap. Accordingly, we constructed an integrated data infrastructure by linking cancer registry data with Medicaid administrative data, mirroring the structure of the linked SEER-Medicare database, and adding area-level measures on social determinants of health.

### Purpose

To evaluate the potential of linked cancer registry and Medicaid data in studying cancer outcomes in persons insured by Medicaid.

### Methods

Our patient population included all cancer patients younger than 65 years old, diagnosed with incident cancer between 1996-2020, and residing in Ohio or Los Angeles County (LA-County). These regions were selected given longstanding relationships with registry leadership and willingness to share individual identifiers for linkage. Linkage with 2016-2020 Medicaid data was accomplished by the Centers for Medicare & Medicaid Services (CMS). To evaluate cancer screening patterns, CMS also identified a random sample of 3-times as many cancer-free individuals insured by Medicaid as the number of cancer patients in the same regions. From cancer registries, we will retrieve demographic and cancer-related data, vital status, and cause of death. We will use Medicaid data to identify enrollment patterns, comorbid conditions, relevant health services, and outcomes.

### Results

The Ohio Cancer Incidence Surveillance System and the Los Angeles Cancer Surveillance Program included 733,024 and 443,932 individuals, respectively. Of those, 132,386 and 99,908 individuals matched with 2016-2020 Medicaid files. Our cancer-free cohort included 2.2 million from the State of Ohio, and 1.3 million from LA-County. These data will be highly instrumental in analyzing outcomes along the cancer care continuum—from cancer screening to diagnostic evaluation, treatment, survivorship, and end-of-life care. Our study population will include children, adolescents, and young adults that are diverse geographically, racially, and ethnically; those who are recently diagnosed with cancer or at various stages of survivorship; those with intellectual, developmental, and physical disabilities; and those with multiple chronic somatic and psychiatric conditions.

### Conclusion

Our large, diverse, and integrated data infrastructure opens new frontiers in health equity research, allowing us to explore cancer outcomes in previously un/understudied populations.



# A Mixed-Methods Assessment of Cancer Registry Technical Assistance Requests

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## Background

The Centers for Disease Control and Prevention (CDC) is implementing the National Program of Cancer Registries (NPCR) Evaluation Plan for the 2022-2027 funding cycle. Evaluation goals are to increase completeness, timeliness, and quality of registry data and understand NPCR promising practices, facilitators, and barriers to effective cancer surveillance program implementation.

## Purpose

A key component of the NPCR Evaluation Plan is understanding NPCR registry technical assistance (TA) needs, requests, and resolution by CDC staff.

## Methods

To understand registry TA needs, CDC evaluators conducted a quantitative analysis of TA requests submitted in the Award Management Platform (AMP) from June 2022 through September 2023. Two CDC evaluators reviewed and coded a total of 114 AMP TA requests by category, subject theme, and time to resolution. CDC evaluators also held 23 informal interviews with registries to gather additional qualitative information on TA needs and satisfaction with CDC resolution of TA requests.

## Results

Of the 114 requests, most fell under the category of operations/general (69.3%), followed by data submission (15.8%), evaluation and data management plans (8.8%), education and training (5.3%), and registry software/informatics (0.9%). Requests submitted under “operations/general” were primarily focused on AMP (51.9%) and NPCR reports and reporting requirements (31.6%). Regarding TA request resolution, 22 of the 114 requests remained unresolved (19.3%). Of the 92 resolved requests, over 75% were resolved in a timely manner (within 7 days). CDC evaluators are in the process of qualitatively analyzing additional data from informal interviews to capture TA needs and satisfaction with CDC request resolution.

## Conclusion

Many TA requests were related to AMP’s functionality and NPCR reporting requirements. Registry staff are still becoming familiar with AMP’s functionality, as AMP use is not standardized across NPCR-funded registries. Additional training on AMP TA request reporting functions for registries may be useful. AMP is a promising resource to capture recipient TA needs in an efficient way and allows CDC evaluators to regularly analyze TA requests to inform cancer registry training and technical assistance needs.

## A Mixed-Methods Evaluation of SOGI Data Collection in an Academic Hospital Setting

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### Background

Collecting Sexual Orientation and Gender Identity (SOGI) data in healthcare settings is vital for understanding the health needs of this population including their cancer burden. It is imperative to implement best practices to accurately capture patients' lived experiences and ensure that implementation is widespread.

### Purpose

To understand patients' perspectives on answering SOGI questions in the healthcare setting and assess collection of these data in an academic hospital setting.

### Methods

We conducted a mixed-methods study to evaluate the acceptability and feasibility of SOGI data collection practices. We interviewed 12 patients on the importance of SOGI questions, their willingness to provide this data, and how to best collect this data. Additionally, we analyzed electronic health records (EHR) data of adult patients with at least 1 healthcare encounter between 2018-2022 to assess the completeness of SOGI data.

### Results

While some participants felt entirely comfortable providing SOGI data, emphasizing its importance for medical care, others hesitated or preferred contextual considerations before disclosure, citing concerns about past experiences or the perceived inclusivity of healthcare settings. Most patients stated a preference for answering SOGI questions through their online patient portal or an intake form, stating concerns about privacy and desire to reserve time spoken with their medical team to discuss healthcare concerns. Most also deemed the inclusion of SOGI questions to be important for their care, though one participant notably highlighted the necessity for follow-through in utilizing collected data (e.g., clinicians checking preferred names and pronouns before patient encounters). In the EHR data, we observed an overall increase in the completeness of data on both sexual orientation (from 4.4% to 55.7%) and gender identity (5.4% to 62.8%). Among cancer patients specifically, data completeness was even higher for sexual orientation (69.1%) and gender identity (77.5%) by the end of the study period.

### Conclusion

Our findings confirm that patients recognize the importance of SOGI data collection efforts and are willing to provide this data. However, it will be critical for healthcare systems to implement flexible approaches to data collection, paying careful attention to patient privacy. The positive trends in SOGI data completeness within our healthcare system indicate the feasibility for data collection.

# A Tale of Two Iowa's: Differences in Treatment Receipt and Timeliness of Treatment Between African American/Black and White Iowan Men

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## Background

NHB Iowans experience higher Prostate Cancer (PCa) mortality than any other racial/ethnic group within the state of Iowa. It is still unclear whether there are factors within the healthcare system linked to unfavorable and unequal outcomes for NHB Iowans.

## Purpose

We assessed whether there is a difference in treatment receipt and or timeliness to treatment receipt for Black Iowans and their non-Hispanic White counterparts and how those differences may vary by treating facility.

## Methods

Demographic, tumor, treatment, and hospital characteristics of men 40-99 years old Iowa residents were gathered from the Iowa Cancer Registry for patients diagnosed between 2010 and 2020. Rurality was defined using the 2013 Rural-Urban Continuum Codes. Hospital characteristics included rural-urban location and type—Commission on Cancer (CoC)-accredited, NCI-designated, or neither. Logistic regression was used to estimate the likelihood of receiving definitive treatment, time from diagnosis to treatment, the type of treatment to be received.

## Results

Of the 18,747 total PCa patients, 18,197 (97.07%) identified as non-Hispanic White (NHW), and 550 (2.93%) were non-Hispanic Black (NHB) and Hispanic (155, or 0.83%). NHB men were younger at the time of their diagnosis, and more likely to have a lower cancer staging (I or II).

The likelihood of receiving definitive treatment is less likely among NHB men (adjusted odds 0.70; 95%CI, 0.54-0.92) & (adjusted odds 0.37; 95%CI, 0.25-0.55). They are also less likely to receive surgery as their form of definitive treatment within the first 180 days after diagnosis. NHB Iowans are however, more likely to receive radiation treatment within the first 90 days of treatment. Additionally, we found that NHB patients at an NCI designated cancer center or a cancer center that is neither NCI/CoC-accredited were less likely to receive definitive care than NHW patients.

## Conclusion

Despite having similar access to high quality cancer care services, NHB Iowans had lower odds of receiving definitive treatment, as well as less likely to receive prostate surgery within the first 180 days after diagnosis.

# Adapting North American Tools to Allow Cancer Registries Worldwide to Assess Data Quality

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## Background

As part of routine data quality assessment procedures, software applications or “Data Edits” programs are used to detect inconsistencies in data generated by population-based cancer registries (PBCRs).

The International Agency for Research on Cancer/International Association for Cancer Registries (IARC/IACR) in the IARC Technical Report No. 42 provides details for data consistency. This includes intra-record accuracy, validity and consistency checks to detect invalid codes and impossible/unlikely combinations of codes within a record; and inter-record edits to detect duplicate records or records considered to be multiple primary records.

## Purpose

Software applications based on international standards are limited and need updating. Furthermore, edits to accommodate ICD-O-3.2 changes have not been made available to the international community. To address these needs, we identified available software tools from NAACCR and are adapting and testing for use by PBCRs.

## Methods

The NAACCR International Data Edits Tool was developed by adapting software programs used in NAACCR quality assessments to international standards. The software package consists of two processes: intra-record and inter-record checks.

For the intra-record process, three freely available, CDC software programs were identified and adapted by NAACCR. NAACCR data items, comparable to internationally used core data items, were identified and adjustments made to accommodate international coding differences. Invalid codes and impossible/unlikely code combinations within a record were programmed following the IARC/IACR guidelines.

Adaptations for inter-record checks using international rules are being explored.

## Results

Intra-record checks performed by the NAACCR International Data Edits software are currently being tested and compared to existing IARC/IACR tools using cancer incidence datasets from Caribbean PBCRs. Preliminary results have shown that checking ICD-O-3.2 rules is essential to promoting high-quality data. Modifications are being made to the software program to ensure all international rules have been accurately incorporated into the NAACCR International Data Edits Tool.

## Conclusion

It is important that Data Edits programs incorporate ICD-O-3.2 beginning with 2020 diagnoses and that these updates are available to all PBCRs. This work will improve the availability and routine use of tools to assess and improve data quality in cancer registries globally.



# Addressing the “Small Number Problem” at the Max-Census-Tract Level in Cancer Surveillance and Epidemiological Research: An Example of Colorectal Cancer Incidence and Screening

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## Background

Federal agencies, cancer registries, and cancer epidemiological research often present data down to the county level, ignoring large within-county variations, especially in areas with high population density. Research adopting a sub-county geographic unit, such as census tract and ZIP Code, often needs to mask areas with statistics derived from small numbers to reduce the risk of de-identifying individual patients – known as the “small number problem”. This dilemma hinders cancer disparities research and limits its capability to design subsequent interventions targeting specific neighborhoods.

## Purpose

To demonstrate the utility of a regionalization method that consolidates geographic areas, balancing the need to present late-stage colorectal cancer (LSCRC) incidence rates at a fine geographic scale with the need to protect patient privacy.

## Methods

Using 2011-2020 data from the Ohio Cancer Incidence Surveillance System, we calculated age-adjusted LSCRC incidence rates at the census tract level, masking areas with <11 patients per data use agreement. In comparison, we applied the Max-P regionalization method to aggregate the minimum number of adjacent, homogeneous census tracts into the smallest geographic areas to satisfy the threshold constraint of 11 patients and called these areas “MaxTract”. We then calculated age-adjusted LSCRC incidence rates at the MaxTract level. Using census tract-level data from CDC PLACES, we re-estimated the colorectal screening rates at the pre-defined MaxTract level weighted by census tract population. Finally, we identified neighborhoods (or MaxTracts) with high LSCRC incidence rates and low colorectal screening rates for future interventions.

## Results

The census tract-level map of LSCRC has 98% of its areas masked due to <11 patients. In comparison, we identified 783 MaxTracts with LSCRC incidence rates varying between 4.1 and 40.4 per 100,000 people. The overlay of the MaxTract-level LSCRC map and the colorectal screening map highlights areas with high LSCRC rates and low screening rates, where target intervention is mostly needed.

## Conclusion

This novel regionalization method increases geographic resolution in displaying cancer statistics, broadening our understanding of cancer disparities at the neighborhood level. Federal agencies, cancer registries, and researchers should consider these more targeted and actionable geographic areas to have better resource utilization in designing interventions to reduce cancer disparities.



# Anonymizing Cancer Pathology Reports: A Three-Tiered Approach

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## Background

Cancer pathology reports contain identifiable information, such as the patients' name, health number, physician's name, etc. With advances in natural language processing, cancer registries are considering automated data collection and curation using deep-learning approaches, with the state-of-the-art being transformer-based large language models.

## Purpose

Multiple studies have shown that such models are capable of memorizing training data and can leak sensitive information. This limits the ability to share models across institutions or openly due to the risk of information leakage. There are two approaches to ensure that the machine learning models do not leak sensitive information from the training data. First, training models using differential privacy and second, training on data that does not have any sensitive information. The first approach is in its infancy where differentially private models tend to provide subpar utility, which is unacceptable in a healthcare setting.

## Methods

At the British Columbia Cancer Registry (BCCR), we have focused on developing a three-tiered approach for the second paradigm, which automatically identifies and removes sensitive information from the pathology reports before they are used for training language models.

In the BCCR's approach, the first tier uses a regular expression-based method to identify names and patient health numbers from the header (HL7 PID segment) that can often be matched and removed from the report body, followed by removal of the header. Header is where most of the identifiable information resides and it does not provide useful information for machine learning models, hence it can be completely removed. After the first step, unmatched names still remain in multiple places within the report. The second tier uses Presidio, an open-source anonymization library to remove any identifiable names. However, Presidio struggles to identify and remove long names or names of ethnic origins. The third tier uses a deep learning based named entity recognition model called piistar.

## Results

Our initial evaluation via manual audit on 100 randomly chosen reports shows that our approach accomplishes 99% and 95% complete or partial removal of patient and physician identifiers respectively.

## Conclusion

This provides evidence that we can successfully leverage pre-trained models for anonymization, lowering the barriers for collaborative ML research.



# Assessing Risk Factors for Invasive Breast Cancer Patients with Ductal Carcinoma In Situ (DCIS) Diagnosis

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## Background

The incidence of ductal carcinoma in situ (DCIS), a noninvasive form of breast cancer, has increased markedly in recent decades. In Virginia, DCIS cases accounted for approximately 20% of all breast cancer diagnosis during 2016-2020. Many DCIS cancers later progress to invasive breast cancer, with or without treatment. However, it is not possible to accurately predict which DCIS would be more likely to progress to invasive breast cancer. Thus, assessing risk factors for DCIS-invasive breast cancer (IBC) progression is very important.

