Cancer Incidence Among Adults with and without Intellectual Disability and Cerebral Palsy

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Introduction

Cancer has consistently been the second leading cause of death in the United States since the 1940s. [1] Prostate cancer is the most common cancer in men, while breast cancer is the most common in women. The second and third most common cancers in both men and women are lung/bronchus cancer and colon/rectum cancer. These listings exclude basal and squamous cell cancers and in situ carcinoma except urinary bladder. Overall, one in two men (44.81%) and one in three women (38.17%) will be diagnosed with cancer at some time in their lifetime. [2]

Some cancers and cancer deaths are potentially preventable through lifestyle changes, screening, or other measures. Other cancers can be detected early and are amenable to treatment. The United States Preventive Services Task Force (USPSTF) makes recommendations for clinical preventive services based on clinical research and is the authoritative guide for preventive services including cancer prevention and screening. The USPSTF recommends breast cancer screenings for women ages 50 – 74 every two years, while cervical cancer screening is recommended for women ages 21 to 65 every three years. Routine screening for colorectal cancer should begin at age 50 and continue to age 75 while PSA-based prostate screening is not recommended for men of any ages. Lung cancer screening is recommended for adults 55 to 80 years of age who have a thirty-pack per year smoking history and currently smoke or a thirty-pack per year smoking history and who have quit within the past fifteen years.[3]

There are some descriptive studies that report cancer rates among people with different disabilities. People with developmental disability such as intellectual disability and cerebral palsy may have less access to cancer prevention services due to cognitive or physical limitations. Specifically, a review of research found that women with developmental disability were less likely to have ever had a mammogram and less likely to have received a recent Pap test or lifetime Pap test compared to women with no disabilities. [4] At the same time, risk factors for some types of cancer (such as smoking) were found to be less common in people with developmental disability, which could result in lower rates of cancer. Young adults with developmental disability were less likely to report tobacco use and to be sexually activity, in a cohort of 482 young adults. [5] Only a few researchers have examined the prevalence of cancer in people with developmental disability in the US and compared them to the general population.

In an Australian cohort of 9,409 people, those with ID were found to have incidence of all cancers that was not significantly different from the general population. Males with intellectual disability had a significantly increased risk of leukemia, brain and stomach cancers, and a reduced risk of prostate cancer, and women had a higher risk of leukemia, corpus uteri and colorectal cancers.[6] A Finnish study of 2,173 individuals with ID similarly found that there was no significant difference in the number of cancers, compared to what would be expected for the general population, though when looking at specific cancers there was a reduced risk of prostate, urinary tract, and lung cancers, and an increased risk of gallbladder cancer.[7] In a Californian study on the causes of mortality in people with cerebral palsy, it was found that mortality from breast cancer was three times that of the general population, which led to the conclusion that there may be poorer detection or treatment for breast cancer in this population.[8]

Two studies conducted by McDermott et. al in 2006 and 2007 found that adults with developmental disabilities were at reduced risk for cancer.[9-10]

It is important to know whether South Carolina adults with developmental disability are at an increased or decreased risk for cancer than the general population. The purpose of this report is to compare the incidence of cancer for people with developmental disability to the incidence of cancer of the general population for specific cancer sites. The cancers explored in this analysis are breast, cervical, colon, prostate, rectum/rectosigmoid/anus, lung/trachea/bronchus, and pre-cancerous findings of the cervix such as abnormal pap, cervical dysplasia, and carcinoma in situ, cervix uteri.

Methods

For the analyses, we utilized data available from the South Carolina Budget and Control Board, Division of Research and Statistics (DRS), a central repository for health and human service data for the state of South Carolina. Through a series of statutes and agreements, agencies and organizations entrust their data systems with DRS while retaining control of the data at all times. To "link across" data sources from multiple providers, DRS developed a series of algorithms using source-specific personal identifiers to create a global unique identifier. Using the global identifier in lieu of personal identifiers enables staff to create views of data across multiple providers while protecting confidentiality.

