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Trends in Cancer Incidence and Mortality Rates in Wisconsin, 1995-2010

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INTRODUCTION

Cancer incidence (new diagnoses) and mortality (deaths) age-adjusted rates are decreasing in the United States for many of the most common cancer sites, including lung, colorectal, prostate, stomach and cervical cancers. These declines are largely attributable to the reduction in smoking prevalence, increased screening, removal of premalignant growths, and improved treatments. In contrast, rates are increasing for several other cancer sites, including cancer of the pancreas, liver and intrahepatic bile duct, thyroid, kidney and renal pelvis, and melanoma of the skin.[1] Many cancer sites with increasing rates have relatively fewer screening and treatment options. The purpose of this report is provide incidence and mortality data to illustrate the trends in Wisconsin for all cancer combined, the most common cancers, and other cancers with patterns of change over the course of years from 1995 to 2010.

METHODS

The Wisconsin Cancer Reporting System (WCRS) collects cancer incidence data on Wisconsin residents. WCRS receives reports of newly diagnosed cancer cases from Wisconsin hospitals, clinics, physician offices, and out-of-state central cancer registries. The North American Association of Central Cancer Registries certified state data in this report as 95% complete. To the extent that cancer cases were not reported to WCRS, the incidence rates may be underrepresented. Late reporting results in apparent increases in rates compared with previous surveillance publications. The incidence rate for 2010, for example, apparently increased since the publication of Wisconsin Cancer Facts & Figures 2013-2014 because additional cases for that year were received by WCRS.

Changes that occurred in cancer incidence and mortality are reported over a fifteen year period, 1995-2010. Invasive incidence data were from the newly diagnosed cancer cases reported to WCRS. Cancer mortality data, based on the underlying cause of death, were from the National Center for Health Statistics (NCHS). The incidence and mortality rates were age-adjusted using the direct standardization method, weighted to the standard 2000 U.S. population. Rates are reported per 100,000 population. SEER*Stat software from the National Cancer Institute was used to calculate incidence and mortality rates.

The percent change (PC) and the annual percent change (APC) are the two trend measurements in this analysis, calculated using SEER*Stat software. The percent change shows the change in the rate from 1995 to 2010. A positive PC corresponds to an increasing trend, and a negative PC to a decreasing trend. The APC calculation is another way to characterize trends in cancer rates over time. A statistically significant trend indicates the APC is significantly different than zero ($p \leq 0.05$); a positive APC corresponds to an increasing trend, and a negative, to a decreasing trend. For more information on how this measure is calculated see: http://seer.cancer.gov/seerstat/WebHelp/Trnd_Algorithms.htm.

Summary

Introduction – Recent trends in cancer incidence and mortality rates in Wisconsin are declining for the most common cancer sites. However, rates are increasing for several other cancers, including some with poor survival rates.

Methods – Data on new invasive cancer cases were from the Wisconsin Cancer Reporting System. Mortality data were drawn from the public-use mortality files from the National Center for Health Statistics. Age-adjusted cancer incidence and mortality rates for 1995 through 2010 were analyzed by cancer site and gender and were used to calculate the percent change (PC) from 1995 to 2010 and annual percent change (APC).

Results – From 1995 to 2010, cancer incidence declined for males, and cancer mortality decline for both genders, more markedly for males. During that period, despite declines in common cancers, including lung, breast, colorectal, and prostate, several cancers have increased, including cancers of the pancreas, liver, melanoma, kidney, and thyroid.

Program Implications – Cancers with increasing rates in Wisconsin represent areas of focus for cancer prevention and control partners. Cancers with no recommended screening programs and poor survival rates will increasingly contribute to the public health burden. Continued surveillance of incidence and mortality trends and research to better understand the contributing factors are needed.

RESULTS

For all cancers combined from 1995 through 2010, the trends of declining age-adjusted cancer incidence and mortality rates for Wisconsin residents were similar to U.S. trends (data not shown).[2] State and national cancer incidence rates for males increased to the highest rates in 2001 (594.3 and 581.3, respectively), and then declined steadily except for a temporary 2007 increase. Incidence rates for females during that period remained more stable, peaking in 2001 (447.2) among Wisconsin females and in 1998 (433.9) among U.S females. State rates tend to fluctuate more than national rates, but in 2010, Wisconsin incidence rates were higher than national incidence rates. The age-adjusted incidence rate for Wisconsin males in 2010 for all cancers was 534.7 compared to the rate for U.S males of 524.7. Similarly, females in Wisconsin experienced higher rates in 2010, 429.0, compared with the national female rate, 416.3.