## Purpose

The purpose was to understand risk factors for female DCIS patients who later developed invasive female breast cancer.

## Methods

We extracted all female breast DCIS patients diagnosed between 2007 and 2011 and followed them up to 2021 from the Virginia Cancer Registry (VCR). After data cleaning and manipulation, there were N=7347 patients in the study. Among those patients, 581 (7.9%) were diagnosed with an invasive female breast cancer after six months or more. We applied a logistic model to examine the association between smoking status, alcohol status, age, race, and family history and the invasive cancer diagnosis after the DCIS diagnosis. The analysis was conducted using SAS 9.4.

## Results

We found that the odds of developing invasive breast cancer in a DCIS patient are 3.4 (95% CI 2.2-5.3) times higher for patients with a breast cancer family history compared with those without a family history of cancer. In addition, black women were found to have a higher rate (1.6 times, 95% CI 1.4-2.0) of progressing to invasive breast cancer compared with white women.

## Conclusion

Women with a family history of breast cancer and black women are disproportionately affected. This may require additional access to screenings to prevent the development of invasive breast cancer. However, expanded racial categories and improved data quality from self-reported variables (alcohol, smoking status, and family history) are needed to further inform prevention efforts.



## Bayesian Mediation Analysis for Time-to-Event Outcome: Investigating Racial Disparity in TNBC Survival

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### Background

Among women in the United States, breast cancer is not only the most common malignancy but also the second leading cause of death. Triple-negative breast cancer (TNBC) has a higher recurrence rate and poorer overall mortality than other subtypes of breast cancer. Studies have shown that African American (AA) women are genetically more likely to develop advanced TNBC than Caucasian American (CA) women. In Louisiana (LA), there were 3,790 TNBC cases from 2010 to 2017, of which 1,861 (49.1%) were from the AA population versus 1,900 (50.1%) were from the CA population, while 32.8% of the LA population were AA and 62.8% were CA. Notably, 43.5% of the AA patients were diagnosed with regional or distant metastasis, compared with 36.6% of CA patients. Thus, TNBC represents a significant challenge to racial health disparities in Louisiana.

### Purpose

To identify environmental risk factors and quantify their effects that explain the racial disparities in survival among TNBC patients in LA.

### Methods

Our research is based on data collected by a CDC project entitled “Enhancing Cancer Registry Data for Comparative Effectiveness Research” (CER). In addition to the routinely collected standard data items, the funded cancer registries also collected variables on patient socio-demographic information, area-based (census tract) socioeconomic status, the detailed first course of treatment information, and tumor biomarkers of prognostic significance listed under CSv2 site-specific factors (SSFs, e.g. estrogen receptor (ER) status, progesterone receptor (PR) status and human epidermal growth factor receptor 2(HER2)) for cancer cases diagnosed in 2011 for the CER project. Patients diagnosed with TNBC were followed-up for more than 8 years. We also developed a Bayesian Mediation Analysis method to explore the observed disparity in survival.

### Results

The observed disparity was completely explained by the included variables. We found that variables age of diagnosis, insurance status, AJCC stage, breast cancer subtypes, poverty, and completion of the first course of chemotherapy were significant mediators.

### Conclusion

We proposed three methods for Bayesian mediation analysis with time-to-event outcomes. All methods are shown to be effective in identifying important mediators and confounders. The disparity was completely explained using the currently collected mediators.

## Cancer Incidence in Persistent Poverty Areas of California by Race/Ethnicity

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### Background

While several studies have examined the relationship between living in persistent poverty areas (PPAs) and adverse cancer outcomes, the relationship between PPAs in California and disparities in specific cancer incidence rates and trends by race/ethnicity are unknown.

### Purpose

To understand the differential impact of poverty on the cancer burden in California.

### Methods

PPAs are defined as census tract of residence at time of diagnosis with a poverty rate of at least 20 percent for approximately 30 years. Using California Cancer Registry data, we identified patients diagnosed with 16 common cancers between 2006-2020. We calculated age-adjusted incidence rates (AAIRs), rate ratios (RRs), average annual percent changes (AAPCs), and associated p-values to facilitate comparisons between incidence rates and trends among patients living in PPAs and non-PPAs in California by race/ethnicity. Incidence rates per 100,000 persons each year were age-adjusted to the 2000 United States standard population.

### Results

Of the 2,493,936 patients, 162,538 (6.5%) lived in persistent poverty areas. The largest proportion (41%) of the cancer patient population in PPAs was of Hispanic/Latino race/ethnicity. Across all racial/ethnic groups, AAIRs of cervical and liver cancers were significantly higher among patients in PPAs versus non-PPAs. Significantly lower incidence of female breast cancer was observed in PPAs versus non-PPAs across all racial/ethnic groups. Among non-Hispanic/Latina Whites, cervical cancer significantly decreased only in non-PPAs (AAPC=-2.0). Incidence of colorectal cancer and non-Hodgkin lymphoma among Hispanic/Latinos increased significantly in PPAs (AAPC=0.4, 1.2) and decreased in non-PPAs (AAPC=-1.4, -0.3). Thyroid cancer incidence among Black/African Americans significantly increased only in PPAs (AAPC=4.7). Cervical cancer incidence among Asian/Pacific Islanders decreased in both groups. Among American Indian patients, significant increases were observed for most cancers in non-PPAs, although trends for many cancers could not be calculated in PPAs due to small numbers and unstable AAIRs.

### Conclusion

Populations living in PPAs of California would benefit from public health interventions. Our findings of significantly higher AAIRs of cervical and liver cancers across all racial/ethnic groups among patients in PPAs versus non-PPAs call for additional research to understand the etiology of these cancers in PPAs and appropriately distribute cancer prevention resources to reduce the observed disparities.

## Cervical Cancer Survival in a Northeastern Brazilian State, 1996-2017

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### Background

Trends in the burden of cervical cancer have been influenced by the availability of preventive measures, early detection, access to high-quality healthcare, and the implementation of effective treatment.

### Purpose

Population-based survival is a pivotal metric for assessing the effectiveness of health systems in cancer management. Our objective was to describe temporal trends in cervical cancer survival in Sergipe, Brazil, by histological group.

### Methods

We analyzed individual data from the Aracaju Cancer Registry on women (15-99 years) diagnosed with an invasive primary cancer of the cervix in Sergipe, Brazil, over five periods (1996-1999, 2000-2004, 2005-2009, 2010-2014, 2015-2017), with follow-up to 31 December 2022. Of 10,482 registrations, 6,095 (58.1%) in situ neoplasms were excluded. After application of the quality control procedures developed for the VENUSCANCER project, 3,977 (90.7%) of 4,387 invasive malignancies were included in survival analyses. One- and five-year net survival were estimated with the Pohar-Perme estimator, by histological group, and age-standardized with the International Cancer Survival Standard weights. To account for background mortality, complete life tables (single year of age 0-99 years) of all-cause mortality rates among women in Sergipe were constructed for each year 1996-2022.

### Results

One-year net survival declined from 84.6% (1996-1999) to 73.4% (2015-2017), while five-year survival fell from 60.8% to 49.3% during the same timeframe. Squamous cell carcinomas comprised 85.1% of cases. Age-standardized survival proved comparable for squamous cell carcinomas and adenocarcinomas, approximately 80% at one year of diagnosis and 55-58% at five years. For other specified morphologies, age-standardized survival was 70.8% at one year and 46.1% at five years. Between 1996-1999 and 2015-2017, net survival for squamous cell carcinoma fell from 85.7% to 74.5% at one year and from 62.5% to 51.4% at five years.

### Conclusion

We observed a modest decline in survival over the years, possibly suggesting improvements in cervical cancer screening programs. Treating and curing in situ tumors found during screenings can reduce the occurrence of invasive cancer. However, aggressive tumors, harder to detect due to faster growth, pose challenges in treatment, possibly leading to a decrease in survival. Additionally, there was no difference in survival between squamous cell carcinoma and adenocarcinoma.

# Contemporary Cancer Mortality Disparities among Asian/Asian American, Native Hawaiian, and Other Pacific Islander Individuals

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## Background

Although the Office of Management and Budget (OMB) disaggregated Asian/Asian American (AA) from Native Hawaiian/Other Pacific Islander (NHPI) in 1997, cancer statistics for NHPI individuals are typically grouped with AA individuals, masking likely existing disparities between populations.

## Purpose

This study examines contemporary cancer mortality among AA and NHPI populations compared to the non-Hispanic White population.

## Methods

We conducted a retrospective cohort study comparing age-standardized cancer death rates (with 95% confidence intervals) from 2018 through 2021 in AA and NHPI individuals to those in White individuals for 23 cancer sites stratified by sex using the underlying cause of death data provided by the National Center for Health Statistics and population estimates based on single race postcensal estimates of the July 1 provided by the CDC. Estimates excluded individuals of Hispanic ethnicity to reduce misclassification.

## Results

From 2018 to 2021, there were 72,495 cancer deaths among AA individuals and 3,084 among NHPI individuals. The overall age-adjusted cancer mortality rate for AA (91.1 per 100,000) and NHPI (142.2 per 100,000) individuals was 40% and 7% lower, respectively, compared to White (152.8 per 100,000) individuals; however, there were striking disparities by cancer type. For example, the death rate in AA individuals in comparison to White individuals was 37% higher for liver cancer (8.2 vs. 6 per 100,000) and 2-fold higher for stomach cancer (4.2 vs. 2.1 per 100,000). The death rate among NHPI compared to White individuals was 30% higher for female breast cancer (25.5 vs. 19.6 per 100,000), approximately 2-fold higher for liver, thyroid, and cervical cancers, and 3-fold higher for stomach (5.9 vs. 2.1 per 100,000) and uterine corpus (15.5 vs. 4.7 per 100,000) cancers.

## Conclusion

Despite lower overall cancer mortality in AA and NHPI individuals compared to White individuals, there are alarming disparities for cancers with known interventions, especially among NHPI individuals. These findings highlight the need for increased cancer prevention strategies in Asian and Pacific Islander communities, including H. Pylori and viral hepatitis infection control and screening interventions, as well as etiologic research to uncover reasons for the extraordinary burden of uterine corpus cancer in Pacific Islander women.



## Data Quality for Gastrointestinal Cancers in Brazilian Population-Based Cancer Registries

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### Background

Population-Based Cancer Registries (PBCR) are important sources for cancer surveillance, in Brazil there are currently 30 PBCRs. Governmental and non-governmental cancer institutions and research groups use registry data to generate incidence estimates, which, in turn, are influenced by the coverage and quality of the data.

### Purpose

This study aimed to assess the data quality of five gastrointestinal cancers in Brazilian cancer registries according to the international criteria of comparability, validity, completeness, and timeliness.

### Methods

A cross-sectional study included data from Brazilian PBCRs available at National Cancer Institute (INCA) on Jan. 08, 2023, last updated on 25 Nov. 2022, with over ten years of historical series from 2000, regardless of the geographic coverage (state, metropolitan region, or capital). The Brazilian PBCRs were evaluated according to comparability, validity (accuracy), completeness and timeliness. We analyzed all cancer cases, excluding non-melanoma skin cancer (NMSC), and five gastrointestinal tumors (esophagus, stomach, colon and rectum, liver, and pancreas) by cancer registries and sex, within the available period.

### Results

Sixteen Brazilian PBCRs included in this study cover 17% of the national population (36 million inhabitants in 2021) with data spanning 2000 and 2018, around 1.3 million cases, excluding NMSC, and around 300,000 NMSC cases. The historical series varied between 12 and 19 years of incidence. Morphologically verified cases (MV%) ranged from 74.3% (Manaus) to 94.8% (Aracaju), while death certificate-only (DCO%) ranged from 3.0% (São Paulo) to 23.9% (Espírito Santo). Highly lethal cancers like liver and pancreas showed DCO% above 30% in most PBCRs. All sixteen registries showed delays of more than 36 months in data disclosure relative to the calendar year 2022.

### Conclusion

While Brazilian cancer registries meeting international comparability criteria, half of the studied exhibited lower-than-expected indexes for validity and completeness in highly lethal tumors such as the liver and pancreas. In addition, the prolonged delay in the timely incidence data dissemination underscores the need to ensure the activity and stability of PBCRs in Brazil, maintaining their role as essential tools for monitoring cancer incidence and informing national cancer control policies.

## Do More Abstracts Equal Better Quality?

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### Background

Cancer registries are experiencing rapid advancements in technology while experiencing cancer registrar workforce shortages. This combination has motivated the Iowa Cancer Registry to evaluate operations to increase efficiency and maximize limited resources. Iowa's catchment includes 184 facilities, of which 26% (n=47) have <30 abstracts annually and see a small fraction of Iowa's cancer cases. Yet, staff devote similar effort abstracting cases at these hospitals as at larger facilities. This led us to the question of what information do we gain from completing a full abstract from these small facilities?

### Purpose

Evaluate the numbers of duplicate abstracts across catchment area facilities and understand the information gained from complete abstracts from small volume facilities.

### Methods

Iowa Cancer Registry abstracts with an admission year between 2018 and 2022 were included. It was determined if tumors had single or multiple abstracts. Reporting facilities (Iowa and non-Iowa) were categorized based on the volume of new primary abstracts each year; low- (<30 abstracts, n=47), medium- (30-124, n=40), high-volume (125+, CoC, n=50), other non-hospital (n=47) facilities. Treatment data from abstracts for surgery, systemic therapies, and radiation variables were categorized as yes/no and values were reviewed to determine which facility categories reported the information.

### Results

Eighty-three percent of abstracts were from a high-volume facility. Low-volume facilities accounted for 2% of abstracts and 0.5% were a single abstract. Of cases that had an abstract from a low-volume facility (n=3,660), the low-volume hospital was the only facility to report receipt of treatment for 36% (n=314) of surgery cases, 25% (n=136) of systemic therapy cases, and 14% (n=31) of radiation cases.

