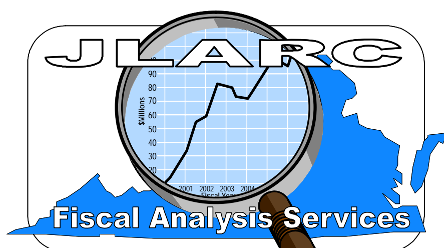
JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION
OF THE VIRGINIA GENERAL ASSEMBLY

EVALUATION OF PROPOSED
MANDATED HEALTH INSURANCE BENEFITS

Evaluation of House Bill 623: Mandated Coverage for Treatment of Malignant Brain Tumors at NCI Cancer Centers

October 2006



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JLARC provides evaluations of proposed health insurance mandates in accordance with Sections 2.2-2503 and 30-58.1 of the *Code of Virginia*.

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Evaluation of House Bill 623: Mandated Coverage for Treatment of Malignant Brain Tumors at NCI Cancer Centers

JLARC SUMMARY

House Bill 623 of the 2006 General Assembly Session would require access to treatment for malignant brain tumors at National Cancer Institute (NCI)-designated cancer centers within 300 miles of the patient's residence. There are 14 such centers, two in Virginia, and twelve in other states. The proposed mandate would not change the types of treatment available to patients with malignant brain tumors. Advocates for the proposed mandate believe that the quality of care at NCI-designated cancer centers is superior to the quality of care available elsewhere.

MEDICAL EFFICACY AND EFFECTIVENESS

Evidence suggests that patients treated for malignant brain tumors at NCI cancer centers would be expected to have lower surgical mortality rates due to the high volume of surgeries performed at these centers. Studies show that patients who have brain surgery at locations where a high volume of surgeries is performed are less likely to die in surgery. However, many patients with malignant brain tumors receive treatments other than surgery. Studies have not examined whether receiving these treatments at NCI cancer centers rather than other locations results in better health outcomes.

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SOCIAL IMPACT

Approximately 5,018 Virginians were diagnosed with a malignant brain tumor in 2005. However, only patients in health maintenance organizations (HMOs), approximately 16.5 percent of Virginia's population, would be directly affected by the proposed mandate and would potentially face major financial hardship in seeking treatment at an NCI cancer center outside their provider networks. Most Virginians with insurance already have access to NCI-designated cancer centers and choose not to use them, possibly because high-quality treatment is already available to them at other locations. In 2005, approximately 79 percent of patients with malignant brain tumors who had inpatient treatment received it through a high-volume hospital or a health provider network with at least one high-volume hospital. As mentioned previously, high volume is associated with better surgical outcomes.

FINANCIAL IMPACT

Overall, the proposed mandate is expected to have a modest financial impact. It could result in higher costs for treatment due to the expected increase in the utilization of NCI cancer centers and the expected higher cost at these locations. However, it appears that most Virginians already have access to quality health care and choose not to use NCI cancer centers. Therefore, the cost of health care would likely increase modestly. The monthly premium impact estimated by five respondents to the Bureau of Insurance survey ranged from $0.55 to $1.08 for mandated individual coverage, which appears to be within the range of existing mandates.

BALANCING MEDICAL, SOCIAL, AND FINANCIAL CONSIDERATIONS

The proposed mandate is not consistent with the role of insurance because it would not fill a critical need for helping patients finance necessary health care costs. For patients with malignant brain tumors, health insurance already provides a means for addressing these costs. In addition, among those patients who have the option of receiving treatment at an NCI cancer center, many choose to receive treatment at other locations instead. Studies support the medical efficacy of having surgery at locations that perform a high volume of brain surgeries. However, many health systems and hospitals other than NCI-designated cancers perform a high volume of brain surgeries. There does not appear to be a compelling rationale for the proposed mandate even if the financial impact of the proposed mandate on the total cost of health care is modest.

JLARC Evaluation of HB 623: Mandated Coverage for Treatment of Malignant Brain Tumors at NCI Cancer Centers

House Bill 623 (HB 623) of the 2006 General Assembly Session mandates health insurance coverage for treatment of malignant brain tumors at National Cancer Institute (NCI)-designated cancer centers within 300 miles of the patient's residence. There are approximately 12 NCI centers outside Virginia that are covered by the proposed mandate, and two NCI centers in Virginia, the Massey Cancer Institute and the University of Virginia Medical Center. The mandate provides that no co-payments, fees, or benefit limitations can be imposed on patients which are not equally imposed upon all individuals in the same benefit category. As with other mandates, the mandate does not apply to short-term travel, accident-only, other types of limited policies, and federal plans, such as Medicare.

