RACIAL DISPARITIES IN THYROID CANCER
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Objectives: The objective of this study is to determine any differences by race or ethnicity in the annual percent change (APC) in incidence rate of thyroid cancer.

Study Design: Retrospective cohort analysis

Background: The incidence rate of thyroid cancer has increased over the last 30 years. In addition, thyroid cancer is half as common in African Americans as it is in Caucasians, and it is most common in Asian/Pacific Islanders. We sought to determine whether the incidence rate for thyroid cancer is increasing at disproportionate rates for different races and ethnicities.

Methods: The SEER*Stat joinpoint regression program was used to determine the APC in thyroid cancer incidence rate for the population described by the National Cancer Institute's SEER 13 database from 1992 until 2010 and for each race and ethnicity within that population. Then, joinpoint comparability tests for parallelism in APC in thyroid cancer incidence rate were conducted.

Results: According to joinpoint comparability tests, the trends in APC in thyroid cancer incidence rate for African Americans and Caucasians were all parallel - the thyroid cancer incidence rates were increasing at statistically identical rates (1995-2010: 6.45). Unlike the comparison between African Americans and Caucasians, the APC in thyroid cancer incidence rates for Non-Hispanics (1992-1998: 3.68; 1998-2010: 6.41) and Hispanics (1995-2010: 5.10) were nonparallel. In addition, the APC in thyroid cancer incidence rate was higher in Non-Hispanics than in Hispanics. However, the APC in thyroid cancer incidence rate for Non-Hispanic males paralleled that of Hispanic males. The increase in thyroid cancer incidence rate was lowest in Asian/Pacific Islanders (1992-2000: 0.65; 2000-2010: 5.24) when compared to Caucasians and African Americans. In fact, thyroid cancer incidence rate is now higher in Caucasians than it is in Asian/Pacific Islanders.

Conclusions: The incidence rate of thyroid cancer continues to increase in all races. Because the increase in incidence rate was parallel, the incidence rate remains higher in Caucasians than in African Americans. The increase in incidence rate was also parallel between Hispanic and Non-Hispanic males. The rise in incidence rate of thyroid cancer in African Americans and Hispanic males negates the assertion that the increase in incidence rate of thyroid cancer is due to an increase in diagnosis of subclinical thyroid cancers. The increase in incidence rate of thyroid cancer for Asian/Pacific Islanders was less than that of both Caucasians and African Americans. In addition, the incidence rate of thyroid cancer is now lower in Asian/Pacific Islanders than in Caucasians.
DEATHS CAUSED BY DIFFERENTIATED THYROID CANCER: EXPERIENCE OF A BRAZILIAN TERTIARY HOSPITAL OVER A 5-YEAR PERIOD

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Introduction: Differentiated thyroid cancer is usually considered indolent and with good prognosis, and is not responsible for many deaths. However, there are few patients that will die from this disease due to advanced local recurrence or distant metastases and the study of these cases may help understand which factors lead to this outcome.

Method: Retrospective cohort study including all differentiated thyroid cancer related deaths recorded at a single institution over 1055 patients treated for the disease in a 5-year period. A total of 22 cases were identified and descriptive data reported.

Results: Most of patients were female (72.7%), with a mean age of 55.3±12.1yo. Only two patients were diagnosed before the age of 45. The most common histologic type was papillary (68.2%) and 31.8% of follicular carcinoma, with a mean tumor size of 4.4±3.8cm. Only two patients did not undergo surgery, one died prior to the procedure and the other was inoperable. Total thyroidectomy (TT) was the initial therapeutical procedure in 18.2% of cases, TT and central neck dissection in 36.4% and TT with central and lateral neck dissection in 27.3%. Only two surgeries were not R0. The distribution according to pTNM classification was: 11.8% T1; 5.9% T2; 52.9% T3; 5.9% T4a and 23.5% T4b. Thirty-five percent of cases were N0; 17.6% N1a and 47.1% N1b. Radioiodine was administered in 63.4%, 42.8% received more than two doses and 8 patients were considered iodine-refractory. Nodal recurrence was identified in 50% of patients, and 50% of these patients were submitted to another surgery. Only one of the patients did not have distant metastases, and in 38.1% of the cases the metastases was diagnosed simultaneously with the thyroid cancer. The most common metastatic site was the lung in 15 patients, followed by bone in 13 and liver in 2. The mean of MACIS prognostic score was 7.7 with 42.9% classified as high risk and surprisingly 35.7% as low risk (MACIS score < 6.0). Considering MSKCC score, 57.9% were classified as high risk and just one patient as low risk. The majority of deaths were due to pulmonary complications related to lung metastases and also respiratory failure due to cancer progression (54%), followed by postoperative complications and neurological diseases with 13.6% each. The median survival was reached in 13 months for time between the cancer diagnosis and the metastases (mean 49.7 months; maximum 238 months), in 26 months for time between the metastases diagnosis and death (mean 31.2 months; maximum 108 months), in 22 months for time between disease progression and death (mean 25.5 months; maximum 65 months) and in 54 months for the interval between the thyroid cancer diagnosis and death (mean 78 months; minimum 4 and maximum 279 months).