Medicaid data housed at DRS were utilized for the project. A separate data request was made to the South Carolina Central Cancer Registry (SCCCR). Data usage approvals were obtained from the South Carolina Department of Health and Human Services for the Medicaid data and South Carolina Department of Health and Environmental Control for the SCCCR data. SCCCR data were used to confirm diagnosis of cancer for the disability and comparison groups. All data linkages were performed at DRS. Investigators were provided aggregate results.

All persons born from 1945 – 1950 were identified from the Medicaid recipient files. This ensured that all individuals identified were at least 50 years of age in 2000 and no more than 64 years of age in 2009. This age range was chosen because it is a time period when incidence of cancer is relatively high and when many cancer screenings (such as colon cancer and mammography) are recommended for the general population. We did not include people 65 and over because much of their medical care is likely paid for by Medicare, and we did not have access to Medicare data.

All medical encounters for the birth cohort were selected and International Classification of Diseases version 9 (ICD-9-CM) primary and secondary diagnosis codes were searched for the following conditions:

- Cerebral Palsy : ICD-9 code 343
- Intellectual Disability (all severity) : ICD-9 code 317, 318, 319

People with one of these conditions served as the case group. Individuals without these conditions who were also born between 1945 and 1950 were included in the potential comparison group. We also examined the possibility of including a case group of people with autism spectrum disorder (ICD-09 code 299). However, we found there were too few to include as a separate case group so we opted to focus

only on ID and CP, but we excluded people with autism spectrum disorders from the comparison group. The following eligibility criteria were applied to the case and comparison groups:

- at least 30 days of eligibility in Medicaid in 2000 and 2009 and
- at least 30 days of eligibility from 2001-2008.

The comparison group was matched to the case group on age, sex and race. The case and comparison group were merged with the SCCCR data using each person's unique identifier.

Diagnosis of cancer was also identified using International Classification of Diseases, Version 9 (ICD-09) billing codes and verified through the SCCCR:

- Breast: ICD-9 code 174
- Cervical: ICD-9 code 180
- Colon: ICD-9 code 153
- Prostate: ICD-9 code 185
- Rectum/rectosigmoid/anus: ICD-9 code 154
- Lung/trachea/bronchus: ICD-9 code 162
- Pre-cancerous findings of the cervix
    - Abnormal pap: ICD-9 code 795.03, 795.04
    - Cervical Dysplasia: ICD-9 code 622.1, 622.10 – 622.12
    - Carcinom in situ, Cervix uteri: ICD-9 code 233.1

Chi square tests or Fisher's exact tests were used if expected counts were less than 25%, and two sample t-tests were used otherwise to compare the incidence of cancer outcomes in people with the conditions with the incidence in the comparison groups. To protect confidentiality, all cell sizes less than 10 are suppressed.

Results

In our birth cohort, we identified 206 individuals diagnosed with cerebral palsy and 1,167 individuals diagnosed with intellectual disability. Table 1 contains the demographic information on our cerebral palsy case group and Table 2 contains the demographic information on our intellectual disability case. It is important to note that the comparison groups for each case group were matched on sex, race, and age.

Table 1: Intellectual Disability Case Demographics

		N = 1167	Proportion
Sex	Male	592	50.7
	Female	575	49.3
Race	Black	530	45.4
	White	559	47.9
	Other	78	6.7

Table 2: Cerebral Palsy Case Demographics

		N = 206	Proportion
Sex	Male	97	47.1
	Female	109	52.9
Race	Black	74	35.9
	White	122	59.2
	Other	10	4.9

We compared the count of diagnosis for each of the cancers for the case and matched comparison group. For both the intellectual disability group and the cerebral palsy group, there were no statistical differences in frequency of diagnoses of breast, cervical, colon, prostate, and rectum cancer. There were also no statistical differences in count of diagnosis of abnormal pap smear, cervical dysplasia, or carcinoma in situ of the cervix uteri.