BACKGROUND

Some people believe that the quality of care available at NCI cancer centers is superior to care available in other settings, and for this reason they favor the proposed mandate. Although HB 623 increases the number of treatment locations available to some patients with malignant brain tumors, it would not change the types of treatment available to patients.

a. Description of Medical Condition and Proposed Treatment

Malignant brain tumors include both primary tumors and metastatic tumors. Primary tumors are those that originate in the brain; metastatic brain tumors are the result of cancer that has spread from elsewhere in a patient's body. According to NCI, brain metastases outnumber primary brain tumors by more than ten to one.

In most cases, the recommended treatment for brain tumors is surgery and radiation. For treating metastases in the brain, NCI's website states that the current practice is to use whole brain radiation therapy, which may be used in combination with surgery or stereotactic radiosurgery. Stereotactic radiosurgery refers to the use of a precise beam of radiation to destroy a tumor. Unlike conventional surgery, it does not involve opening a patient's skull.

The proposed mandate (HB 623) would not change the types of treatment available to patients with malignant brain tumors. Instead, the mandate would allow some patients access to the same treatments at different locations, NCI-designated cancer centers within 300 miles of the patient's residence.

The medical community regards the NCI cancer center designation as quite prestigious. According to staff at the Massey Cancer Center in Richmond, Virginia, the process for gaining the NCI designation is highly competitive. Among other criteria, centers are evaluated based on the quality of staff publications, the amount of funding the center has been able to attract, and the outcomes associated with the center's clinical trials. However, health outcomes for patients treated at the cancer center are not among the criteria used for the evaluation.

Although patient health outcomes are not among the criteria for being awarded the NCI designation, staff at NCI centers and advocates for the proposed mandate believe the quality of care at these centers is superior. Staff at NCI cancer centers covered by the proposed mandate emphasized that the treatment approach– in particular collaboration with a whole team of professionals involved in the patient's care– results in better care. Other advantages that staff mentioned included the clinical trials available and the better health outcomes associated with having a higher volume of patients with a particular type of cancer. Although staff noted clinical trials as an advantage, patients' access to these trials would not be influenced by the proposed mandate.

b. History of Proposed Mandate

Sources indicate that the mandate (HB 623) was proposed primarily as a result of a particular family's positive experience with treatment for malignant brain tumors at an NCI-designated cancer center outside Virginia. Although the language in the bill refers to "centers of excellence," it appears that the bill is intended to cover treatment at NCI cancer centers. Therefore, this review focuses on NCI cancer centers.

c. Proponents and Opponents of Proposed Mandate

Proponents and opponents of HB 623 will have the opportunity to officially express their views at the public hearing on October 17, 2006, held by the Special Advisory Commission on Mandated Health Insurance Benefits. The main opposition to this bill appears to be from the health insurance industry. The Virginia Association of Health Plans, which represents several insurance companies, opposes the mandate due to the expected higher costs for insurance companies and insufficient research establishing im-

proved patient outcomes at NCI cancer centers. Another reason that the insurance industry and others may be opposed to the mandate is their belief that, in general, mandates lead to higher health insurance costs, which in turn increase the number of uninsured people.

The primary advocate for the proposed mandate is one family which included members treated for malignant brain tumors. This family believes that all Virginians with malignant brain tumors should have access to NCI-designated cancer centers because of the quality of care available at these locations.

JLARC staff contacted neurosurgeons around the State regarding their opinions of the proposed mandate. Only five responses were received, and the views of these neurosurgeons were mixed. Some favored the proposed mandate, while others opposed it or thought it was unnecessary. Their views seemed to be based on their perceptions of patients' current access to NCI centers and the quality of care available at non-NCI center locations.

MEDICAL EFFICACY AND EFFECTIVENESS

Based on a literature review conducted in the Medline and Cochrane Library databases, there is evidence to suggest that patients treated for malignant brain tumors at an NCI cancer center would be expected to have lower surgical mortality rates, but there is not enough evidence to conclude longer term outcomes are better for patients treated at an NCI cancer center compared to other locations. In addition, many patients with malignant brain tumors receive treatments other than surgery. Studies have not established that receiving these treatments at an NCI cancer center rather than another location leads to better health outcomes for patients.