Wisconsin and U.S. cancer mortality rates for all cancers declined during the 1995-2010 period for both genders, and was consistently lower among women than among men. In 2010, Wisconsin males and females had marginally higher cancer mortality rates than U.S. males and females; Wisconsin male mortality rate was 211.2 compared with the U.S. rate of 208.8 and the Wisconsin female mortality rate was 147.7 compared to the national rate of 145.7.

In Wisconsin, for males and females combined, there was less than one percent overall decline from 1995 rate of 477.7 to 2010 rate of 473.3. **Table 1** presents Wisconsin age-adjusted incidence rates in 1995 and 2010 for selected cancer sites by gender, with percent change (PC) and the annual percent change (APC) for the fifteen year period. Males experienced an overall decline (-6.9 percent change), while females experienced an increase (3.1 percent change). Incidence rates declined for several cancer sites, including colorectal, breast, prostate, ovarian, stomach, larynx, esophageal and brain. Colorectal incidence decreased by 34 percent statewide, with a 37 percent decline among males and 32 percent among females. Increasing incidence rates were found among both genders, including thyroid, melanoma, liver, pancreatic, and kidney.

The patterns of cancer incidence trends vary by gender, particularly the rising incidence of leukemia and liver cancer among males. However, males experienced a more pronounced decline in incidence than females for the following sites: oral cavity and pharynx, lung and stomach. Incidence rates increased more quickly among females than males for melanoma, thyroid, myeloma, and lung.

Table 2 shows Wisconsin age-adjusted mortality rates in 1995 and 2010 for selected cancer sites by gender, with percent change (PC) and the annual percent change (APC) over the period. Wisconsin's age-adjusted cancer mortality rate decreased from 200.5 to 173.7 (data not shown), a 13 percent decrease, but males experienced an 18 percent decline compared to 10 percent among females. Site-specific mortality

TABLE 1. Trends in Wisconsin Cancer Incidence Rates by Gender, 1995-2010

	MALE 1995	MALE 2010	MALE 1995-2010	MALE 1995-2010	FEMALE 1995	FEMALE 2010	FEMALE 1995-2010	FEMALE 1995-2010
Cancer Site	Rate	Rate	PC	APC	Rate	Rate	PC	APC
All Sites	574.2	534.7	-6.9	-0.6*	416.1	429.0	3.1	0.1
Oral Cavity and Pharynx	16.9	16.2	-4.1	-0.9*	6.9	6.9	0.6	-0.2
Esophagus	10.1	7.9	-21.9	-0.5	2.7	1.9	-31.0	-0.4
Stomach	12.4	10.0	-19.3	-2.3*	4.6	4.3	-7.7	-0.7
Colon and Rectum	71.6	45.1	-37.0	-3.4	51.8	35.3	-31.8	-2.6*
Liver and Intrahepatic Bile Duct	6.2	9.7	56.2	2.7*	2.5	3.4	40.2	1.8*
Pancreas	13.4	14.9	10.8	0.9*	9.6	10.8	12.2	1.1*
Larynx	8.6	6.1	-29.2	-2.5*	2.2	1.4	-38.0	-3.0*
Lung and Bronchus	87.1	75.2	-13.7	-1.5*	46.6	54.8	17.8	0.8*
Melanoma of the Skin	14.7	26.0	76.8	4.0*	8.5	19.4	127.5	4.8*
Urinary Bladder	39.1	38.9	-0.5	0.1	9.9	9.8	-0.4	-0.4
Kidney and Renal Pelvis	17.2	22.8	32.9	2.5*	9.1	12.1	33.0	2.7*
Brain and Other Nervous System	8.9	8.4	-5.1	0.6	6.6	6.1	-7.3	-0.4
Thyroid	3.3	6.7	99.4	5.3*	7.2	17.7	145.7	6.1*
Hodgkin Lymphoma	3.0	3.7	25.6	0.3	2.6	3.1	20.9	0.5
Non-Hodgkin Lymphoma	23.2	25.8	11.2	0.5	17.3	17.6	1.7	0.4*
Myeloma	8.1	7.7	-4.0	1.2	4.6	5.3	15.9	1.4*
Leukemia	19.0	23.0	21.4	1.0*	12.4	13.0	5.0	0.5
Breast					128.3	122.7	-4.4	-0.6
Cervix Uteri					8.1	6.5	-19.3	-3.2*
Uterus					27.4	27.4	-0.2	0.0
Ovary					17.5	12.6	-28.0	-2.4*
Prostate	165.3	131.9	-20.2	-1.4*				