Conclusion: Amongst the patients that died due to differentiated thyroid cancer, the majority was over 45 years and the absolute majority (95.5%) had distant metastases. The most common cause of death was pulmonary complications due to lung metastases. Amongst these, within 54 months of the diagnosis 50% of patients were deceased.
ASSOCIATION OF RACE AND SOCIOECONOMIC STATUS WITH OUTCOMES OF PATIENTS UNDERGOING THYROID SURGERY
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Background: Socioeconomic factors, access to care, and insurance status have all been proposed as predictors of delayed diagnosis and ultimately worse prognosis in minority populations. We seek to measure the effects of race, ethnicity, and socioeconomic status on outcomes following thyroid surgery.

Methods: Cross-sectional analysis was performed using ICD-9 codes included in the Nationwide Inpatient Sample (NIS) from 2003-2009 to identify all adult patients that underwent thyroid surgery. Logistic regression models, controlling for confounders, were used to calculate the odds ratio and to test for interaction between significantly associated outcomes of interest. Surgeon volume was categorized as either low or high (< or > 100 operations/year, respectively).

Results: 62,722 thyroid procedures were included in the current analysis. The majority of cases were total/complete thyroidectomies (57.9%) and benign conditions predominated (60.8%). Low volume surgeons performed the majority of operations (90.8%). Low hospital volume was significantly associated with postoperative complications (17.2% vs. 12.1%, p=0.0182), while hospital location and teaching status had no effect. Low surgeon volume was significantly associated with a higher risk of complications in the Midwest (OR: 2.61, 95% CI: 2.07, 3.30). High surgeon volume was associated with a significantly decreased length of stay across the country (1.2 days vs. 1.7 days, p<0.0001). Hispanics were more likely to be operated on by low volume surgeons (OR: 2.04, 95% CI: 1.19, 3.48), and in certain regions throughout the United States so were African Americans. Patients with Medicare (OR: 1.3, 95% CI: 1.13, 1.53) and lower annual income (OR: 1.73, 95% CI: 1.19, 2.53) were significantly more likely to be treated at low volume centers. Compared to Caucasians, minorities were significantly more likely to have their operation in an urban setting (p<0.001 for AA, Hispanics, and others). African Americans were significantly less likely to have operations performed at non-teaching institutions (OR: 0.48, 95% CI: 0.38, 0.60), as were people without private insurance (p< 0.01 for Medicare, Medicaid, and Self-pay).

Conclusions: Significant racial and socioeconomic disparities exist in regards to thyroid surgery. Inequalities are prevalent concerning access to high volume hospitals. Furthermore, low volume centers had a significantly higher risk of complication and patients with Medicare and a low annual income were more likely to go to these institutions.
FACTORS PREDICTIVE OF COMPLIANCE WITH AMERICAN THYROID ASSOCIATION GUIDELINES FOR THE TREATMENT OF PAPILLARY THYROID CARCINOMA

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Background: There is significant variability in the treatment of papillary thyroid cancer, and controversy exists regarding the required extent of primary thyroid surgery, management of lymph nodes, and use of radioactive iodine. The American Thyroid Association (ATA) provides evidence-based guidelines that can be used to direct therapy based on cancer stage and tumor characteristics. The purpose of this study is to identify factors associated with receiving ATA compliant treatment for papillary thyroid cancer.