We found fewer diagnoses of lung cancer in both case groups (intellectual disability and cerebral palsy) when compared to their respective matched comparison group. The cell size for people with intellectual disability who were diagnosed with lung cancer was less than 10, and there were no cases of lung cancer for people with cerebral palsy. The complete results can be found in Table 3 for the intellectual disability group and in Table 4 for the cerebral palsy group.

Table 3: Results of Intellectual Disability Group and Matched Comparison Group

	Group	N	Count	% diagnosed	Std	p-value
Breast Cancer (Female)	Case	575	15	2.61	2.6	
	Comparison	5750	239	4.16	4.2	0.0745
Cervical Cancer (Female)	Case	575	<10	<1.74	<1.7	
	Comparison	5750	17	0.30	0.3	0.6893
Colon Cancer	Case	1167	<10	<0.86	<0.9	
	Comparison	11670	97	0.83	0.8	0.4005
Prostate Cancer (Male)	Case	592	15	2.53	2.5	
	Comparison	5920	151	2.55	2.6	0.9803
Rectum/rectosigmoid/anus Cancer	Case	1167	<10	<0.86	<0.9	
	Comparison	11670	37	0.32	0.3	0.2543
Lung/trachea/bronchus Cancer	Case	1167	<10	<0.86	<0.9	
	Comparison	11670	305	2.61	2.6	<0.0001
Abnormal Pap (Female)	Case	575	<10	<1.74	<1.7	
	Comparison	5750	42	0.73	0.7	0.4306
Cervial Dysplasia (Female)	Case	575	<10	<1.74	<1.7	
	Comparison	5750	100	1.74	1.7	0.5411
Carcinoma in Situ, Cervix uteri (Female)	Case	575	<10	<1.74	<1.7	
	Comparison	5750	22	0.38	0.4	0.7172

* Count for cancers is the number of people in the category with any diagnosis of the specific cancer within the 2000-2009 time frame

Table 4: Results of Cerebral Palsy Group and Matched Comparison Group

	Group	N	Count	% diagnosed	Std	p-value
Breast Cancer (Female)	Case	109	<10	<9.17	<9.2	
	Comparison	1090	34	3.12	3.1	0.7674
Cervical Cancer (Female)	Case	109	0	0.00	0.0	
	Comparison	1090	<10	<0.92	<0.9	1.000**
Colon Cancer	Case	206	0	0.00	0	
	Comparison	2060	15	0.73	0.7	0.3879
Prostate Cancer (Male)	Case	97	<10	<10.31	<10.3	
	Comparison	970	28	2.89	2.9	0.5278
Rectum/rectosigmoid/anus Cancer	Case	206	0	0.00	0.0	
	Comparison	2060	<10	0.49	<0.5	1.000**
Lung/trachea/bronchus Cancer	Case	206	0	0.00	0.0	
	Comparison	2060	52	2.52	2.5	0.0124
Abnormal Pap (Female)	Case	109	<10	<9.17	<9.2	
	Comparison	1090	<10	<0.92	<0.9	0.1274
Cervial Dysplasia (Female)	Case	109	<10	<9.17	<9.2	
	Comparison	1090	16	1.47	1.5	0.6758
Carcinoma in Situ, Cervix uteri (Female)	Case	109	0	0.00	0.0	
	Comparison	1090	<10	<0.92	<0.9	1.000**

*Count for cancers is the number of people in the category with any diagnosis of the specific cancer within the 2000-2009 time frame.
**Expected cell counts less than 5, Fisher's Exact Test used to compute the P-value.

Discussion

In the South Carolina Medicaid data used, we found no disparity for any diagnosis of the cancers examined. Instead of combining all types of cancer together, we looked at specific cancer types in order to better understand where disparities might exist. We found that the proportion of people with intellectual disability or cerebral palsy diagnosed with lung cancer was significantly lower than the comparison group. This may be due to less smoking in people with these developmental disabilities. It does not appear that middle-aged South Carolinians with ID or CP are at increased risk of cancer compared to demographically similar people without a developmental disability. Additional research is needed to generalize these results to the US population.

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