Note: Rates are per 100,000 and age-adjusted to the 2000 US standard population. Rates are rounded to one decimal place. PCs and APCs are based on extended (three) decimal places.
PC=Percent Change from 1995 to 2010.
APC=Annual Percent Change
* = APC is significantly different from zero ($p<0.05$)
Source: Wisconsin Cancer Reporting System, Office of Health Informatics, Division of Public Health, Department of Health Services.

rates declined for the total population for the four most frequently diagnosed cancers. Both males and females had lower mortality rates in colorectal cancer, declining by approximately 36 and 35 percent, respectively. By contrast, lung cancer mortality reflected the gender disparity: 20 percent decline in mortality for males compared with 16 percent increase among females. Female breast cancer mortality declined during the period by 28 percent and prostate cancer declined by 38 percent.

Increasing mortality rates were found for pancreatic, liver/ intrahepatic bile duct, and melanoma cancers. Despite the dramatic increase in thyroid cancer rates since 1995, mortality rates increased only from 0.3 to 0.6 for both genders combined.

DISCUSSION

Overall cancer incidence and mortality rates declined from 1995 to 2010. However, rates did increase for some less common cancers. For instance, pancreatic cancer incidence and mortality increased significantly for both males and females. The causes of the increase in pancreatic cancer are not well known, but genetic syndromes, tobacco use and obesity are thought to be risk factors.[3] Increasing obesity is one potential cause, particularly since smoking is generally decreasing.[4] Also of concern, survival for this cancer is poor regardless of the stage of disease when diagnosed. In the U.S., even when pancreatic cancer is diagnosed at the localized stage, in less than 10 percent of all pancreatic cases, only 26 percent of people survive 5 years after diagnosis (5-year survival rate). Approximately 53 percent of pancreatic cancers are diagnosed at the distant stage and have a 5-year relative survival rate of 2 percent.[5]

TABLE 2. Trends in Wisconsin Cancer Mortality Rates by Gender, 1995-2010

	MALE 1995	MALE 2010	MALE 1995-2010	MALE 1995-2010	FEMALE 1995	FEMALE 2010	FEMALE 1995-2010	FEMALE 1995-2010
Cancer Site	Rate	Rate	PC	APC	Rate	Rate	PC	APC
All Cancers	257.7	211.2	-18.1	-1.4*	164.5	147.7	-10.2	-0.8*
Oral Cavity and Pharynx	3.9	3.2	-16.9	-1.8*	1.7	1.6	-7.9	-0.8
Esophagus	8.1	9.0	11.6	0.0	1.7	1.5	-10.1	-0.5
Stomach	6.4	4.7	-25.9	-3.3*	2.7	2.1	-22.8	-2.2*
Colon and Rectum	27.4	17.5	-36.4	-3.4*	18.7	12.1	-35.0	-2.9*
Liver and Intrahepatic Bile Duct	5.7	8.1	42.8	2.1*	2.7	3.5	27.9	1.4*
Pancreas	12.7	13.0	2.4	0.5*	9.3	10.0	7.5	0.7*
Larynx	2.3	2.0	-12.8	-2.1*	0.4	^	~	~
Lung and Bronchus	70.5	56.7	-19.6	-1.5*	33.1	38.4	16.1	0.6*
Melanoma of the Skin	4.0	4.3	8.2	0.4	1.8	1.9	8.0	-0.3
Urinary Bladder	9.5	7.5	-20.6	-0.1	2.1	2.3	9.7	0.3
Kidney and Renal Pelvis	6.3	6.8	9.3	-0.2	3.1	2.8	-9.7	-1.0
Brain and Other Nervous System	6.1	5.7	6.9	0.1	4.0	3.7	-7.5	-1.1
Thyroid	^	0.5	~	~	^	0.7	~	~
Hodgkin Lymphoma	0.6	0.4	-39.5	~	0.4	0.5	10.8	~
Non-Hodgkin Lymphoma	10.5	8.2	-21.4	-2.3*	7.7	5.3	-30.9	-2.6*
Myeloma	4.8	4.4	-6.8	-0.4	3.1	2.9	-6.3	-0.2
Leukemia	10.7	12.1	12.6	0.2	6.6	6.2	-6.6	-1.3*
Breast					29.6	21.3	-27.9	-2.2*
Cervix Uteri					2.5	1.3	-48.8	-3.8*
Uterus					4.7	4.7	0.1	0.9
Ovary					9.3	8.0	-14.1	-0.6
Prostate	38.4	23.8	-38.1	-3.3*				