Methods: Case characteristics of 7,679 patients with papillary thyroid cancer treated between 2006 and 2009 were extrapolated from the Surveillance, Epidemiology and End Results (SEER) database. Compliance with 2006 ATA guidelines was examined. Chi-square and multivariate analyses were performed to determine the impact of demographic variables, socioeconomic factors, tumor stage, and clinicopathologic characteristics on ATA compliance.

Results: Sixty-four percent of patients (n=4955) received treatment compliant with ATA guidelines. An inverse relationship between increasing age and ATA compliance was noted (71.2% <45 years, 62.7% 45-65 years, 53.8% >64, p-trend <0.0001), and African-Americans were less likely to receive ATA compliant treatment compared to non-Hispanic Whites (57.1% vs. 65.4%, respectively, p=0.001). A higher county-level high-school graduation rate was associated with an increase in compliance (66.2% highest vs. 62.1% lowest quartiles, p-trend=0.0009), while no association was noted between ATA compliance and county-level median household income or county-level insurance rate. A stepwise increase in the rate of ATA compliance was noted between 2006 and 2009 (62.5% 2006, 64% 2007, 64.7% 2008, 66.5% 2009, p-trend=0.0083). On multivariate analysis, age <45 years (adjusted OR 1.93 95% CI 1.67-2.24 p <0.0001) and higher county-level education rate (highest quartile adjusted OR 1.4 95% CI 1.12-1.75, p=0.003) were associated with an increased likelihood of receiving ATA compliant care. African-Americans (adjusted OR 0.75 95%CI 0.62-0.92, p=0.005), Hispanics (adjusted OR 0.84 95% CI 0.72-0.97, p=0.019), and single vs. married patients (adjusted OR 0.87 95% CI 0.79-0.97, p=0.011) were less likely to receive ATA compliant care.

Conclusions: This population-level assessment demonstrates that approximately one-third of papillary thyroid cancer patients do not receive ATA compliant care, underscoring variability in treatment patterns and the need to further implement evidence-based practice into the care of thyroid cancer patients. A yearly increase in compliance following publication reflects success in dissemination of these guidelines. Continued efforts should be made to ensure access to evidence-based thyroid cancer care irrespective of race, age, and socioeconomic status.
AN INTERNATIONAL MULTI-INSTITUTIONAL VALIDATION OF AGE 55 YEARS AS A CUT OFF IN THE AJCC STAGING SYSTEM FOR WELL DIFFERENTIATED THYROID CANCER

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Background

Advanced age is a recognized prognostic factor in well differentiated thyroid cancer (WDTC). Recent analyses of data from MSKCC using unsupervised recursive partitioning identified 55 years as the age cut off at which the risk of thyroid cancer mortality begins to increase. The objective of this study was to validate a modification of the current AJCC staging model to incorporate 55 years as a cut off instead of 45 years in a large cohort of patients drawn from centres in 4 countries.

Patients and Methods

Clinician collected, institutional data on patients treated for WDTC was submitted from Mount Sinai Hospital, Toronto, Canada, University of California, San Francisco, USA, University of Sydney Endocrine Surgical Unit, Australia and Instituto Nacional do Cancer / Universidade Federal do Rio de Janeiro, Brazil.

Disease specific survival (DSS) was used as the primary outcome measure. In total 4551 patients were available for inclusion. Data provided included T, N and M stage and age in addition to DSS outcome data. The median follow up was 40 months (range 1-528).

Results

The median age of the cohort was 45 years (range 18-96 years). 2361 (52%) were T1, 859 (19%) T2, 1047 (23%) T3 and 284 (6%) were T4. 2952 (65%) were N0, 793 (17%) N1a and 806 (18%) were N1b. 4403 (97%) were M0 and 148 (3%) M1.

Using the current AJCC staging system 3194 patients were stage I (70%), 325 stage II (7%), 537 stage III (12%) and 495 stage IV (11%). 10 year DSS by stage was 99.6%, 95%, 96% and 79% respectively. Applying the cut off of 55 years, 3751 were stage I (82%), 202 stage II (5%), stage III 286 (6%) and 312 were stage IV (7%). 10 year DSS by stage was 99.4%, 91%, 92% and 70% respectively.