Medical Efficacy

Assessments of medical efficacy are typically based on clinical research, particularly randomized clinical trials, demonstrating the efficacy of a particular treatment compared to alternative treatments or no treatment at all.

a. Medical Efficacy of Benefit

Medical efficacy refers to the effectiveness of a particular treatment based on its evaluation under controlled conditions, rather than a normal clinical setting. The criterion of medical efficacy is not applicable for the proposed mandate because all relevant studies reviewed were based on actual clinical experience, rather than controlled conditions.

Medical Effectiveness

Medical effectiveness refers to the effectiveness of a particular treatment in a normal clinical setting as opposed to ideal or laboratory conditions.

b. Medical Effectiveness of Benefit

There is evidence that suggests patients treated for malignant brain tumors at an NCI cancer center would be expected to have lower surgical mortality rates than patients treated at some other types of locations. However, no published studies were located that

specifically evaluated the benefit of having treatments for malignant brain tumors at NCI-designated cancer centers compared to other locations. The most relevant evidence is peer reviewed studies regarding the value of having brain surgery performed at a location where a high volume of brain surgeries is performed. However, it also appears that more than half of all patients with malignant brain tumors have treatments other than surgery.

The strongest evidence that suggests lower surgical mortality rates at NCI cancer centers comes from studies that examine the relationship between mortality rates for brain surgery and the volume of surgeries performed at a location and per surgeon. NCI cancer centers with expertise in brain surgery typically perform a high volume of brain surgeries, and higher volumes for surgeries have been shown to lead to better patient outcomes. In one study, the average mortality rate for low-volume locations (4.6 percent) was almost twice as high as the rate for high-volume locations (2.5 percent). Four studies grouped data into four sub-volume groups, instead of just two groups (high-volume and low-volume), and found a clear trend toward lower mortality rates as the volume of surgeries increased. Similarly, mortality rates were lower for surgeons who performed a high volume of surgeries.

The results of another published study found surgical mortality rates were significantly lower at NCI-designated cancer centers for several surgical procedures, but the study did not include brain surgery. This study examined surgical outcomes for patients treated at NCI-designated cancer centers compared to high-volume hospitals and found that, with regard to surgical mortality rates, the NCI-designated cancer centers had significantly lower mortality rates for four of the six surgeries studied. With regard to five year mortality rates, however, NCI-designated cancer centers did not achieve better results than the high-volume hospitals. Therefore, the researchers concluded that choosing surgery at a hospital that performs a high-volume of surgeries is more critical for patient outcomes than choosing treatment at an NCI-designated cancer center. Although the study did not include brain surgery among the procedures reviewed, the conclusion of the researchers is consistent with other medical literature.

Although several studies reviewed indicate that mortality rates for brain surgery were typically significantly lower at locations where a high volume of surgeries is performed, the mortality rates for brain surgery may not be relevant for many patients with malignant brain tumors who are deciding where to seek treatment. Many patients with malignant brain tumors receive treatments other than surgery. This may be attributable to the large number of patients with malignant brain tumors from cancers that have metastasized from other sites.

According to two physicians contacted for this review, patients with metastatic brain cancer are generally treated with radiation, not traditional surgery. Data on the number of patients with malignant brain tumors who received inpatient treatment in 2005 and the expected incidence of malignant brain tumors suggest that as many as 60 percent of patients with malignant brain tumors may only have outpatient treatment, such as radiation. Surgery is always an inpatient procedure. For treatments other than surgery, such as radiation and stereotactic radiosurgery, JLARC staff did not locate any studies regarding the value of having these treatments at NCI cancer centers rather than other locations.

SOCIAL IMPACT

Only patients in health maintenance organizations (HMOs), an estimated 16.5 percent of the population, would be directly affected by the proposed mandate and would potentially face major financial hardship in seeking treatment at an NCI cancer center outside their provider networks. Most Virginians with insurance already have access to NCI-designated cancer centers and choose not to use them. One reason may be that high-quality treatment is already available to patients at other locations.

a. Utilization of Treatment

In Virginia, an estimated 5,018 individuals were diagnosed with a malignant brain tumor in 2005, based on Virginia's population and data collected by NCI that suggests the incidence of primary and metastatic brain tumors combined is 66.3 per 100,000 people. In 2005, approximately ten percent of patients with malignant brain tumors received treatment at one of the two in-state NCI-designated cancer centers (Massey Cancer Institute and the University of Virginia Medical Center). Of those patients with malignant brain tumors that required inpatient treatment, such as surgery, a greater percentage utilized the NCI-designated cancer centers in Virginia, approximately 24 percent (483 total patients). JLARC staff attempted to contact the 12 NCI cancer centers covered by the legislation that are outside of Virginia to find out how many Virginians received treatment at these locations. Three of these cancer centers responded, indicating an estimated total of 81 Virginia residents received treatment for a malignant brain tumor at these locations in 2005.