### Conclusion

The majority of cancer treatment information comes from high-volume facilities. In an era of limited resources, it is important to design registry operational workflow to account for this. Strategies could include prioritizing abstraction from high-volume facilities, identifying duplication at low-volume hospitals, and implementing a limited abstract to reduce staff time spent abstracting low-volume hospitals. Future work will explore these strategies.



## Emerging Cancer Trends by Birth Cohort in the USA

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### Background

Cancer trends in recent birth cohorts reflect changes in exposures during early life and foreshadow the future disease burden. Herein, we examined trends in cancer incidence by birth cohort for 34 cancer types in the USA.

### Purpose

Examine trends in cancer incidence rates by birth cohort for 34 cancers in the USA.

### Methods

Incidence data for invasive cancers diagnosed in individuals aged 25-84 years from 2000-2019 were identified from the North American Association of Central Cancer Registries. The cohort-specific incidence rate ratio (IRR), adjusted for age and period effects, was calculated for each birth cohort born from 1920 to 1990 (10-year overlapping birth cohorts, designated by the mid-year of birth).

### Results

The cohort-specific incidence rate increased in successive birth cohorts born since circa 1920 for eleven of the 34 cancer types. For example, cancer risk was approximately 2-3 times higher in the 1990 birth cohort than in the 1955 cohort for cancers of the small intestine (IRR=3.56; 95%CI=2.96-4.27), pancreas (IRR=2.61; 95%CI=2.22-3.07), and gastric cardia (IRR=1.46; 95%CI=1.07-2.00) in both sexes; and for liver (IRR=2.05, 95%CI=1.23 to 3.44) and esophageal adenocarcinoma (IRR=1.72; 95%CI=1.14-2.61) in females. In contrast, the cohort-specific rate increased in the younger birth cohorts after either stabilizing or declining in the older birth cohorts for 9 of the remaining cancers, including estrogen-receptor-positive breast cancer, uterine corpus, colorectum, gastric non-cardia, gallbladder, ovary, testis, anus (males), and Kaposi sarcoma (males). For these cancers, the risk in the 1990 birth cohort was 12% (CRR1990 versus 1975=1.12; 95%CI=1.03-1.21 for ovary) to 169% (CRR1990 versus 1930=2.69; 95%CI=2.34-3.08 for uterine corpus) higher than the risk in the older birth cohort, which had the lowest risk.

### Conclusion

Twenty of 34 cancers examined had increasing risk in younger birth cohorts, including some that followed previously declining trends. The findings add to growing evidence of elevated cancer risk in younger generations and highlight the need for etiologic research to identify underlying risk factors.



# Emergency Dispatch Address Points as Geocoding Candidates to Quantify Delimited Confidence in Residential Geolocation

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## Background

Publication of cancer incidence rates at sub-county (compared to county) scales may impact citizens' sense of well-being and/or property values. If such negative impacts occur, citizens naturally pay attention to the quality of data used for calculating cancer incidence. This in turn brings a need for a simple metric to quantify confidence in residential geolocation as a key constraint of geospatial analysis.

## Purpose

We repurpose emergency dispatch (ED) address point data to quantify delimited confidence in residential geolocation.

## Methods

During geocoding record linkage, a patient address may have more than one ED address point candidate with equal likelihood (CEL) of being the correct match. The discriminant power of residential geolocation depends on the number of CEL, with a higher CEL number signifying lower confidence in residential geolocation. We propose a simple metric based on residential geolocation discriminant power (RGDP) calculated for each case as  $1/CEL$ , thus ranging between  $>0$  and 1. Using 5807 new cancer cases reported to the North Carolina Central Cancer Registry in January of 2022, we calculate summary RGDP (sRGDP) for a set of cases from each county to show variation in the quality of residential geolocation.

## Results

74 NC counties reported new cancer cases, among them 54 were rural and 20 were urban. Cases matched to a unique best ED address (CEL=1) constituted 86%, demonstrating the importance of residential geolocation for sub-county incidence results. While current standards ensure that ~97% of cases are identified within the county boundaries, within the counties, confidence in residential geolocation is lower. Overall, between counties, sRGDP varied 1.6-fold (0.62–1.00), with 1.00 indicating the highest discriminant power of matched addresses. We demonstrate significant differences in sRGDP for cases identified in urban vs. rural counties: mean sRGDP 0.948 vs. 0.896 ( $p < 0.05$ ).

## Conclusion

Variability in sRGDP between counties informs confidence in the quality of geospatial analysis, with low sRGDP helping to manage expectations for the uncertainty in cancer incidence data. The overall quality of residential geolocation is lower in rural vs. urban counties, likely reflecting the lack of resources in the rural areas.

# Estimating the Uninsured Cancer Rate: Unraveling the Indelible Link Between Insurance, Age, and the Accessibility of Cancer Treatment

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## Background

Patients without insurance often wait until their symptoms become severe before seeking treatment. While done to avoid the cost of preventative care, this decision often leads to uninsured patients presenting with more advanced diseases. This trend can be clearly seen in cancer care. Research has shown that uninsured adults are less likely to receive cancer screenings than their insured counterparts, more likely to be diagnosed with cancer at a later stage, hence, have an increased risk for death for certain types of cancer.

## Purpose

We aim to calculate the overall uninsured rate for cancer patients across The University of Kansas Cancer Center's (KUCC) catchment area and estimate the uninsured rate for patients treated within a large health system in the state of Kansas.

## Methods

We conducted a literature review to collect data related to the uninsured rates for Kansas and Missouri by age group. Three datasets were used to generate an overall uninsured rate for both states for the age groups of 0-19, 20-64, and 65 or older. The cancer incidence was derived using the 2020 estimated number of KUCC cases and the mean percentage of 2015-2019 cases for the corresponding age groups. The estimated uninsured and cancer incidence rates were then used to calculate the overall uninsured cancer rate.

## Results

The total number of estimated 2020 KUCC cases was 24,412, with 0.86%, 42.56%, and 56.58% being the percentage per the age groups 0-19, 20-64, and 65 or older. The estimated uninsured rate per age group was 5.33%, 13.49%, and 0.40%. Based on these results, there were an estimated 11 uninsured cancer patients in the MCA area between the ages of 0-19, 1,401 between the ages of 20-64, and 55 uninsured cancer patients over the age of 65. This yielded an overall uninsured cancer rate of 6.01%.

## Conclusion

With the estimate of uninsured cancer patients, we could do future projections and plan on how to solicit funds through philanthropic and state administrators to provide care to these uninsured cancer patients.



## Evaluating Impacts of the COVID-19 Pandemic on Cancer Outcomes

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### Background

Previous assessment of the COVID-19 pandemic's impact on 2020 cancer incidence data showed a significant decrease in case counts and age-adjusted rates (AARs) in 2020 compared to 2005–2019. Much of the decrease in 2020 occurred during March–May when a public health emergency response was implemented.

### Purpose

Evaluate the impact of the COVID-19 pandemic on cancer incidence, late-stage diagnoses, survival, and death trends.

### Methods

U.S. Cancer Statistics (USCS) data were used to evaluate trends in AARs and stage at diagnosis during 2012–2021 for all cancer sites combined and selected sites. Rates from 2020 were calculated but excluded from the trend. We used Merged Summary Stage to define stage at diagnosis and analyzed data for leading cancer sites and screening-amenable cancers. We used National Center for Health Statistics death data to assess cancer death rates during 2012–2021. NPCR data from the 2023-submission will be used to measure survival in three- and five-year cohorts across geographic areas. NPCR recipients meeting USCS publication standards for the 2022- and 2023-data submissions will be included.

### Results

Across all sites, incidence trends remained stable during 2012–2019 with a decrease in 2020 to 450.7 per 100,000 population. There were differences in the stage distribution for several cancers. For breast cancers diagnosed in 2020, there was a 10.0% drop in cases diagnosed at the localized stage, and an 8.4% drop in cases diagnosed at the regional stage when compared to 2019. Death trends decreased over the period from 2012 to 2021. Additional results, including survival and 2021 data, will be presented after analyses are completed.

### Conclusion

The decrease in 2020 incidence rates for all sites is presumed to be from missed cases resulting from screening delays and interruptions to care. It is yet to be seen if these missed cases were caught during 2021 through return to screening and care efforts. Cancer death rates continue to decrease, primarily driven by reductions in deaths among the common screening-amenable cancers. Preliminary analysis shows that among breast cancer cases, there was a decrease in early-stage diagnoses in 2020. This could be a result of declines in breast cancer screening during the pandemic.

## Evaluating the Burden of Lung Cancer among Arkansans

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### Background

Arkansas historically grades poorly for lung cancer measures ranking bottom tier for 3.7% screenings performed among high-risk groups and low 5-year overall survival rate of 22.6%.<sup>1-3</sup> In 2021, the state had the 5th highest lung cancer mortality rate in the US with 44.0 deaths per 100,000.<sup>4</sup>

### Purpose

The purpose of this study is to examine the latest lung cancer incidence rates and trends for Arkansas.

### Methods

NCI's SEER\*Stat program was used to calculate percentages of risk factors and lung cancer age-adjusted incidence rates (AAIR) diagnosed as the only primary tumor using Arkansas Central Cancer Registry data between 2011-2020. Data was stratified by sex, race/ethnicity for early and late-stage and 2 main lung cancer subtypes, Non-Small Cell Lung Cancer (NSCLC) and Small Cell Lung Cancer (SCLC).<sup>5,6</sup> Joinpoint software was used to assess average annual percent change (AAPC) for Arkansas and by sex, race/ethnicity among late-stage cases.

### Results

In Arkansas, 19,432 lung cancer cases were diagnosed. At the time of diagnosis, 44.6% previously used tobacco, 30.3% currently used tobacco, 40.4% had a family history of cancer. Among males, Black, Non-Hispanic (NH) had the highest overall lung cancer incidence rate (AAIR=100.9, 95%CI: 95.5-106.6), late-stage diagnosis rate (AAIR=74.0, 95%CI: 69.5-78.8) and NSCLC rate (AAIR=56.3, 95%CI: 52.8-60.0), but White, NH males had the highest SCLC rate (AAIR=8.4, 95%CI: 8.0-8.9). Among females, White, NH had the highest overall lung cancer incidence rate (AAIR=61.6, 95%CI: 60.3-63.0), late-stage diagnosis rate (AAIR=42.8, 95%CI: 41.7-44.0), NSCLC rate (AAIR=32.8, 95%CI: 31.9-33.7), and SCLC rate (AAIR=8.5, 95%CI: 8.0-8.9). Arkansas had an estimated 2.2% AAPC decrease for lung cancer incidence (95% CI: -2.8, -1.3), but an overall trendline higher than the US. White, NH males had the most AAPC decrease for late-stage diagnosis (AAPC=-3.3, 95% CI: -4.08, -2.6), followed by Black, NH males (AAPC=-2.9, 95% CI: -3.6, -2.2), White, NH females (AAPC=-1.5, 95% CI: -1.9, -1.1), and Black, NH females (AAPC=-0.8, 95% CI: -2.6, 1.1).

### Conclusion

This study is consistent with national findings with Black males experiencing a higher burden of lung cancer incidence.<sup>7,8</sup> These findings may provide statewide cancer programs with data-driven information to promote lung cancer services such as screening and/or genomic testing among subgroups.



## Evaluation of Cancer Incidence Rates among American Indians/Alaska Natives in the California Cancer Registry Using Two Different Classification Methods

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### Background

Accurately assessing the cancer burden among different populations is imperative to identifying health disparities. Population-based cancer registries continue to face challenges in assessing the cancer burden among American Indians/Alaska Natives (AIANs) including: the misclassification of AIANs as another race or ethnicity, the effect of calculating incidence rates only for AIANs living in Purchased/Referred Care Delivery Areas (PRCDA), and small numerators and denominators which may require suppression of data and lead to unstable rates. Furthermore, in California, a large number of people identify as both AIAN and Hispanic/Latino ethnicity, requiring further consideration of how to accurately define AIANs in cancer registry and population data.

### Purpose

To evaluate how two different methods of classifying AIANs in California Cancer Registry (CCR) data impacts cancer incidence rates.

### Methods

Individuals with cancer diagnosed from 2000 through 2019 were obtained from the CCR. Patients were classified as AIAN when Race 1, 2, 3, 4, or 5 (NAACCR Data Items 160-164) had a value of 3, or the patient linked to the Indian Health Service patient registration database (Method 1). Method 2 excluded AIANs from Method 1 who also identified as Hispanic/Latino ethnicity. Hispanic/Latino ethnicity was determined using NHIA Derived Hispanic Origin (NAACCR Data Item 191). Population data for AIANs, used in the denominators, were obtained from the National Center for Health Statistics. Using both classifications of AIANs, we will calculate and compare age-adjusted incidence rates (AAIR) and trends by cancer type, sex, age at diagnosis, and PRCDA designation.

### Results

16,870 Hispanic/Latino AIANs versus 15,120 non-Hispanic/Latino AIANs were identified in the CCR. Regardless of the classification method used, the incidence of all cancers combined among AIANs significantly increased over the study period. The average annual percent change was 3.25% among Hispanic/Latino AIANs and 2.25% among non-Hispanic/Latino AIANs. Comparison of AAIR and trends by cancer type, sex, age, and PRCDA are forthcoming.

### Conclusion

Despite limitations, cancer registries must provide information to the AIAN community on their cancer burden. Cancer registries should continue to evaluate the best methods for accurately assessing the cancer burden in this population and engage with the AIAN community to understand their needs.



## Examining the Impact of the COVID-19 Pandemic on Survival Rates for Breast, Colon, Lung, Prostate, and Rectal Cancers in Manitoba, Canada

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### Background

We previously examined the impact of the COVID-19 pandemic on cancer survival up to September 2021 using an interrupted time series analysis. One-year survival rates were similar to expected values except for individuals 50 to 74 years of age diagnosed with lung cancer from April to June 2021. However, these analyses did not include the Omicron wave. Although the Omicron variant caused less severe disease than previous variants, it was more transmissible and resulted in significant increases in COVID-19 incidence, hospitalizations, and deaths in Manitoba. Consequently, this wave of the COVID-19 pandemic may have had a significant impact on cancer survival.