573 patients (13%) were down staged by applying 55 years as a cut off. 139 moved from stage II-I (3%) 251 from stage III-I (6%), 167 from stage IV-I (4%) and 16 from stage IV-II (0.4%). 10y DSS in these groups were 100%, 100%, 95% and 77% respectively.

Conclusion
By increasing the age cut off from 45 to 55 years a wider spread of 10 year DSS was seen between stage I-IV (100%-79% versus 100%-70%) (Figure 1). In addition to this improvement, 13% of patients were down staged. This decreased the number of patients considered to have advanced disease (stage III/IV) by 10%. Over 80% of the cohort are therefore considered Stage I and appropriately, DSS in this group is over 99% at 10 years. Of those patients directly affected by the change, the vast majority move from stage II/III/IV to stage I with a 10y DSS>95%. Such a change would have significant impact on therapeutic decision making, patient expectations, and cost effective delivery of care.

Figure 1. AJCC Staging Curves displaying disease specific survival by stage using 45 years and 55 years as a cut off
OVERDIAGNOSIS OF THYROID CANCER OCCURS IN POPULATIONS RECEIVING HIGHER LEVELS OF MEDICAL SCRUTINY
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Introduction

Overdiagnosis is the diagnosis of a disease which would not have caused symptoms or death if left undiscovered. The rising incidence of thyroid cancer thyroid cancer in the US has been attributed to overdiagnosis due to detection of a subclinical reservoir of cancers. If this is true, the incidence of thyroid cancer diagnosis would vary among populations subjected to differing levels of medical scrutiny, while the mortality rate would remain the same.

Methods

We used the SEER cancer registry to examine thyroid cancer incidence and mortality rates in the US over time, stratified by county socioeconomic status (SES). County SES was defined as a composite of characteristics including county educational attainment, proportion uninsured or non-English speaking, median income, and rates of poverty, unemployment and white collar employment. In other published datasets, we examined the standardized incidence ratios (SIRs) of thyroid cancer diagnosis in people with enhanced health care access/utilization due to occupation, place of residence or other medical conditions.

Results

The US incidence of thyroid cancer increased from 4.2/100,000 in 1973 to 13.8 in 2010 (p<0.01). Despite the tripled incidence, thyroid cancer mortality declined from 0.63 (1973) to 0.51/100,000 (2010; p<0.01). The incidence of thyroid cancer increased faster in high SES counties compared to low SES counties (RR 1.05, p<0.01). Thyroid cancer mortality did not differ between high and low SES counties (0.45 vs 0.50/100,000; RR 0.91, p=0.16). The incidence of thyroid cancer was higher in virtually every population examined in which increased medical surveillance was expected: US military personnel (SIR 1.42, 95%CI 1.25-1.61), Danish nurses (SIR 1.90, 95% CI 1.3-2.5), WTC first responders (SIR 3.12 95% CI 2.04-4.57), patients with a prior non-thyroid cancer (SIR 1.50, 95% CI 1.45-1.55), and patients with other chronic diseases, including inflammatory bowel disease (SIR 1.93 , 95% CI 1.28-2.79), endometriosis (1.33, 95% CI 1.02-1.70),intellectual disability(SIR 2.1, 95% CI 1.0-4.8), lupus (SIR 1.76, 95% CI 1.13-2.61),acromegaly(SIR 3.70, 95% CI 1.8-10.9), myotonic dystrophy (SIR 5.54, 95% CI 1.80-12.93),cystic fibrosis(SIR 9.80, 95% CI 1.2-5.5),hyperparathyroidism(SIR 21.19, 95% CI, 4.3-61.9 ), liver transplantation (SIR 4.60, 95% CI 1.25-11.80), kidney transplantation(SIR 5.8, 95% CI 3.0-10.2), and non-radiation exposed persons in Japanese surveillance programs (SIR 2.60, 95% CI 1.92-3.37). In South Korea, a country with a high prevalence of screening thyroid ultrasound examinations, the incidence of thyroid cancer increased 8-fold over 10 years, to the highest incidence in the world (53/100,000). Over the same time period there was no change in mortality, however.