Data suggest that 79 percent of Virginians with malignant brain tumors who are treated as inpatients are treated through health care systems or hospitals that handle a high volume of patients with malignant brain tumors annually (49 or more). Therefore, it appears that patients are already choosing to have inpatient pro-

cedures, such as surgery, at locations which would be expected to provide a similar quality of health care compared to NCI-designated cancer centers, in terms of surgical mortality rates.

It is unknown how many Virginians with malignant brain tumors utilize NCI cancer centers to receive outpatient treatment, such as radiation, or to gather additional medical opinions on their course of treatment. This information is not tracked by most health systems, although a substantial percentage of patients may use centers for these purposes. Based on the estimated number of patients newly diagnosed with malignant brain tumors in 2005 and inpatient data for Virginia hospitals, it appears that approximately 60 percent of these patients receive only outpatient treatment.

b. Availability of Coverage

Patients enrolled in point of service health insurance plans (POS) or preferred provider organization plans (PPOs) already have access to NCI designated cancer centers both in state and out of state. These patients would pay for treatment at an NCI-designated cancer center as described in their health insurance contracts. They could pay greater out-of-pocket expenses for choosing treatment at an NCI-designated cancer center rather than another location within their provider network, but the proposed mandate will not alter this financial arrangement.

Among the 50 insurance carriers surveyed by the Bureau of Insurance (BOI), approximately half of the POS and PPOs responding (14) indicated that the benefit is available as part of the standard insurance package. However, three of these insurers qualified their responses. Representatives for these insurance companies indicated that patients with malignant brain tumors for whom it is medically necessary to have treatment at a location outside their health insurance network would have coverage for it.

Patients enrolled in HMOs would be most affected by the mandate because their network of providers is limited. Based on results from a 2003 survey of the U.S. Census Bureau, approximately 16.5 percent of Virginians are enrolled in HMOs and would potentially be affected by the proposed mandate. Results from the survey conducted by BOI show that only one of the 12 HMOs surveyed cover treatment of malignant brain tumors at designated NCI centers as described in the proposed legislation. However, seven of the HMOs provide coverage for malignant brain tumors at one or both of the NCI designated cancer centers in Virginia. Therefore, it appears that even most individuals in HMOs have insurance coverage for treatment at one or more NCI-designated cancer centers.

c. Availability of Treatment/ Benefit

The amount and types of treatment available to Virginians will not be changed by the proposed legislation. Instead, the proposed legislation would potentially increase Virginia residents' access to NCI-designated cancer centers.

As previously mentioned, there are two NCI-designated cancer centers in Virginia, the Massey Cancer Institute located at the Medical College of Virginia (MCV) and the University of Virginia (UVA) Cancer Center. In addition to these two centers, there are twelve NCI cancer centers which are within approximately 300 miles of Virginia's borders. The majority of these centers are located closer to the eastern or northern areas of Virginia. For a complete list of NCI cancer centers that would be covered by the proposed mandate, refer to Appendix D.

d. Availability of Treatment Without Coverage

As will be discussed in the next section, the cost of treatment for a malignant brain tumor at an NCI-designated cancer center could be very high for someone in an HMO plan that excludes NCI cancer centers from its provider network. Patients in these HMOs would still have access to the same types of treatment for their malignant brain tumors. However, these patients would not necessarily be able to have these treatments at an NCI-designated cancer center.