### Purpose

To investigate differences in cancer survival due to the Omicron wave of the COVID-19 pandemic in Manitoba, Canada.

### Methods

We will use an interrupted time series analysis with quarterly survival rates to examine cancer survival rates prior to COVID-19 (January 2015 to December 2019) and after the start of COVID-19 (April 2020 to June 2022). Royston-Parmar models will be used to account for time-varying effects. Kaplan Meier (KM) estimates at 1-year will be calculated to describe observed survival. Restricted mean survival times (RMST) will be produced at 1-year for COVID-19 fitted values and counterfactual values during the COVID-19 period. The delta between these two values will represent the mean survival time lost or gained during the COVID-19 period. Models will be adjusted for age, stage, and sex.

### Results

The delta RMST results will be presented in forest plots for each quarter in the COVID-19 period for both the unadjusted and adjusted analyses. Plots of the KM estimates will be used to describe the observed and expected survival in each quarter of COVID-19. The results will be presented for breast, colon, lung, prostate, and rectal cancers.

### Conclusion

By extending the analyses to include individuals where the predominant strain of COVID-19 during the diagnosis and follow-up periods was Omicron, this study will examine the impact of the Omicron wave on cancer survival. Cancer survival during the Omicron wave will be compared to pre-pandemic cancer survival and survival during the previous COVID-19 waves.

## Exploring Knowledge Sharing and Boundary Spanning Leadership in Cancer Surveillance: The Cancer Surveillance High Level Strategic Group (HLSG)

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### Background

The Cancer Surveillance High-Level Strategic Group (HLSG) collaborates on decisions affecting the cancer surveillance community that support cancer research, prevention, control and patient care. The collective goal is to enhance the future timeliness, responsiveness, and adaptability of cancer surveillance systems. This involves overseeing the maintenance and improvement of consensus data standards and supporting shared initiatives that advance the field.

### Purpose

The goal of this project is to identify potential opportunities for HLSG to engage in boundary spanning, which refers to alignment and commitment at individual, group, and system levels to improve partnership and collaboration across boundaries while providing new opportunities to advance cancer surveillance.

### Methods

A modified Delphi process prioritized 22 HLSG activities. In the first round, member organizations decided on retention or removal for each activity. In the second round, using a Likert scale, HLSG members rated the 15 retained activities based on importance and feasibility.

### Results

Four HLSG priorities were identified, with a combined feasibility and importance score exceeding 17. The priorities include aligning priority data items with other U.S. data standards, promoting increased adoption of synoptic reporting over text, exploring the role of diagnostic and treatment partial records in early case capture and processing, and developing a value proposition for data harmonization and interoperability.

Two HLSG operations priorities were identified, with a combined feasibility and importance score exceeding 18. Those priorities include reviewing HLSG meeting cadence, agenda creation, and status reports, and developing a standard process and timeline with Mid-Level Tactical Group for communicating vital information to central registries, hospitals registries, and partners.

### Conclusion

The findings serve as a roadmap for enhancing boundary spanning and knowledge sharing within complex systems like the HLSG, and across cancer surveillance and broader public health communities.

## Final Results of the Evaluation of Melanoma and Bladder Cancers in New Hampshire After Follow-Back Efforts

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*<sup>1</sup>New Hampshire State Cancer Registry, Lebanon, USA, <sup>2</sup>Department of Epidemiology, Lebanon, USA*

### Background

A Data Quality Evaluation (DQE) by the National Program of Cancer Registries (NPCR) is performed every five years to assess quality of data from central cancer registries and to determine training needs. Following the NPCR protocol, the New Hampshire State Cancer Registry (NHSCR) evaluated a sample of melanomas of skin and urinary bladder cancers diagnosed in 2018 to identify challenges and implement training for hospital registrars. Following our initial audit reported last year, we now present findings on this evaluation after follow-back efforts to reporting sources.

### Purpose

The DQE can help determine whether central registries need to incorporate additional training for their reporters.

### Methods

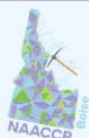
The NHSCR performed a recoding audit on random samples of melanomas of skin and urinary bladder cancers diagnosed in 2018. The audit included a review of data items with the lowest accuracy found on the national DQE and three additional data items recommended for review based on the DQE findings. Discrepancies that were identified were sent to hospital registries for reconciliation. Responses from hospital registries will be reviewed, and cases will be finalized.

### Results

Accuracy rates were calculated on the quality of data items. Data items for melanomas of skin include Tumor Size Summary, Date of First Course Treatment, and Treatment Summary – Surgery of Primary Site. Data items for urinary bladder cancers include Grade Clinical and Grade Pathological. The three additional data items include Diagnosis Date, Histology, and Date of First Surgical Procedure.

### Conclusion

Results from the recoding audit will be used to address training needs for New Hampshire registrars.





## Follow-up and Evaluation of Cancer Patients Who Were Over 100 Years Old and Not Known to be Dead in the New York State Cancer Registry

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### Background

State vital records and the National Death Index (NDI) are two primary data sources used by the New York State Cancer Registry (NYSCR) to ascertain deaths among cancer patients. For various reasons, but mainly due to issues with demographic data quality, a small number of matches were missed during the initial linkages, causing some patients to become immortal in our database. Data linkage could be improved with updated demographic information available since the initial linkage attempt. The current study aimed to identify immortal patients in the NYSCR, then conducted additional death record linkages to improve follow-up information.

### Methods

Patients in the NYSCR diagnosed with an invasive cancer during the years 1995-2020 were included. We calculated expected ages as of 12/31/2021 for all patients, to identify those who were 100 years or older and not known to be dead. We re-linked those patients to state vital records and NDI with a broader death year range (1995-2021). Patients with newly identified deaths were examined by demographic and tumor characteristics. Percentage of patients lost to follow-up was evaluated before and after these linkages.

### Results

We identified 2,405 patients not known to be dead who would be 100 years or older (ranging from 100 to 130) on 12/31/2021. Compared to patients younger than 100 and alive, those elder/alive patients were more likely to be female, Black, Asian/Pacific Islander, of unknown race, Hispanic, foreign born, living in NYC, diagnosed in early years. A total of 194 new deaths were identified, 56.2% of which occurred in 1995-2001 and 91.8% died in NYS. The percentage lost to follow-up among those elder/alive patients was reduced from 62.6% to 54.6% after the linkages.

### Conclusion

This study identified 194 new deaths that had been missed previously, the majority of which were identified through the vital records linkage. Many of those patients had certain data quality issues (such as missing SSN or incorrect birth date), thus, requiring more time and work in determining their match status. Periodically identifying potential immortal patients and conducting additional death follow-up could help reduce the loss to follow-up rate in registries.

## Guideline-Based Treatment Utilization in Treatment of Bladder Cancer in California: 2011-2020

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### Background

Bladder cancer is a highly recurring cancer occurring three times more frequently in men than women, with expected incidence of over 83,000 and approximately 16,840 deaths in 2024.<sup>1</sup> Timely and appropriate treatment is critical for better management of disease. Guideline-based treatments (GBT) are recommended for this purpose. However, underutilization of such treatments for varying stages of disease have been reported before.

### Purpose

To describe utilization of GBT in patients diagnosed with bladder cancer in California in the past decade and identify factors associated with GBT utilization.

### Methods

California Cancer Registry (CCR) data from 2011-2020 were used to identify first primary bladder cancer cases. The cohort included adults (age  $\geq 20$ ) with microscopically confirmed diagnosis, who had a known stage and grade (for non-muscle invasive disease) at diagnosis. Receipt of GBT (Yes/No) was assigned by comparing first course treatment to American Urological Association (AUA) and National Comprehensive Cancer Network (NCCN) guidelines relevant for the study period. Distribution of GBT by sociodemographic characteristics were assessed using frequencies, percentages, and chi-square tests. Logistic regression analysis, adjusted for relevant covariates, will be conducted to assess factors associated with receipt of GBT.

### Results

A total of 44,553 cases were identified. Of them, nearly 40% received GBT. Fewer patients in the following groups received GBT as initial treatment: 75+ age group (33.6% vs 43 – 44.7% in <75 age groups), Hispanic (35.9%) and other racial/ethnic groups (22.8%) compared to non-Hispanic white (41.1%), those without partner (36.7% vs 42.9% with partner), residing in the lowest socioeconomic (SES) quintile areas (32.5% vs 45.4% in the highest SES areas), and those on Medicaid or Medicaid/Medicare dual program (30.5% - 32.9% vs 42.6% for Private insurance). Over time, a gradual increase in reception of GBT was observed (33% in 2011 to 47% in 2020). However, the degree of increase and patterns varied across groups. Results from regression analysis will be presented at the conference.

### Conclusion

GBT utilization continues to be underutilized in California. Lower use of GBT in poorer neighborhoods and in Hispanic/other racial/ethnic groups suggest some disparities exist. Further studies are needed to better understand of its underlying mechanisms and potential effects on survival.

## Health Behaviors and Beliefs about Cancer among Cancer Survivors in the United States: A SEER-HINTS study

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### Background

Data on health behaviors among cancer survivors have largely come from studies with limited generalizability.

### Purpose

To describe demographic factors, beliefs about health behaviors and cancer risk, and health behaviors among a population-based sample of cancer survivors from 3 US regions.

### Methods

Data for this analysis came from a Health Information National Trends Survey (HINTS) study that sampled cancer survivors from 3 Surveillance, Epidemiology and End Results (SEER) registries (Greater Bay Area, Iowa, New Mexico) in 2021. We used weighted logistic regression to examine whether age, sex, education, income, financial stability, occupation, marital status, rurality, or time since diagnosis were associated with alcohol use, tobacco use, adherence to aerobic exercise and resistance training guidelines, or beliefs about health behaviors and cancer risk.

### Results

Of 1,195 cancer survivors, the median age was 72 y; 55% were female; 72% were Non-Hispanic White and 11% were Hispanic or Latino; 40% had less than a college education; 35% reported some financial instability; and 18% lived in a rural area. Participants had 56 cancer types; 23% had breast and 21% had prostate cancer. 42% reported no alcohol use and 59% were never smokers; 43% met aerobic exercise, and 31% met resistance training, guidelines. Male cancer survivors and survivors with higher incomes were more likely to drink alcohol. Cancer survivors 75+ y, male, with less education, or with financial instability were more likely to ever have smoked. Survivors with less education, not employed or retired (e.g., disabled, unemployed), lower income, or residing in rural areas were less likely to meet aerobic exercise guidelines. Cancer survivors <65 y, with less education, and <5 y since diagnosis were more likely to agree that “everything causes cancer.” Cancer survivors with less education were more likely to agree that there are “too many [cancer prevention] recommendations.” Lastly, cancer survivors with less education, lower income, and those residing in rural areas were more likely to agree that there is “nothing one can do to lower their [cancer] risk.”

### Conclusion

Behavioral interventions need to be tailored to cancer survivors with lower education and income, and address survivors’ beliefs that health behaviors do not impact cancer risk.



## Hematopoietic Cell Transplantation Trends and Outcomes in Manitoba

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### Background

Hematopoietic cell transplantation (HCT) is an established therapy for hematologic malignancies and certain blood disorders. Effective HCT delivery requires complex hospital-based care. Therefore, monitoring HCT trends in a population is essential to track disease burden for healthcare resource planning and utilization.

### Purpose

We assessed HCT trends and outcomes [overall survival (OS) and non-relapse mortality (NRM)] in Manitoba from 2005 to 2019 using data obtained from the Cell Therapy Transplant Canada (CTTC) registry - a clinical database of HCTs in Canada.

### Methods

Data on patients' first HCTs was stratified by transplant type (allogeneic vs autologous) and age group (pediatrics: 00-17yrs, young adults: 18-39yrs, middle-aged adults: 40-64yrs, older adults: ≥65yrs). Rates are based on the number of HCTs performed among the Manitoba population and standardized to the 2011 Manitoba population. Time trends were analyzed using Joinpoint regression software. 5-year OS probabilities were estimated using the Kaplan-Meier method with curves compared using the log-rank test. 100-day NRM was analyzed using cumulative incidence and Gray's test to accommodate competing risks of relapse and death from other causes.

### Results

Of the 1049 transplants, 51.7% were autologous and 17% were for pediatrics. Generally, transplant rates increased across all types and age groups with notable increases in older adults [annual percent change (APC) = 20.7%]. The 5-year OS was similar between both transplant types (allogeneic: 58%, autologous: 62%,  $p=0.2057$ ), but differed by age group with the highest among pediatrics (71%), but comparable between young, middle-aged, and older adults [58%, 58%, and 56% respectively,  $p=0.0041$ ]. 100-day NRM differed by transplant type [6% for allogeneic and 1% for autologous HCT ( $p<0.0001$ )] but was similar between age groups [4% each for pediatrics, young adults, and older adults but 3% for middle-aged adults ( $p=0.8666$ )].

### Conclusion

The rate of allogeneic and autologous HCT increased over the 15-year time period. In particular, the rate of HCT in older adults increased significantly over time and showed similar 5-year OS and 100-day NRM compared to other adult age groups. This marks a significant increase in transplant accessibility and underscores the importance of ongoing monitoring and surveillance to plan for resource allocation appropriately as our population ages.

## Identify Cancer Recurrence or Metastasis Events using Radiology Report and Natural Language Processing

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### **Background**

Cancer recurrence and metastasis are critical events following primary treatment with profound effect on patient outcomes. Population cancer registries do not include these events. Currently, the identification of these events relies on manual chart review, which is time consuming and costly. Clinical narratives, such as radiology reports, contain information about the presence and timing of cancer recurrence and metastasis. By extracting data from these narratives, we could potentially automate the identification of recurrence or metastasis events.

### **Purpose**

To develop AI algorithms for detecting recurrence/metastasis in population-based radiology reports

### **Methods**

Data consists of 2,404 radiology reports from 1,752 patients linked with SEER data. We include patients with breast, colorectal, and lung primary cancer who were diagnosed between 2011 and 2018, with images that were taken at least six months after the primary diagnosis. We adopt a pre-trained deep learning model “stanza” with rule-based negation detection algorithm to identify recurrence or metastasis instances from each report. The data are split into training sets (80%) and testing sets (20%) at the patient level. The training data are used to develop the negation rules to exclude unqualified terms. We compared our model with a traditional keyword-searching algorithm (i.e., searching for recurrence/metastasis-related words). The model performances were evaluated by randomly selected 32 cases for independent manual validation.