Note: Rates are per 100,000 and age-adjusted to the 2000 US standard population. Rates are rounded to one decimal place. PCs and APCs are based on extended (three) decimal places.
PC=Percent Change from 1995 to 2010.
APC=Annual Percent Change
* = APC is significantly different from zero ($p<0.05$)
^ = Statistic not displayed due to fewer than 10 cases.
~ = Statistic could not be calculated.
Source: Underlying mortality data provided by National Center for Health Statistics (NCHS) (www.cdc.gov/nchs).

Significant increases in liver cancer rates are attributed to liver damage from alcohol abuse, smoking, obesity and fatty liver, chronic infection with diseases such as hepatitis B and C, or hemochromatosis (a hereditary disease associated with too much iron in the liver). More than half of all people diagnosed with primary liver cancer have cirrhosis of the liver commonly caused by alcohol abuse.[6] The aging of the population is consistent with chronic hepatitis and excessive alcohol consumption now resulting in development of cancer. Although approximately 42 percent of liver cancers are diagnosed at the localized stage, the 5-year relative survival rate is only 30 percent for this early stage, and 17 percent in general for all liver cancer.[5]

Thyroid cancer incidence is increasing more rapidly than any other malignant cancer and more than doubled in Wisconsin from 1995 to 2010. Unlike pancreatic and liver cancers, thyroid cancer is not usually fatal: the overall 5-year survival rate is 98 percent, and is 100 percent for localized cancers.[5] The standard treatment for thyroid cancer is surgical thyroidectomy and thyroid hormone replacement.

The dramatic increase raises questions about optimal treatment for small papillary cancers that are increasingly detected by ultrasound and sensitive medical technology.[7] Enhanced detection does not fully explain the increase in incidence reported across demographic and geographic boundaries.[8] Risk factors include exposure to radiation during childhood, family history of thyroid disease, and the higher rate among women suggests an interaction between sex hormones and thyroid hormones. Thyroid cancer age-adjusted incidence rates among females were greater than those among males for all racial groups in Wisconsin.[9]

PROGRAM IMPLICATIONS

Starting in 2007, the cancer mortality rate surpassed the heart disease mortality rate (excluding stroke and other vascular mortality) in Wisconsin. Reasons for the increasing incidence and mortality rates for several cancers are not entirely known but are feasibly linked to preventable risk factors such as obesity, drinking, and smoking. These risk factors, if curtailed, can potentially decrease the incidence of of many cancers including less common but often fatal cancers.

Poor survival rates for cancers of the liver and pancreas suggest the need for improved awareness, detection and treatments for these cancers. There are no standard recommended screening practices for pancreatic cancer, although those at high risk may benefit from ultrasonography or testing for genetic molecular markers.[10] The increase in primary liver cancer could be curtailed by hepatitis B vaccination, as recommended for newborns and high-risk adults, as well as prompt treatment of chronic hepatitis B and C.[11]

Despite progress in reducing incidence and mortality rates from the four major cancers in Wisconsin, those less common cancers with rising rates will become increasingly relevant. This highlights the need for continued monitoring of cancer trends in Wisconsin and research to improve our understanding of less common cancers to develop optimal approaches to reduce all cancer mortality.

End note: For risk factors and survival data for major cancers (colorectal, lung, melanoma, breast and prostate) please refer to the Wisconsin Cancer Facts & Figures 2013-2014.[12]

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