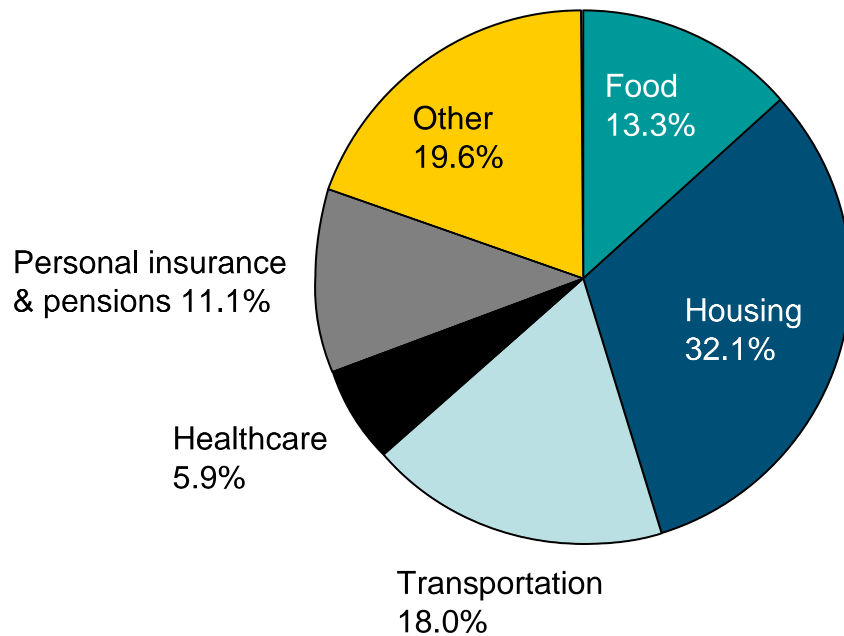
e. Financial Hardship

The financial hardship attributable to receiving treatment at an NCI-designated cancer center would be greatest for persons enrolled in an HMO plan which does not include any such centers in its network. Such patients would potentially be responsible for the full amount of hospital charges. One NCI cancer center reported the average cost of treatment for patients with metastatic brain tumors is approximately $42,000. This NCI cancer center also reported that the respective average costs for treating high-grade and low-grade primary brain tumors are $27,000 and $16,000. (There are four grades of brain tumors, based on the severity of disease.) However, as indicated by the NCI cancer center, these average costs may underestimate the costs for patients because patients often also receive lab tests or some treatments through other providers.

Based on data from the U.S. Census Bureau that has been adjusted for inflation, the median household income in Virginia in 2006 is $56,575. Given the estimated average annual costs for treatment of a malignant brain tumor (between $16,000 and

$42,000), the average annual cost of medical treatment services would be between 28 and 74 percent of median household income. As shown in Figure 1, these amounts are comparable to, or much greater than, the largest typical expenditure for households, which is housing. According to the Bureau of Labor Statistics annual Consumer Expenditure Survey for 2004, on average, housing costs accounted for 32 percent of household income expended annually.

Figure 1: Distribution of Total Annual U.S. Household Expenditures by Major Category, 2004



Source: Bureau of Labor Statistics, Consumer Expenditure Survey, 2004

f. Prevalence/Incidence of Condition

Based on data provided by the Virginia Cancer Registry, the incidence of primary malignant brain cancer for the time period 1999-2003 ranged from 4.6 to 6.1 cases per 100,000 Virginians, and the annual number of cases for this time period ranged from 323-425. However, the Virginia Cancer Registry data is based on information reported by hospitals and may undercount cases due to under-reporting. Data collected by NCI suggests that the incidence of primary malignant brain cancer is likely slightly higher, about 7.4 cases per 100,000 people. With Virginia's population, this incidence rate (7.4) translates into an estimated 560 patients newly diagnosed with primary malignant brain tumors in 2005. An addi-

tional 4,458 patients would be expected to be newly diagnosed with metastatic brain tumors based on their incidence among patients with another type of cancer.

g. Demand for Coverage

Based on data from the U.S. Census on the percentage of Virginians enrolled in HMOs and the expected incidence of malignant brain tumors in the population, it appears that an estimated 828 Virginians each year could potentially request treatment at an NCI designated cancer center. However, as indicated by responses to the BOI survey, some HMOs already provide the coverage described in the proposed mandate. Therefore, it is likely that fewer than 828 patients would request such coverage.