### **Results**

Using a pre-trained model with negation detection in our approach has demonstrated enhanced results compared to the traditional keyword searching approach. The results indicate that our approach significantly improved accuracy (0.94 vs. 0.62), specificity (0.96 vs. 0.57), precision (0.75 vs. 0.25), and F1 (0.75 vs. 0.40). However, our approach has modestly lower sensitivity (0.75 vs. 1.00); to be verified in a larger validation set.

### **Conclusion**

This study shows the potential of using deep learning algorithms to identify recurrence and metastasis events from radiology reports. Model performance will be further evaluated on larger validation sets by using secondary and salvage treatment information from linked claims data as the gold-standard labels.

## Impact of Residence on Survival of Lung Cancer Patients in Saskatchewan

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### Background

Lung cancer is the common malignancy among Canadian. It remains a leading cause of cancer-related death and responsible for about 25% of cancer death among Canadians. Lung cancer death rates may be varied by the place of residence due to access to care and high turnover of primary care providers. Geographical distributions of healthcare resources have become critical areas of inquiry, especially in regions with diverse landscapes and populations. We hypothesized that patients with lung cancer living in Rural area have inferior survival compared to their urban counterpart.

### Purpose

To compared the stage distribution and survival of lung cancer patients by rural vs. urban in Saskatchewan.

### Methods

This retrospective cohort study will use data from the Saskatchewan Cancer Agency Registry from 1995-2017 for patient diagnosed with lung cancer (ICD-O-3 C34). Place of residence will be identified at the time of diagnosis and will be defined as urban/rural using available Statistics Canada definition. The baseline demographic and clinical information of eligible patients will be obtained from the Cancer Registry. Net survival will be obtained for both rural and urban patients. Overall survival for the two groups will be compared by Long Rank Test. For the multivariable analysis, this study will use the Cox proportional hazard model.

### Results and Conclusion

Outcomes from this study will be helpful for the healthcare provider, policy maker, government, and stakeholder to determine and plan, how to minimize the survival disparities among lung cancer patients impacted by the place of residence. This research is expected to result in valuable insights into healthcare disparities within Saskatchewan. In this study, residence and lung cancer survival based on disease stage will be investigated to develop targeted interventions that take into account the challenges faced by patients living in different geographical locations. Healthcare policies and resource allocation can be shaped in a more equitable and efficient manner when these disparities are understood.

## Improvements in Conditional Survival for Childhood Cancer Survivors

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### Background

Considerable progress has been made in the treatment of childhood cancers over the past five decades. However, many survivors of childhood cancer experience continuing adverse effects from the disease or treatment. Conditional survival is a novel measure that can elucidate the long-term survivorship of childhood cancer patients.

### Purpose

The aim was to quantify improvements in conditional survival for children diagnosed with cancer using data from the Surveillance, Epidemiology, and End Results (SEER) program.

### Methods

Relative survival data on first primary tumors from nine SEER registries for children diagnosed between ages 0 and 19 from 1975 to 2017 were used for analysis. Generally, conditional survival is defined as the probability of surviving to time  $t+s$ , given survival to time  $t$ . Conditional relative survival at 10 years, given survival to 5 years, was calculated for all cancers combined and 15 childhood cancer sites identified using the ICCC site recode 3rd edition/IARC 2017 variable. Trends in 10-year conditional relative survival were assessed using the joinpoint survival model with a maximum of two joinpoints.

### Results

10-year conditional survival was predicted to increase or remain constant for all childhood cancers examined. The largest increases in 10-year conditional relative survival were observed for lymphoid leukemia and acute myeloid leukemia (AML). For lymphoid leukemia, 10-year conditional survival was estimated to increase from 84.4% in 1975 to 98.0% in 2007, corresponding to an increase of 0.38 percentage points (pp) annually (95% CI 0.31-0.46). For AML, conditional survival was predicted to increase from 90.5% in 1975 to 97.2% by 2007, equivalent to a 0.08 pp yearly increase (95% CI 0.03-0.35). For all cancers combined, 10-year conditional survival was estimated to increase from 92.9% in 1975 to 97.2% in 2007, with a significant annual increase of 0.20 pp (95% CI 0.16-0.24) between 1975 and 1996.

### Conclusion

For most childhood cancers, 10-year conditional survival was high, capturing advancements in treatment and improvements in survival. Conditional survival is a measure that is more pertinent to cancer survivors as it contextualizes future survival in terms of current survival, and it can serve as an alternative to the 5-year survival benchmark commonly used in childhood cancer.

# Incidence of Uveal Melanoma in the US: Age-, Sex-, and Race-Based Analysis and Forecast

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## Background

Uveal melanoma (UM) is a rare cancer but is the most common ocular malignancy. Although risk factors are not well known, advanced age and White/Caucasian race are known to be associated with greater rates of disease. Despite recent advancements in diagnosis and treatment options, morbidity and mortality associated with UM has not significantly improved. As the US population ages and changes, a greater understanding of the burden of the disease is critical to providing proper diagnosis and care.

## Purpose

To estimate and forecast the age-, sex-, and race-specific incidence of UM in the US from 2022-2035 using historical data.

## Methods

The NAACR CiNA Use Public Dataset and the SEER Research dataset were used to obtain data for incidence rates of UM from 2012-2020. Incidence analysis was done for sex, race, and age and historical data were used to inform forecast rates for 2022-2035. Averages of the rates observed across datasets were used to inform forecast rates.

## Results

The age-, sex-, and race-adjusted incidence of UM was estimated to be 0.69 per 100,000 [95% CI = 0.53,0.80] in 2022, corresponding to approximately 2,400 cases, and was forecast to grow modestly to 0.70 [95% CI = 0.55, 0.87] by 2035. White males have the highest rate of disease, growing from 1.15 per 100,000 in 2022 to 1.28 per 100,000 in 2035. Incidence of UM was highest among those 65 and older (2.18 per 100,000 in 2022), particularly for 75–84-year-olds (2.47 per 100,000 in 2022). However, these rates are estimated to decline by nearly 6% by 2035.

## Conclusion

In this study, we analyzed the historical rate of uveal melanoma utilizing cancer registry data from NAACR CiNA Use Public Dataset. Despite an aging population and greater rate of disease among older Americans, the incidence of UM is forecast to remain relatively stable through 2035, due in part to demographic changes and differences in race- and sex-specific rates.



# Interfacing with the CDC Guidelines for Unusual Patterns of Cancer and Environmental Concerns: A 2023 Wisconsin Case Study

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## Background

Interfacing with the CDC Guidelines for Unusual Patterns of Cancer and Environmental Concerns (Guidelines) remains a challenge for many state and territorial public health agencies. We use a Wisconsin community concern reported in 2023 as a case study to highlight the importance of strong working relationships between an environmental and occupational health bureau and a population-based central cancer registry in responding to community cancer cluster concerns.

## Purpose

To showcase one population-based central cancer registry's experience interacting with the CDC Guidelines.

## Methods

The Wisconsin Cancer Reporting System received notice of a community-initiated cancer cluster concern about per- and polyfluoroalkyl substances contaminated drinking water from the Bureau of Environmental and Occupational Health in late February 2023. We applied the CDC Guidelines to design a series of county-level aggregate data tables as well as review and select record-level cases for use in a spatial assessment within one month's time.

## Results

We experienced significant challenges applying Criteria 1-5 in Phase 2 of the CDC Guidelines—specifically: selecting appropriate reference population(s) for the community of concern for standardized incidence ratio calculations; communicating the many nuances of registry operations and data release policies (e.g. reporting schedules, release of only non-DCO cases, exclusion of cases solely reported by the VA); validating statistical models, and reviewing geocoding quality for data used in mapping the geographic distribution of cancer cases.

## Conclusion

Strong working relationships between registry and environmental health staff are imperative to responsibly applying the CDC Guidelines at state and territorial public health agencies. Decisions in operationalizing the CDC Guidelines should include registry staff throughout a cancer cluster response as study populations in Phase 2 will most often be created from our data.



## International Prostate Cancer Mortality Trends

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### Background

Prostate cancer, the fifth leading cause of cancer death globally among men in 2020, is estimated to cause approximately 740,000 deaths by 2040. Despite this growing burden, comprehensive data on international trends in prostate cancer mortality rates is limited.

### Purpose

Analyze international prostate cancer mortality trends using up-to-date data from the World Health Organization (WHO).

### Methods

Population-based death registry data from 50 countries with available data between 1950 to 2019 were obtained from the WHO database, as compiled by the International Agency for Research on Cancer. Age-standardized mortality rates based on the 1966 Segi-Doll world standard population, were calculated for the most recent 5-year period of available data for each country. Trends, expressed as annual percent change (APC) and average APC (AAPC), were described as increasing or decreasing when the APC or AAPC was statistically significantly different from a two-sided p-value of <0.05, otherwise expressed as stable.

### Results

Rates varied 6-fold, from 4.03 per 100,000 men in Kyrgyzstan (2012-2016) to 24.25 in Cuba (2014-2018), with the lowest rates found in most countries throughout Asia and the highest in Latin America and the Caribbean and Northern Europe. Rates began to decrease in many countries around the late 1990s to early 2000s, and stabilized in Singapore, Canada, Poland, Estonia, Croatia, Greece, and Austria around the late 2000s to early 2010s. In contrast, rates began to increase in Bulgaria, Romania, and Cuba since 1982 and in the Kyrgyzstan and Slovakia since the mid-to-late 2010s. During the most recent 5-year period, mortality rates decreased, on average, for 37 of the 50 countries analyzed, ranging from 3.5% per year in Israel to 0.4% per year in Mexico. In contrast, rates increased in 5 countries, from 4.7% per year in Slovakia to 0.8% per year in Ecuador, and stabilized in 8 countries.

### Conclusion

While many countries experienced decreasing mortality rates during the most recent 5-year period, rates in 13 countries increased or stabilized. This variation may be due to heterogeneity in the introduction and dissemination of Prostate-Specific Antigen (PSA)-based testing and early diagnosis, prevalence of certain risk factors such as genetic susceptibility, and access to care and treatments.



## Key Findings from the NCRA-UCSF Hospital Workload Study

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### Background

Cancer registrars (CRs) are vital to cancer surveillance and monitoring. Foundational CR work includes collecting, coding, and reporting national cancer data. However, cancer registry work extends far beyond these processes. Previous research and staffing guidelines have been used to inform staffing decisions and advocate for staffing needs.

### Purpose

The purpose of this study is to update guidelines by documenting and quantifying the workload of hospital-based CRs and to collect qualitative data about the role and skills required for future activities.

### Methods

Two surveys were conducted: the Registry Lead Survey (RLS) and the Cancer Registrar Survey (CRS). Survey development was informed by cancer registry experts, and both surveys were pretested. The RLS was sent to all self-identified registry managers/leads working at hospital-based registries in the National Cancer Registrars Association's membership database. RLs were asked to send the CRS to their CR staff. Post-survey interviews were conducted with experts and leaders in the cancer registry industry.

### Results

RLs were most concerned with recruiting well-trained staff (87.6%), compensating staff well enough to retain them (82.3%), and funding additional positions (77%). About 25% of registries reported that they had vacant positions and expressed concern about filling them. About 28% of CRs had 1-5 years of experience in the profession and nearly 25% of CRs had more than 20 years' experience, with about 28% planning to leave the profession in the next five years. Reported case completion times are about 1 hour for simpler cases and 1.5 hours for more complex cases. A model using data from the RLS survey indicated that caseload is the dominant consideration when determining staffing. An additional consideration is the type of institution served, multi- or single. Post-survey interviewees opined that myriad artificial intelligence (AI) based technologies will automate certain tasks and can help to recover some of registrars' time.

### Conclusion

AI will shift the responsibilities of CRs, but it will not eliminate the role. Attracting new people to the field and training them in the appropriate areas is more critical than ever given existing shortages. RLs can use these results to develop their own workload and productivity standards and staffing guidelines.

## Minimized Data Set for Early Reporting in Rhode Island

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### Background

In 2018, the RI Cancer Registry changed their Rules and Regulations to include “Each health care facility and/or health care provider shall submit a set of available information on reportable cases within thirty (30) to forty-five (45) days from the date of a case first seen by provider” (RI DOH Rules and Regulations). After numerous meetings with hospital registry staff members, RICR has agreed to change the Rules and Regulations to sixty (60) days from the date of first contact. This change is currently in the process of being updated.

### Purpose

Changing the time to report will give the central registry more complete information within each abstract with the minimized data set. These abstracts will be incorporated into the registry system quicker so that the information can be used for data requests or other purposes in the state of RI. This could also assist in casefinding audits.

### Methods

- Provide facilities with a minimized data set.
- Ask that they send the ‘suspense’ cases from the 2 months prior (example: current month is April, they will send suspense cases from February).
- Ensure that all facilities are sending a complete minimized data set.

### Results

Changing from 30-45 days to 60 days in reporting yielded great results. With most RI reporting facilities using the minimized data set, they can provide a more complete minimal abstract that the registry will be able to use.

### Conclusion

Getting data quicker can be completed using a minimized data set. Currently, we are receiving the minimized data set through Excel. In the future, we will be asking all reporting facilities to report the minimized data set through XML format. The central registry will then incorporate these cases into the registry system for complete use.

## Misclassification of Adult T-cell Lymphoma/Leukemia Deaths in Florida

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### Background

Adult T-cell lymphoma/leukemia (ATLL) (ICD-O-3 code 9827.3) is a rare cancer with low 5-year survival (28%) caused by human T-cell lymphotropic virus type 1 (HTLV-1). US HTLV-1 prevalence is low, but infection is endemic in areas of the Caribbean, South America, and Africa, leading to a seemingly higher ATLL risk among specific US populations including Afro-Caribbean people, who make up a considerable portion of the Florida population. ATLL is preventable through control of HTLV-1 vertical transmission.

### Purpose

To help inform ATLL public health measures among high-risk groups in the US [as birth country is more complete in mortality Vital Statistics (VS) than in registry data], a validity study is needed to measure the extent of misclassification present for ATLL deaths among hematological cancers in relation to the respective cancer registry incident case.