Conclusion

Persons under elevated levels of medical scrutiny have higher rates of thyroid cancer diagnosis, but not higher rates of thyroid cancer mortality. These data are supportive of widespread overdiagnosis of
thyroid cancer in people receiving high levels of health care. As medical technology continues to improve, thyroid cancer overdiagnosis is likely to become more common.
S184 RAPIDLY INCREASING INCIDENCE OF THYROID CANCER IN PENNSYLVANIA FROM 1985 - 2009
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Background: Over the last 30 years, thyroid cancer has increased in incidence to become the 7th most common cancer in the United States. Moreover, by 2019 thyroid cancer is predicted to become the 3rd most common cancer among women. Much of this increase results from papillary thyroid cancer, which is associated with excellent prognosis but still causes significant morbidity and represents an important clinical and economic burden. However, the etiologic and epidemiologic factors underlying the increase in PTC remain unclear. Recent evidence indicates that Pennsylvania is the state with the highest incidence of thyroid cancer in the country, and that thyroid cancer may be increasing at a faster rate in Pennsylvania than the United States as a whole. Therefore, to better understand the epidemiologic and etiologic factors that may contribute to the national increase in thyroid cancer we examined the incidence of thyroid cancer among different groups in Pennsylvania from 1985 - 2009.

Methods: Data on thyroid cancer were collected from the Surveillance Epidemiology and End Results-9 registry and the Pennsylvania Cancer Registry spanning the years 1985 - 2009. Data were reviewed for information regarding sex, race, histologic type of thyroid cancer, staging, and tumor size at diagnosis. Trends in cancer incidence were examined by fitting joinpoint models to the data using the JoinPoint Regression Program (National Cancer Institute, Maryland, USA).

Results: From 1985 - 2009 the average annual percent change (AAPC) for thyroid cancer in the US was 4.2 percent per year while the AAPC for thyroid cancer in Pennsylvania was 7.1 percent per year, and the trends in incidence were significantly different (P<0.001). In Pennsylvania, females experienced a greater AAPC in thyroid cancer (7.6 percent per year) than males (6.9 percent per year), and trend analysis suggested that the incidence of thyroid cancer is increasing the most rapidly among black females. Similar to national trends, papillary thyroid cancer was the histologic type of cancer with the most rapid increase in Pennsylvania. Furthermore, we also observed significant increases in the incidence of tumors with regional or distant spread and tumors larger than 2 cm at diagnosis (P<0.05).

Conclusions: The incidence of thyroid cancer is increasing at a faster rate in Pennsylvania than the rest of the country. Our observation that the incidence of tumors that are larger and higher-stage at diagnosis is also increasing suggest that the rise in thyroid cancer incidence represents a true increase in disease prevalence, and is not solely due to increased detection or over-diagnosis. Furthermore, these data suggest that the etiologic factors underlying the increase in thyroid cancer may be concentrated in Pennsylvania. The precise factors responsible for the increase in thyroid cancer remain unclear, however obesity has been implicated as a risk factor for many cancers, including thyroid cancer. Pennsylvania has a higher rate of obesity than many of the states included in the SEER-9 database, suggesting that obesity may be a contributing factor in the rapid increase in thyroid cancer incidence.
OVERDIAGNOSIS OF SUBCLINICAL PAPILLARY THYROID CANCERS LEADS TO SPURIOUS IMPROVEMENTS IN SURVIVAL RATES

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BACKGROUND: Advanced medical imaging facilitates diagnosis of mild, subclinical disease. This leads to an apparent increase in disease incidence, and shifts the spectrum of disease toward indolent cases. Survival rates appear to improve, although the natural history of the disease may not have actually changed. If this phenomenon is operant in papillary thyroid cancer (PTC), one would expect a rapidly rising incidence of PTC, mostly limited to small tumors, with a resulting shift in the spectrum of disease toward more indolent cancers, and improvements in survival (but not mortality) rates.

METHODS: We analyzed 2295 patients receiving treatment for PTC at Memorial Sloan-Kettering Cancer Center (MSKCC) from 1950-2005, and U.S. population-based data from 1973-2009 in the SEER dataset. Incidence, prevalence, mortality and survival rates were analyzed using SEERStat, CompPrev and ProjPrev tools.