Interested parties will have the opportunity to formally voice their support for HB 623 on October 17, 2006, public hearing before the Special Advisory Commission of Mandated Health Insurance Benefits. However, staff at one NCI designated cancer center provided anecdotal information that some patients want to be treated at their location, but lack insurance coverage for it. Other physicians indicated that patients with a poor health prognosis sometimes prefer to receive treatment in their communities or would do just as well receiving treatment locally. It appears, then, that not all patients would be expected to request coverage for treatment at an NCI designated cancer center.

h. Labor Union Coverage

Labor unions do not appear to have advocated specifically for the inclusion of this benefit in their health benefit packages. Typically, labor unions advocate for broader benefits, rather than a benefit as specific as coverage for malignant brain tumors at NCI-designated cancer centers.

i. State Agency Findings

No State agencies have previously analyzed any of the issues discussed in this report. However, the Virginia Department of Health provided data on the incidence of malignant brain tumors.

j. Public Payer Coverage

Both Medicaid and Medicare provide the level of coverage included in the proposed mandate. Staff at the Virginia Department of Medical Assistance Service (DMAS) indicated that patients potentially have access to all of the NCI-designated cancer centers within 300 miles of Virginia's borders. In order for a patient en-

rolled in Medicaid to be treated outside of Virginia, a facility must agree to accept the reimbursement levels for Virginia's Medicaid program. Currently, all of the out-of-state facilities covered by the proposed legislation accept Virginia's Medicaid rates. However, DMAS staff also noted that treating a patient in Virginia is the preferred option, especially if the patient is eligible for paid transportation services.

Similar to Medicaid, Medicare provides coverage for treatment of malignant brain tumors at NCI-designated cancer centers. Medicare has no restrictions on where a patient receives therapy, except for cases in which a provider has been sanctioned. Medicare patients with malignant brain tumors could receive treatment at any NCI cancer center, even one more than 300 miles away. However, Medicare would not cover the costs of transportation.

k. Public Health Impact

Public Health

The role of public health is to protect and improve the health of a community through preventive medicine, health education, and control of communicable diseases.

The proposed legislation is not expected to impact public health. The potential benefits of the proposed legislation would be directly received primarily by the patients diagnosed with malignant brain tumors. To the extent that the proposed mandate may increase the cost of health insurance, and thereby increase the number of uninsured patients, there could be a negative public health impact. However, as described in the next section, the financial impact of the proposed mandate would likely be modest.

FINANCIAL IMPACT

Overall, the proposed mandate is expected to have a modest financial impact. The mandate could result in higher costs for treatment partly due to the expected increase in the utilization of NCI cancer centers and the expected higher cost at these locations. However, it appears that most Virginians already have access to quality health care at other locations and may not change their decisions on where to seek treatment. The monthly premium impact estimated by respondents to the BOI survey ranged from $0.00 to $3.20 for mandated coverage, which appears to be within the estimated range of impacts for existing mandates.

a. Effect on Cost of Treatment

Representatives for insurance companies expressed concern that the proposed mandate would result in higher costs for the treatment of patients with malignant brain tumors. According to these representatives, because the proposed mandate gives patients the option of going to several different facilities, insurance companies could not direct patients to the facilities where they have negoti-

ated the best rate. Instead, insurance companies would likely have to pay whatever amount the facility charges.

Currently, insurance companies typically negotiate rates with doctors and facilities. Insurance companies have strong influence in these negotiations because of the volume of patients that they can potentially bring to these doctors or facilities. The proposed legislation provides no incentive for cancer centers to lower the charges billed to insurance companies and removes the incentive for providers currently within an insurer's network to negotiate a favorable rate in the future. Therefore, insurance companies may pay more for the treatment of some patients than they otherwise would. In addition, as will be discussed later, the cost of treatment at NCI cancer centers is higher than at community hospitals.

b. Change in Utilization

Utilization of NCI-designated cancer centers would probably increase, if the proposed mandate were adopted. As many as 828 patients newly diagnosed with malignant brain tumors might seek treatment at NCI-designated cancer centers annually. Due to the population density in northern Virginia and the proximity to multiple out-of-state NCI cancer centers, there could be a larger shift in patients' choice of treatment location in that region compared to other areas of the State. However, any change in utilization would still be modest relative to the number of patients treated at the locations affected.