### Methods

All decedents by hematological causes (ICD-10 codes C81-C96) with incident cancer during 2005-2018 were collected from the Florida Cancer Data System (FCDS) inclusive of ATLL deaths (ICD-10 C91.5). Validity of cause of death ATLL was estimated by sensitivity and specificity calculations using FCDS data as the gold standard.

### Results

Of 58,244 total hematological cancer deaths, there were 159 ATLL deaths documented in Florida VS, and 271 deaths among 381 FCDS ATLL cases. The sensitivity of VS ICD-10 ATLL was 19.2% (95%CI: 18.9%-19.5%), while the specificity was 99.8% (95%CI: 99.8%-99.8%). Over two thirds of VS ATLL deaths were false positives (67.3%, 107/159) with a low positive predictive value of 32.7%. Of the 159 VS ATLL deaths, FCDS had 8.8% recorded as peripheral T-cell lymphoma, 10.1% T-cell prolymphocytic leukemia, 7.5% T-cell lymphoblastic leukemia/lymphoma, 5.0% chronic lymphocytic leukemia, 5.7% T-cell large granular lymphocytic leukemia, and 30.2% other diseases.

### Conclusion

Accuracy of ICD-10 mortality coding for ATLL is very poor (sensitivity <20%), with extensive misclassification across hematological cancers and other diseases. Two major issues which hinder ATLL population-based research: 1) the lack of validity among ATLL mortality data, and 2) the lack of specific racial-ethnic data among incidence registry data precluding the study of the groups most affected by this preventable disease.

## Ohio Melanoma Reporting System

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### Background

The Ohio Partners for Cancer Control (OPCC) Skin Cancer and UV Protection Workgroup, in collaboration with the state central cancer registry (Ohio Cancer Incidence Surveillance System, "OCISS"), developed goals to improve skin cancer case reporting in Ohio. The group developed a system for increasing the number of dermatology practices submitting skin cancer cases to OCISS, which involved a diverse group of partners and stakeholders.

### Purpose

To improve skin cancer data collection accuracy in Ohio; to provide real-world abstracting experience for graduating Health Information Management (HIM) students; to increase awareness of and compliance in cancer reporting for physicians in Ohio; saving physician office staff time and resources.

### Methods

The system requires four (4) fundamental partners: the dermatology partner, the university partner, the central registry partner, and the individual dermatology offices. The dermatology partner and university partner are responsible for the secure transmission of health records needed for abstracting by the students. To do this, the dermatology partner established a secure HIPAA fax line for use by all dermatology offices to securely transmit relevant patient information to the university partner. Once received, the university partner stores the records in the appropriate provider's secure folder and assigns that folder to a student. Students can access the secure folders within the secure school software. Students then abstract the cases based on the information provided by the dermatology offices and upload them directly to OCISS via WebPlus. Once reporting is complete, folders are destroyed for security purposes.

### Results

Currently there are seventeen providers reporting to OCISS through the Ohio Melanoma Reporting System; none of these providers were previously reporting to OCISS. Four graduating classes of students have successfully abstracted skin cancer cases in real time, earning valuable, practical cancer case abstraction experience.

### Conclusion

The Ohio Melanoma Reporting System has been a success and has increased melanoma case reporting to OCISS from the previous year. HIM students receive valuable work skills to use after graduation. Dermatology offices are now in compliance with state cancer reporting requirements, without the need to reallocate staff. This system allows dermatology offices to save time and resources that would otherwise be devoted to cancer reporting.



## Opportunities and Challenges Linking Central Cancer Registry and Clinical Databases Data

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### Background

The Manitoba Cancer Registry (MCR) is legally mandated to collect, organize and analyze data for all individuals in Manitoba with a cancer diagnosis. The CAISIS Chronic Lymphocytic Leukemia (CLL) database is a clinical database at CancerCare Manitoba that collects detailed clinical information from individuals seen at CCMB. Linkage between these two data sources offers great potential to answer many epidemiologic, health services, clinical and translational research questions. We report on our experience linking these two data sources for a multidisciplinary translational research study.

### Purpose

To review and highlight key considerations when linking central cancer registries with clinical databases.

### Methods

The MCR and CAISIS databases were both used to identify individuals diagnosed with CLL from 2006 to 2019 in Manitoba, Canada. The MCR contributed demographic, diagnosis, staging and high-level treatment information. CAISIS contributed demographic, diagnosis, progression, disease-specific staging, detailed treatment and diagnostic testing information. As part of the linkage process, concordance in diagnosed malignancy and diagnosis date was measured. Malignancies and dates of diagnosis were noted to exist in either or both datasets, and a review of diagnoses with a different malignancy or diagnosis date was completed.

### Results

A total of 1808 diagnoses were identified, sixty-six percent (n=1204) of diagnoses were found in both data sources, 28% (n=516) were only in the MCR, and 5% (n=88) were only in CAISIS. Of those found in both datasets, 4% (n=50) had different malignancies, 8% (n=99) differed by diagnosis date, and 3%(n=33) differed by both malignancy and diagnosis date.

### Conclusion

Differences between the two data sources are expected given inclusion, and data collection/coding practices differ. The MCR is a province-wide registry that registers all cancer cases regardless of treatment location, but follows strict coding rules that are not as flexible to incorporating new knowledge compared to a clinically-managed database. Due to discordance likely caused by different methods of data acquisition, it is important to verify the linkage, harmonize variables collected and resolve differences prior to analyses. Ongoing communication between registry and clinic personnel to review case registrations and update disease and treatment details is an essential component to ensure data are useable and accurate before use.

## Ovarian Cancer Survival in a Brazilian State with Medium Human Development Index (1996-2017)

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### Background

Ovarian cancer survival in low- and middle-income countries tend to be lower compared to high-income countries. Access to quality healthcare and socioeconomic factors contribute to this disparity.

### Purpose

Our objective was to describe trends in ovarian cancer in Sergipe, Brazil, by histological group.

### Methods

We analysed individual data from the Aracaju Cancer Registry on women aged 15 to 99 years diagnosed with a cancer of the ovary, fallopian tube, uterine ligaments and adnexa, peritoneum or retroperitoneum, other specific and unspecified female genital organs, in Sergipe, Brazil, over five periods (1996-1999, 2000-2004, 2005-2009, 2010-2014, 2015-2017), with follow-up to 31 December 2022. After application of the quality control procedures developed for the VENUSCANCER project, of 1,131 registrations, 948 eligible patients were included in survival analyses. We determined one- and five-year net survival using the Pohar-Perme estimator and age-standardised with the International Cancer Survival Standard weights. These estimates were stratified by histological group. To adjust for background mortality, complete life tables (single year of age 0-99 years) of all-cause mortality rates among women in Sergipe were constructed for each calendar year 1996-2022.

### Results

One-year net survival ranged from around 60-70% during 1996-2017, while five-year survival varied from 31-47%. Epithelial type I tumours accounted for approximately a quarter (24.9%) of cases, whereas type II constitutes over half (56.1%) of the cases. One-year survival for type I and type II were comparable, at around 67-68.5% in 1996-2017. However, five-year net survival for type II tumours was 32.5%, in contrast to a higher survival of 52% for type I. Over time, there was an increase in survival for type II tumours, going up from 55.4% (2000-2004) to 69% (2015-2017) at one year, and from 22.3% (2000-2004) to 37.4% (2015-2017) at five years.

### Conclusion

Survival trend for ovarian cancer remained relatively stable over time. Notably, type II epithelial tumours, accounting for over half of the cases, presented a lower five-year survival rate compared to type I tumours. The observed disparities in healthcare infrastructure and resources in regions with a medium Human Development Index could potentially impact the survival outcomes for patients with ovarian cancer.



## Overall Cancer Survival: A Decade-Long Analysis at Cancer Center in Brazil, from 2000 to 2017

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### Background

Hospital Cancer Registries (HCR) are sources of information about cancer, including diagnoses, clinical characteristics, treatment, and short- and long-term outcomes. The HCR at A.C.Camargo Cancer Center (ACCCC) has been active since 2000, recording new cases diagnosed and/or treated at the institution.

### Purpose

This study aimed to analyze the overall survival of the ten most common cancer types within the institution, by sex and period, between 2000 to 2017.

### Methods

Survival analysis utilized HCR data extracted on August 10, 2022, focusing on cases diagnosed from 2000 and 2017. Overall survival was calculated for ten most common cancer by sex (oropharynx, oral cavity, stomach, colorectal, lung, melanoma of skin, kidney, bladder, thyroid, Hodgkin's lymphoma; and tumors exclusive to a single sex as prostate, female breast, cervix and uterine corpus) across three five-year periods (2000-2004, 2005-2009, and 2010-2014) and one three-year period (2015-2017) applying the log-rank test with a significance level of  $p < 0.05$  was applied using IBM® SPSS Statistics (version 23).

### Results

More than 33,000 cases were analyzed, an increasing five-year survival probability for the top ten cancers in both sexes from 2000 to 2017 was observed principally in females. For adenocarcinoma of the lung (C34), the survival rate rose from 10.4% (2000-2004) to 51.1% (2015-2017) in males and from 18.8% (2000-2004) to 59.0% (2015-2017) in females. For adenocarcinoma of the stomach, the probability of five-year overall survival increased from 25.2% (2000-2004) to 51.0% (2015-2017) in males and from 31.3% (2000-2004) to 58.5% (2015-2017) in females. Increases in survival occurred for papillary thyroid adenocarcinoma in males and Hodgkin's lymphoma in both sexes, although with no difference among periods. Survival decreased for bladder carcinoma in females during the period 2015-2017.

### Conclusion

The overall survival rates for the analyzed cancers increased in periods analyzed, with better survival observed in the most recent period (2015-2017) in females. These observed increases in survival from 2000 to 2017 reflect the ACCCC's commitment to embracing innovations in oncological diagnosis and treatment, providing patients with improved resources for therapeutic success.

## Pancreatic Cancer in Manitoba: An Assessment of Incidence, Mortality and Net Survival

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*Background: Recent findings from the Canadian Cancer Society's 2023 report show that pancreatic cancer mortality is on the rise and is projected to be the third leading cause of cancer death in Canada for both sexes and Canadians 60 years of age and older.*

### Purpose

We evaluated pancreatic cancer incidence trends from 2007 to 2021, mortality trends from 2018 to 2021, and 5-year net survival in Manitoba using the Manitoba Cancer Registry data.

### Methods

Data obtained on individuals diagnosed with invasive pancreatic cancer was stratified by sex, stage at diagnosis, age group ( $\leq 69$  yrs, 70-79 yrs, and  $\geq 80$  yrs), and residence type (rural or urban). Rates were based on the number of cases and deaths among the Manitoba population and standardized to the 2011 Manitoba population. Time trends were analyzed using Joinpoint regression software and 5-year net survival was estimated using the cohort method for cases diagnosed from 2007 to 2016 and the period approach for cases diagnosed from 2017 to 2021.

### Results

2,677 cases of invasive pancreatic cancer were diagnosed over the 15-year period with rates increasing from 2007 to 2010 but remaining relatively stable from 2011 onwards. Most cases were diagnosed at Stage IV, higher in males, and primarily among people aged 70 and above. Urban residents had higher rates of pancreatic cancer from 2007 to 2016 but declined from 2016 to 2021. For mortality, 667 deaths occurred between 2018 and 2021 but demonstrated an annual decline. Mortality rates are higher for unknown-staged tumours, in males, among people aged 70 years and above, and urban residents. 5-year net survival is generally low, but a 5% increase occurred between the 2007-2016 period and the 2017-2021 time period.

### Conclusion

This study is a preliminary assessment of the pancreatic cancer landscape in Manitoba. These results serve as a baseline for further investigation that can highlight gaps and opportunities for pancreatic cancer control strategies, identify priority areas for clinical and health services research, and inform prevention and screening initiatives for early detection of pancreatic cancer in Manitoba.

## Patient Compliance with Recommended Cancer-Directed Therapy in Hawaii

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### Background

Cancer-directed treatment plays a critical role in cancer outcomes. There is limited population-based information on patient compliance with recommended treatment regimens.

### Purpose

Our objective was to evaluate cancer patient treatment compliance, including variation by demographic and clinical factors and its impact on survival.

### Methods

We evaluated treatment compliance among Hawaii residents diagnosed with cancer in 2006-2019 using statewide registry data.

### Results

Overall, among all patients for whom cancer-directed treatment was recommended, receipt of treatment was highest (93%) for surgery and lowest (79%) for chemotherapy. Significant differences were observed by stage, age, sex, race/ethnicity, and Yost socioeconomic index ( $p < 0.0001$ ). Treatment refusal was higher for patients with localized compared to those with advanced cancers for chemotherapy (20% vs. 13%) and hormonal therapy (7% vs. 5%).

Treatment refusal was higher for patients aged 60+ compared to those <60 years for surgery (4% vs. 1%), radiation (5% vs. 3%), chemotherapy (18% vs. 8%), hormonal therapy (7% vs. 5%), and biological response modifiers (9% vs. 4%). Refusal of chemotherapy was 16% among females compared to 13% among males. Refusal of radiation ranged from 3% for Filipinos to 6% for Whites and refusal of chemotherapy ranged from 11% for Filipinos to 16% for Whites. Comparing the lowest to the highest SES levels, treatment refusal varied for chemotherapy (16% vs. 14%) and radiation (6% vs. 3%).

Five-year cancer-specific survival significantly varied by treatment compliance. Among surgery-recommended patients, survival was 85.7% (95% CI 85.4 - 86.1) for treatment receipt, 53.4% (51.6 - 55.2) for treatment not given/unknown, and 42.2% (39.3 - 45.0) for treatment refusal. For radiation, survival was 72.4% (71.8 - 73.0) for treatment receipt, 71.7% (68.4-74.7) for treatment not given/unknown, and 53.5% (50.1-57.0) for treatment refused. For chemotherapy, survival was 56.3% (55.7 - 57.0) for treatment receipt, 39.0% (36.6-41.3) for treatment not given/unknown, and 42.5% (40.9-44.0) for treatment refused. Survival differences were also observed for hormonal and biological response modifier therapies.