RESULTS: The incidence of PTC in the US has increased to 12.4/100,000, 4.6-fold the 1973 rate, increasing at an annual rate of 10%. In contrast, the incidence of large (>6cm) or distant metastatic PTC, has remained stable. A larger share of PTCs are subcentimeter tumors, comprising 23% in 1983, and 36% in 2009. At MSKCC, this percentage was 24.5% before 1995 and 34.5% after 1995. The U.S. PTC mortality rate has remained unchanged at 0.5/100,000, but the mortality:prevalence ratio has decreased by 40%. With mortality rates fixed but incidence increasing, survival rates have increased. In the U.S., 10-year disease-specific survival improved from 93.1% to 99.7% from 1973-2009. At MSKCC, 10-year disease-specific survival improved from 88.1% to 97.6% from 1950-2005. While survival rates have increased among all PTCs, survival has not changed within individual risk categories.

CONCLUSIONS: Advanced diagnostic imaging identifies small, indolent PTCs. As a result, the spectrum of disease shifts toward milder cases, and the incidence of PTC and survival rates both appear to increase. These phenomena are spurious findings, which tend to reinforce current practices and lead to an inexorable cycle of increasing intervention. Aggressive treatment practices should be revisited, given the impact of these technological advances on cancer detection.
QUALITY OF CANCER CARE IN THE NETHERLANDS: VARIATION IN THYROID CANCER TREATMENT BY HOSPITAL TYPE AND VOLUME.

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Introduction

It is well known that there is variation in thyroid cancer treatment (Haymart and others JAMA 2011; Haymart and others J Clin Endocrinol Metab 2013). Furthermore, the choice of operation was reported to differ by patient volume per hospital (Lifante and others 2009) or surgeon (Loyo and others Laryngoscope 2013). Reoperations, recurrent laryngeal nerve injury and postoperative hypoparathyroidism have also been associated with surgeon experience (Gonzalez-Sanchez and others Langenbecks Arch Surg 2013; Loyo and others Laryngoscope 2013). In this study, we describe the variation in treatment numbers and choice of treatment by hospital type and volume for the Netherlands.

Methods

This study, commissioned by the working party Quality of cancer care of the Signalling Committee Cancer of the Dutch Cancer Society, was performed using data from the Netherlands Cancer Registry for 2006 through 2010. The number of thyroid operations and the number of patients treated with radioactive iodine as part of the initial treatment for cancer was assessed. Per hospital, the number of patients treated with radioactive iodine was divided by the number of patients with well differentiated thyroid cancer treated by total thyroidectomy. Also the number of lymph node dissections, defined as removal of 5 or more lymph nodes, divided by the number of patients with clinically positive nodes at diagnosis, was calculated. We related these proportions to the teaching status and volume of the hospital.

Results

The annual number of thyroid cancer operations ranged from 1 to 38 per hospital; 35% of patients were treated in hospitals that performed less than 10 operations for thyroid cancer per year. The proportion of lymph node dissections equalled 85% in the period of 2006-2010 and we observed no differences by hospital type or volume. The mean number of radioactive iodine treatments per institute increased from 8 to 11 per year between 2006 and 2010, which were performed in about 30 institutions. The percentage of patients receiving radioactive iodine treatment for thyroid cancer excluding T1N0M0 tumours was 90%. The mean proportion for teaching hospitals was 91%, while this proportion was 81% for non-teaching hospitals (difference: 10%; 95% CI: -4%-25%; not statistically significant). This difference between hospital types did not exist if the number of radioactive iodine treatments exceeded 10 (Figure 1). At the patient level, the difference between teaching and non-teaching hospitals was smaller but statistically significant at a difference of 6% for the total group and 14% for hospitals with a volume of 1-10 treatments in 5 years.

Conclusion
The treatment of thyroid cancer in the Netherlands is fragmented and the number per hospital would internationally be considered low-volume. Although differences in indicators are small these data indicate that experience due to volume or teaching status may be related to the proportion of patients treated with radioactive iodine.

Figure 1. Mean proportion of hospital proportion of patients treated with radioactive iodine by hospital type and volume.