### Conclusion

Treatment compliance, including refusal of therapy, varies by patient and clinical characteristics. Treatment refusal is associated with poor survival outcomes. The reasons for treatment refusal warrant further investigation.

## Population-Based Survival from Advanced Melanoma among Adolescents and Young Adults since the Widespread Use of Immunotherapy Treatments: Is it Getting Better?

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### Background

Melanoma survival remains understudied among the adolescent and young adult population (AYA; ages 15-39 at time of diagnosis). Advanced melanoma outcomes were historically poor. Since immunotherapy was first approved in 2010, advanced melanoma survival has improved greatly, increasing from a median of about 6 months to 6 years for stage IV melanoma, based on data from clinical trials with long-term follow-up data. It is unclear if gains in survival from advanced melanoma are observable in population-based data, and whether improvements are similar across age groups, specifically for AYA patients with advanced melanoma.

### Purpose

This population-based study aims to examine age-group-specific survival to determine if disparities in survival from advanced melanoma are observable in the era after immunotherapy usage became available.

### Methods

Cutaneous cases of AYA melanoma in 2010-2021 from the California Cancer Registry will be included. Frequencies/percents of melanoma by sociodemographic and clinical characteristics, including sex, age group (15-39y, 40-64y), race/ethnicity, socioeconomic status (SES), insurance type, and stage at diagnosis, along with immunotherapy as a first course of treatment for advanced stages, will be described. Kaplan-Meier estimates will be used to examine the probability of survival by sex, stage, and age group. Cox proportional hazard regressions with adjustment for confounding will be used to evaluate survival from late-stage vs early-stage melanoma.

### Results

Age-group-specific survival from advanced melanoma by sex, race/ethnicity, SES, insurance type, and stage at diagnosis will be presented using Kaplan-Meier graphs and hazard ratio estimates with 95% confidence intervals.

### Conclusion

Immunotherapy use has led to dramatic improvements in survival from advanced melanoma. However, the literature largely reflects older adults, remaining less well-examined among AYAs, who may not have equal access, impacting their survival. In our prior study, we observed worse survival from advanced melanoma for AYAs vs older adults, during a period prior to widespread use of immunotherapy. In this study, we will report whether evidence of improved AYA survival from advanced melanoma may be observable by using data from the period after immunotherapy was first approved. Should a sustained disparity in AYA survival from advanced melanoma be observed, further study of AYA melanoma would be needed.

## Regional Differences in Lung Cancer Survival: The Tennessee Story

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### Background

In Tennessee, lung cancer was the first leading cause of cancer incidence and death by numbers of cases with 5530 diagnoses and 3974 deaths recorded in 2020. Studies suggest that new cases of and deaths from lung cancer are more common in rural areas. Recent studies suggest overall lung cancer survival is poorer in more rural areas compared to urban areas.

### Purpose

To analyze Tennessee-based regional differences in overall lung cancer survival and factors associated with poor survival using Kaplan-Meier and Cox Proportional Hazards analysis

### Methods

The lung cancer dataset includes 40797 cases diagnosed during 2010-2016. Univariate and bivariate analyses were conducted using the Kaplan-Meier method. The dependent variable in all analyses was follow up time in days, which was determined by calculating the difference between the Date of Last Contact variable and the Diagnosis Date variable. The chief covariate of interest was TN Department of Health region, which was stratified into 8 separate regions: Northwest, Southwest, Mid-Cumberland, South Central, Upper Cumberland, Southeast, East, and Northeast. Analyses were adjusted using sex, age at diagnosis, race, stage, primary payer at diagnosis, and tumor histology. Sex was classified into males and females. Age at diagnosis was a continuous variable. Race was classified into Black, Other, and White. Stage was classified using SEER Summary Stage 2000 as early stage (in situ and localized) and late stage (regional and distant stage). Primary Payer at Diagnosis was classified into insured and uninsured. Tumor histology was classified as Squamous Cell Carcinoma, Small Cell Carcinoma, Adenocarcinoma, Large Cell Carcinoma, and Other. The event of interest in all analyses was death due to lung cancer, and censoring was employed for non-events.

### Results

Univariate and bivariate analyses using the Kaplan-Meier method revealed the poorest overall survival occurred in the Northwest region of Tennessee. Multivariate Cox Proportional Hazards analysis demonstrated the Northwest region continued to display a marked survival disparity compared to all other Tennessee regions, with an average hazard ratio for the other regions of 0.90.

### Conclusion

The Northwest region of Tennessee, a highly rural region, displayed significant lung cancer survival geographic disparities. These results confirm the findings of other recent studies.



## Reviewing of GenEDITS on Cancer Data Collected in New Hampshire

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### **Background**

GenEDITS is an application developed by the National Program of Cancer Registries (NPCR) to identify errors in cancer data collected by cancer registries. Raw cancer data received by reporting facilities at the New Hampshire Cancer Registry (NHSCR) are run through GenEDITS before they are processed into the main system. Feedback on errors is sent to individual reporting facilities in an effort to improve data quality at the reporting source.

### **Purpose**

We will utilize the findings of this assessment for data quality improvement and to identify areas of opportunity for training.

### **Methods and Results**

The NHSCR runs GenEDITS every month and generates reports for each reporting facility to identify common errors using pivot tables. We will tabulate the type and number of errors seen in the raw data received in calendar years 2022 and 2023. We will assess if the top errors are reduced with the monthly feedback to the reporting facilities. Repetitive cases will be selected and analyzed to identify the root causes of errors and determine where training is needed.

### **Conclusion**

Findings will be shared with the reporting facilities and will be used to address training needs.



# Spatio-temporal Modeling Approach to Mapping Geographic Variation in Cancer Incidence Rates for U.S. Subnational Areas

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## Background

Mapping plays a crucial role in spatially analyzing and visualizing cancer incidence distribution within specific geographic areas. While previous literature has predominantly focused on reporting and mapping variations in cancer incidence by state, limited information is publicly available at the county level especially for less common cancer sites. Counties with sparse data often face masking due to instability and confidentiality concerns.

## Purpose

This research aims to explore suitable spatio-temporal small area models for estimating age-adjusted cancer incidence rates for all U.S. counties, with the objective to create maps that identify patterns and hotspots through comprehensive mapping.

## Methods

U.S. cancer counts for 16 cancer sites ranged from common to rare cancers from 15 diagnosis years, specially 2005-2019, were obtained from NAACCR's CiNA Research Dataset. County-level hierarchical spatio-temporal models incorporating ecological covariates obtained from alternative sources, assuming a standard Poisson distribution and several extensions to address sparseness and zero inflation were implemented using R-INLA. Rigorous model selection and diagnosis processes were carried out to identify the best models.

## Results

This presentation will include a summary of the model selection and evaluation results. Modeled age-adjusted rates for 3,142 counties for each year from 2005-2019, based on the ultimately selected models, will be generated. Maps derived from modeled estimates will be created to discern trends and patterns, allowing for a comparison with maps based on observed data with suppression.

## Conclusion

The spatio-temporal modeling approach proves useful in smoothing and estimating age-adjusted rates for all the U.S. counties. These modeled estimates serve as a useful resource for studying trends, patterns, and disparities in cancer incidence among U.S. counties. The product offers insights for identifying focus areas in cancer intervention and guides further research.

## Statewide Linkage Study of Salmonella Infection and Colorectal Cancer Incidence in Michigan, United States

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### Background

Non-typhoidal Salmonella infection is one of the most common foodborne illnesses and its oncogenic potential has been documented in animal models. This study is the first to attempt linking two statewide public health surveillance registries (communicable disease and cancer) to assess the feasibility of addressing epidemiologic association between laboratory-confirmed salmonellosis and the subsequent risk of colorectal cancer. Further, we established an efficient method of linking two public health registry systems under the condition of lacking pivot unique identifiers (Social Security Number, SSN).

### Methods

Records with positive laboratory test for enteric Salmonella between 01/01/1992 to 12/31/2020 were linked to LexisNexis database for the period of January 1992 to February 2020 using address, date of birth (DOB) and names. Information such as SSN, address history, deaths in Michigan or other states were obtained through this linkage. Second linkage occurred by using SSN, names and DOB to link records in Michigan Cancer Surveillance Program. The standardized incidence ratio (SIR) was calculated with the consideration of age, sex and specific calendar year with the assumption of Poisson distribution.

### Results

93% of the initially identified Salmonellosis records diagnosed between 1992 and 2020 (n=16,179) were sent to LexisNexis linkage, which returned address history, death, and social security number for 97% of these records (N=15,734). Further linkage to the statewide cancer registry identified 98 incident colorectal cancer cases from diagnosed of infections till 12/31/2020. Overall, the standardized incidence ratio compared with general population was not different from unity (0.833 with 95% confidence interval 0.627-1.003).

### Conclusion

While the new linkage strategy was found effective, we cannot rule out bias due to incomplete/under reporting in estimating the risk associated with Salmonellosis.



## The Burden of High-Risk Hereditary Breast and Ovarian Cancers (HBOC) in New Jersey

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### Background

Hereditary breast and ovarian cancer syndrome (HBOCS) increases the risk of developing breast, ovarian, and other cancers; however, the true burden of HBOCS-related cancers remains unclear at the population level.

### Purpose

To estimate the age-adjusted incidence rate of high-risk HBOCS (HR-HBOCS) related breast and ovarian cancers in New Jersey (NJ) and compare racial/ethnic and stage patterns between HR-HBOCS cancers and all breast and ovarian cancers statewide.

### Methods

We used 2015-2019 breast and ovarian cancer data from the New Jersey State Cancer Registry. The HR-HBOCS cancer definition was based on diagnostic criteria from the 2021 National Comprehensive Cancer Network® guidelines. Age-adjusted incidence rates (AAIR) per 100,000, rate ratios (RR), and 95% confidence intervals (CI) were generated in SEER\*Stat.

### Results

The AAIR of HR-HBOCS-related cancers in NJ women was 50.6. Among Hispanic women, the rate was significantly higher in Hunterdon County (AAIR 115, 95%CI: 68.4-181.1) compared to statewide (AAIR 40.6, 95%CI: 38.7-42.6). Compared to non-Hispanic Whites, the AAIR was significantly lower for non-Hispanic Asian/Pacific Islanders (RR 0.85, 95%CI: 0.80-0.91), Hispanics (RR 0.74, 95%CI: 0.70-0.79), and non-Hispanic Blacks (RR 0.90, 95%CI: 0.85-0.95). Compared to local-stage ovarian cancer, the AAIR of distant-stage was significantly higher statewide (RR 2.59, 95%CI: 2.37-2.83) and among those with HR-HBOCS (RR 3.22, 95%CI: 2.93-3.55). The AAIR of regional-stage ovarian cancer was only significantly higher for the HR-HBOCS group (RR 1.21, 95%CI: 1.08-1.36).

### Conclusion

We uncovered potential racial/ethnic and county-level differences and a greater burden of late-stage cancers related to HBOCS. Quantifying population-level HR-HBOCS cancers and identifying high-incidence areas represent the first steps toward understanding the true burden in affected populations. Policies supporting the collection of genetic data at the population level are needed to accurately quantify the population at risk.

## The Effect of Major Events on Breast Cancer Incidence Trends in Puerto Rico: An Interrupted Time Series Analysis

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### Background

During 2016 to 2020, breast cancer was the most common diagnosed cancer among Puerto Rican women. During this period, PR was affected by two major events that disrupted its health system.

### Purpose

This study aims to assess the effects of the Hurricanes (Irma and Maria), post-hurricanes recovery peak, and the COVID-19 lockdown restrictions on the breast cancer cases in PR.

### Methods

PR Central Cancer Registry database was used to obtain the breast cancer counts diagnosed from 2012 to 2021. An interrupted time-series analysis was used to assess the following: 1) estimate the changes in the breast cancer counts after each event, 2) determine trends in each time period, and 3) to estimate the difference between the observed cases count and the expected count without the event. We analyzed four time periods: 1) prior major events (January 2012 to August 2017), 2) after the hurricanes (September 2017 to March 2018), 3) after post-hurricane recovery peak (April 2018 to March 2020), and 4) start of COVID-19 restrictions (April 2020 to December 2021). To accomplish our aims, we used Prais-Winsten AR (1) regression to fit our data using first-order autoregression.

### Results

A steady trend in the monthly breast cancer cases was observed from January 2012 to August 2017. Immediately after the hurricanes, the breast cancer cases count dropped 53% of the estimated count, followed by an upward trend of 24.8 cases per month. Case counts similar to the pre-hurricane period were observed at the end of this period. A second major drop was observed immediately after COVID-19 restrictions, reaching only 35.7% of the estimated counts, followed by a positive trend of 4.55 cases per month until the end of 2021.

### Conclusion

Our analysis supports that these major events had great impact on the breast cancer incidence in PR. After the major events, the case count drops substantially but gradually returns close to the estimated count. Further research is needed to understand the different factors that could be additionally associated with the changes in the breast cancer incidence in PR.



# The Impact of COVID-19 on Cancer Incidence Projections in Manitoba, Canada

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## Background

Cancer projections inform capital planning and service delivery, provide a basis for risk reduction strategies, and give an indication of time trends. Anomalous data points in Manitoba cancer surveillance data due to the COVID-19 pandemic have made it unclear if, or how, these disruptions should be handled when estimating cancer projections. The National Cancer Institute has proposed the exclusion of 2020 incidence data from trends estimates and to observe a wait-and-see approach going forward to determine if 2020 data should continue to be excluded or reincorporated into analyses. The Manitoba Cancer Registry has begun the process of updating its cancer projections for its next 5-year cycle and is investigating if, and how, data points impacted by COVID-19 should be handled.

## Purpose

To investigate the impact of excluding or replacing pandemic period estimates with expected incidence counts and age-standardized incidence rates (ASIRs) on cancer incidence projections.

## Methods

To investigate the impact of the COVID-19 period (2020 to 2021) on projected cancer incidence, the number and ASIR for all invasive cancer diagnoses will be estimated (1) without adjustment for the COVID-19 period, (2) by replacing the 2020 and 2021 incidence counts and ASIRs with counts and ASIRs expected in the absence of COVID-19, and (3) by excluding the 2020 and 2021 counts and ASIRs. Within these scenarios, additional sensitivity analyses comparing the impact of using low-, medium-, and high-level population growth projections will be investigated. Expected counts/ASIRs will be estimated using generalized linear models within an interrupted-time series analysis to account for baseline trends in the historical data. Projected counts and ASIRs will be estimated over a 25-year period using the CanProj package in R. Joinpoint regression models will be used to visualize incidence trends throughout the observed data period.

## Results

Line and scatterplots, in combination with Joinpoint, will be used to visualize the historical and projected incidence trends. The results will be presented for the province overall, by sex (female/male), and region.

## Conclusion

This work will examine the impact of COVID-19 on projected incidence in Manitoba and provide the basis for selecting appropriately fit projection models.

## Trends in Breast Cancer Incidence Rates by Estrogen Receptor Status in the United States, 2004-2020

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<sup>1</sup>*American Cancer Society, Atlanta, USA*

### Background

Prior studies have shown a rising incidence of estrogen receptor (ER)-positive breast cancer but falling ER-negative breast cancer in the United States. Whether this trend has continued, however, is unknown.

### Purpose

To examine the most recent trends in breast cancer incidence trends by ER status in the United States.

### Methods

Female malignant breast cancer cases of ages 20 to 84, diagnosed from 2004 to 2020, were identified in the U.S Cancer Statistics database. Unknown ER status was corrected using a simple imputation that incorporated age and year of diagnosis and race and ethnicity. Trends in incidence rates were quantified with joinpoint regression model and estimated annual percent change (APC) in age-standardized incidence rate per 100,000 woman-years were calculated overall and by race and ethnicity (non-Hispanic American Indian or Alaska Native (AIAN), non-Hispanic Asian or Pacific Islander (API), non-Hispanic Black (Black), Hispanic, or non-Hispanic White (White)).

### Results

A total of 3,081,142 breast cancer cases were identified. After correcting unknown ER status (N=170,405, 5.5%), 81.6% of women had ER-positive cancer, while 18.4% had ER-negative cancer. From 2004-2009, the incidence rate of ER-positive cancer increased by 1.75% annually (95%CI=1.26%-3.15%), and the increase decelerated to 0.87% per year (95%CI=0.41%-1.03%) from 2009-2019. The increase in ER-positive cancer was steady among API (APC=2.27%; 95%CI=2.05%-2.52%) and Hispanic (APC=1.47%; 95%CI=1.21%-1.78%) women, while the increase slowed down among White women and stabilized among Black and AIAN women since around 2010. Meanwhile, the incidence rate of ER-negative cancer decreased by 3.13% annually (95% CI= -4.2% to -2.55%) from 2004-2012 and then flattened (APC=0.55%; 95%CI= -1.30% to 0.92%) with generally similar trends were observed across all racial and ethnic groups.

### Conclusion

The contemporary rise in breast cancer incidence in the US is due to a continuous increase in ER-positive cancer, coupled with the recent plateauing of the rapid decline in ER-negative cancer. These trends align with the slowdown in the decline of breast cancer death rates, potentially halting the progress made against breast cancer death rate. Further research is imperative to identify risk factors responsible for the observed trend to inform preventive strategies.



## Trends in Lung Cancer Incidence in Maine by Sex and Age Group

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### Background

While lung cancer rates have declined over the last twenty years, Maine's lung cancer incidence rate remains significantly higher than the United States; Maine's lung cancer incidence rate is the fifth highest in the nation. Lung cancer is the most common cancer in Maine overall and among Maine males. It is the second most common cancer among Maine females after breast cancer.

### Purpose

To assess whether Maine data reflect recently published national trends where rates of lung cancer among women under 50 years of age are higher than rates of lung cancer among men under 50 years of age.

### Methods

Using SEERStat software, we assessed Maine's overall and age-specific trends in lung cancer incidence by sex between 2000 and 2019. We used Joinpoint software to analyze overall trends. For age-specific analyses, we analyzed five-year age groups for ages 35 to 54 and non-overlapping five-year aggregate rates estimates for 2000-2004 through 2015-2019 to improve statistical reliability due to small numbers.

### Results

In 2000, the age-adjusted lung cancer incidence rate was substantially higher among Maine males than females. Over the last 20 years, rates among Maine males declined significantly, while rates among females remained stable. The overall age-adjusted incidence rates converged over time, though the rate among males remains significantly higher than among females. In the most recent 5-year time period (2015-2019), the age-specific rates among those 35-54 were higher among females than males in each age group. Age-specific trends appear similar for males and females in each age group among those 35-49, but rates among males are decreasing while those among females are increasing among those 50-54. Above age 55, male incidence rates remain higher than female rates.

### Conclusion

There has been a greater decline in lung cancer incidence rates among men in Maine compared with women from 2000-2020. In the most recent five years, women ages 35-54 years of age have higher age-specific rates of lung cancer than men, though the differences were not statistically significant. Currently only 1 in 5 Mainers who are eligible for lung cancer screening have been screened; screening rates by age and sex should be assessed.

## Two Breast Cancer Risk Prediction Models Based on the Universal Mammography Screening Program of Taiwan

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### Background

Breast cancer incidence rates in Taiwan have been increasing rapidly in the past three decades, and it is the most common cancer among Taiwanese women. Based on some exploratory studies, the Taiwan Health Promotion Administration has implemented a universal biennial mammography screening (UBMS) program since 2004. However, it is essential to use a validated absolute risk model for breast cancer for individualized risk assessment regarding mammography screening.

### Purpose

Developing and validating the breast cancer risk prediction models for the Taiwanese population.

### Methods

Based on the linkage of datasets from the UBMS from 2004 to 2019, Taiwan Cancer Registry (TCR) from 1979 to 2019, Taiwan Cause of Death Database (TCOD) from 1985 to 2019, and Taiwan National Health Insurance Research Database from 2000 to 2019, we developed and validated absolute risk prediction models for breast cancer among Taiwanese women aged 50–69. In fact, the linked dataset had a total of 1,746,580 women and was randomly divided into three disjoint datasets: one-half as the training set, one-quarter as the validation set, and the remaining quarter as the test set. Eventually, we obtained two models: one included mammography density, called the Taiwan Breast Cancer Model with mammography density (TBCM-M), and the other didn't, called the Taiwan Breast Cancer Model (TBCM). The other risk factors used included age at screening, age at menarche, age at menopause, parity, age at first birth, height, interaction between BMI and hormone replacement therapy (HRT) use, education, breast cancer family history in first-degree relatives, and breastfeeding.

### Results

Both models were well-calibrated, and TBCM-M (TBCM) had an AUC of 0.60 (0.58) for predicting breast cancer occurrence in the upcoming 5 years.

### Conclusion

Both models could be used to improve the early detection of breast cancer. TBCM is applicable to women without any mammography screening record, and TBCM-M is suitable for women had mammography screening results.

## U.S. Cancer Statistics and Cancer Screening Change Packages: CDC Tools to Monitor Screening-Detectable Cancers and Support Delivery of Cancer Screening Services

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### Background

For some cancers, regular screening tests can find cancers early, when treatment is likely to work best. CDC supports screening for breast, cervical, colorectal, and lung cancers as recommended by the U.S. Preventive Services Task Force (USPSTF).

### Purpose

Assess trends from 2011 to 2020 in 4 screening-detectable cancers by stage: female breast, cervical, colorectal, and lung.

### Methods

Using U.S. Cancer Statistics data, the annual percent change (APC) in age-adjusted incidence rates by stage from 2011 to 2019 was calculated with joinpoint regression. Rates were considered to increase or decrease if the APC was statistically significantly different from zero ( $P < 0.05$ ). Rates from 2020 were calculated but were excluded from the regression models.

### Results

Localized female breast cancer incidence rates increased from 77.8 to 82.6 per 100,000 women in 2011-2017 and then were stable through 2019; distant stage diagnoses were stable over the 9-year period. Localized cervical cancers were stable across the 9-year period and decreased slightly for distant diagnoses in 2014-2019 (1.1 to 1.0 per 100,000 women). Both localized and distant colorectal cancers decreased over the 9-years (localized: 15.5 to 11.8 per 100,000 persons; distant: 8.3 to 8.0). Localized lung cancers increased in 2011-2019 (11.9 to 14.7 per 100,000 persons); distant stage decreased over the 9-years (31.0 to 21.0). Across the 4 sites, rates of localized and distant diagnoses decreased by an average of 15% and 6%, respectively, between 2019 and 2020.

### Conclusion

Differences were seen in the 4 screening-detectable cancers' incidence trends by stage, which may reflect variations in risk factors, shifts in screening test usage, and changes in screening recommendations. Delays in cancer screenings during the COVID-19 pandemic may have attributed to declines in localized cancer diagnoses. To improve cancer screening, CDC developed Cancer Screening Change Packages (<https://www.cdc.gov/cancer/dcpc/resources/change-packages>), which provide clinic staff and public health organizations with evidence- and practice-based strategies, tools, and resources for implementing and scaling effective screening services. The actionable strategies span the screening process, including social determinants of health, community-clinical linkages, and follow-up and referrals. U.S. Cancer Statistics data can be used to monitor population-level cancer burden and to evaluate the effectiveness of cancer screening programs.

# Using AI Technology via Atlas to Streamline Clinical Documentation and Enable Data-Driven Improvement Through Analysis of Patient Data

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## **Background**

Using AI technology, via Carta Healthcare Atlas, to streamline clinical documentation and enable data-driven improvement through analysis of patient data. Atlas uses human expertise and the power of AI to automate and simplify the resource-consuming task of finding and interpreting patient data for clinical registries.

## **Purpose**

To streamline clinical documentation and enable data-driven improvement through analysis of patient data.

## **Methods**

Atlas automates and simplify the resource-consuming task of finding and interpreting patient data for clinical registries. This allows clinicians to focus on what's most important — caring for patients.

## **Results**

Atlas allows your staff to focus on other tasks while increasing data availability for your organization to access deeper data insight.

## **Conclusion**

Atlas implementation leads to more accurate clinical registry completion and the opportunity to drive greater value from your data.



## Using Available Resources to Streamline the Casefinding Audit Process

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### Background

Performing a casefinding audit poses significant challenges, involving manual review for every patient listed on the medical record disease index (MRDI), visually comparing diagnosis codes to the ICD-10-CM casefinding list, and ensuring accuracy in patient details. Prior to changing the process, time spent completing an audit process ranged from several weeks to several months prompting us to identify crucial modifications in the MRDI format. Through this undertaking we discovered a change in the MRDI format was essential to make this goal achievable. Facilities were submitting their MRDI in non-standardized as a PDFs, hindering seamless conversion to Excel with no formal structure. This made it difficult when converting the PDF to Excel.

### Purpose

Our objective was to streamline the audit process by leveraging Excel and Match\*Pro software and shorten the audit process time.

### Methods

A sample MRDI using Excel was created, placed on our website, and distributed to low volume facilities throughout the state. The process involved exporting MRDIs to Excel and utilizing the Excel match function to compare ICD-10 codes in the MRDI to the ICD-10 case finding list. This yielded a list of potential cases for review. The list of potentially reportable cases was then analyzed in Match\*Pro and compared against our database. The results were consolidated, and any MRDI cases missing in the database were flagged for facility review.

### Results

Recognizing the need for a modified MRDI format and process, the implementation of Excel and Match\*Pro software significantly reduced the case finding audit timeline from weeks to days.

### Conclusion

Utilizing Excel, Match\*Pro software, and requesting MRDIs in Excel format, allowed the MCR QA staff to substantially diminish the time spent on case finding audits, transforming a lengthy process into a more streamlined process for MCR and facilities.



## Utilization of First-line Targeted and Immunotherapy-Based Treatments for Stage IV Non-Small Cell Lung Cancer

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### Background

Lung cancer, the third most common cancer, is often diagnosed late-stage when prognosis is poor (8.2% 5-year survival). In the past decade, an expanding array of targeted and immunotherapy-based treatments have become available for late-stage non-small cell lung cancer (NSCLC), the most common subtype.

### Purpose

To quantify the utilization of targeted and immunotherapy-based treatments among patients with stage IV NSCLC and to investigate disparities by race/ethnicity, insurance type, and neighborhood socioeconomic status (SES).

### Methods

We obtained data for 33,875 patients diagnosed 2016 to 2021 with stage IV NSCLC from the California Cancer Registry (CCR). We summarized first-line treatments into targeted therapy, immunotherapy, chemotherapy, and no systemic treatments using text fields from the CCR. We used multivariable logistic regression models to examine characteristics associated with treatment utilization and treatment type.

### Results

Patient median age was 71 years, slightly more were male (51.7%), most were non-Hispanic White (NHW, 57.5%), and approximately half had private insurance (48.3%). The most common treatment was immunotherapy (18.2%), followed by chemotherapy (14.0%), targeted treatment (13.4%), targeted treatment and immunotherapy (2.3%), and unknown (1.8%). However, the greatest proportion of patients received no systemic treatment (50.4%). Characteristics associated with not receiving systemic treatment included older age ( $\geq 80$  years, odds ratio (OR)=9.27, 95% confidence interval (CI) 7.90-10.88), male sex (OR=1.18, CI 1.13-1.24), American Indian race/ethnicity (vs. NHW) (OR=1.37, 95% CI 1.02-1.83), low SES (OR=1.57, CI 1.47-1.68), increasing comorbidity, non-private insurance, and treatment at non-NCI designated cancer center (OR=2.14, CI 1.99-2.30). Among patients receiving treatment, characteristics associated with receipt of targeted therapy or immunotherapy included more recent year of diagnosis, Asian/Pacific Islander race/ethnicity, high SES (OR=1.58, CI 1.43-1.75), being married, and treatment at NCI-designated cancer centers (OR=1.61, CI 1.45-1.77).

### Conclusion

In this population-based study, we found low utilization of each category of systemic treatments and significant disparities by race/ethnicity, insurance type, treatment facility, and SES. The decreased likelihood of treatment for patients residing in low SES neighborhoods and with non-private insurance suggests possible financial and educational barriers. More research is needed to better understand reasons for non-treatment and efforts should be made to improve uptake among vulnerable populations.