The proposed mandate would not result in inappropriate utilization because treatment at an NCI cancer center is available only on the basis of a medical diagnosis; patients would not be receiving treatment that is not medically indicated. In addition, NCI cancer centers are intended for use by cancer patients, not just patients that meet specific criteria. As previously noted, many patients already have access to NCI-designated cancer centers but choose not to seek treatment at them.

c. Serves as an Alternative

The proposed mandate would provide coverage for a more expensive alternative, treatment for a malignant brain tumor at an NCI cancer center. Brain surgery is more expensive at locations where a high volume of surgeries are performed, such as NCI-designated cancer centers. One study found that charges were higher at higher volume hospitals by eight percent. Another study using Maryland patient data found charges were almost 13 percent higher at high-volume hospitals, even after adjusting for multiple confounding factors. Consistent with the studies mentioned here, staff at the University of Virginia's Cancer Center estimated that

costs would be expected to be about ten percent higher at NCI cancer centers.

d. Effect on Providers

Both the number of NCI-designated cancer centers and the number of non-NCI cancer centers providing patients with treatment for malignant brain tumors are unlikely to change as a result of the proposed mandate. Federal research funding determines the number of NCI-designated cancer centers, not patients' decisions on where to seek treatment. In addition, few patients currently lack access to the NCI-designated cancer center of their choice for treatment of a malignant brain tumor. Only patients enrolled in HMOs (16.5 percent of Virginians) and who also do not have NCI-designated cancer centers in their provider network would be affected by the proposed mandate. Because many patients with malignant brain tumors already have access to NCI-designated cancer centers, but choose not to seek treatment at these locations, it is unlikely that a large number of patients would change their treatment decisions. Therefore, it is unlikely that community hospitals and other smaller providers will be affected by a shift away from their facilities.

e. Administrative and Premium Costs

Administrative costs of the proposed mandate would likely be similar to other mandates. The premium expenses of policyholders are expected to be higher. These higher estimated costs are similar to the costs of existing health care mandates.

Administrative Expenses of Insurance Companies

The administrative expenses for insurance companies would likely be similar to other mandates. Insurance companies do not provide estimates on the administrative expenses separately in their responses to the BOI survey.

Premium and Administrative Expenses of Policyholders

Among the 43 insurance companies responding to a survey by BOI, very few provided an estimate of the monthly premium cost. Eleven of the companies surveyed did not provide an estimate for individual policyholders, and 26 indicated that the question was not applicable. Among the five companies that provided responses for the monthly premium impact on individual contracts for mandated coverage, the estimates ranged from $0.55 to $1.08. This amount represents approximately 0.3 percent to 0.6 percent of the average monthly premium for a standard individual contract ($191.90), as defined in BOI's 2004 report on the financial impact of mandated health insurance benefits.

Table 1: Estimated Monthly Premium Impact for HB 623

	# of Responses	Median Estimate	Highest Estimate	Lowest Estimate
Individual (standard)	5	$1.00	$1.08	$0.55
Individual (optional)	4	$2.27	$3.00	$1.39
Group (standard)	20	$1.00	$3.20	$0.00
Group (optional)	14	$2.04	$70.22	$0.00

Source: Bureau of Insurance survey of 50 insurance companies, 2006.

Compared to other mandates passed in Virginia, the estimated premium impact of the proposed mandate is in the middle range. Based on BOI's 2004 report, about half of the mandates' premium impacts (23 of 42) for single coverage individual contracts were less than 0.6 percent. However, there are some limitations to drawing conclusions from this comparison. Some insurance companies responding to the survey predicted the premium impact based on limited claims experience, which may reduce the accuracy of their estimates. Also, many insurance companies did not provide any estimate for the premium impact of proposed mandates; the small resulting sample may not be representative of expected premium impacts.

With regard to the estimated monthly premium impacts for group certificate holders for mandated coverage, 20 companies provided estimates. These estimates ranged from $0.00 to $3.20 monthly. BOI did not explicitly include the average premium for group certificate holders in its 2004 report on the financial impact of mandated health insurance benefits. Therefore, it is difficult to provide more context for the premium impact estimates for group certificate holders.

f. Total Cost of Health Care

As a result of HB 623, only a modest increase in the total cost of health care is estimated. The cost of treatment for a malignant brain tumor at an NCI-designated cancer center is estimated to be about ten percent higher, but few patients would likely choose treatment at an NCI cancer center as a result of the proposed legislation. As previously mentioned, many patients already have access to these locations, but choose to receive treatment at other locations. Based on this, few patients enrolled in HMOs would be expected to choose treatment at an NCI-designated cancer center.

Although the increase in the total cost of health care is expected to be modest, spending on treatment for malignant brain tumors could increase to a greater extent. Representatives for the insurance industry stated that they would potentially pay more for the treatment of all malignant brain tumors because they may not be able to negotiate the best rates through promising a high volume of patients at a few locations. However, insurance companies could potentially make up for higher costs by negotiating lower reimbursement rates with providers for other services due to the high volume of business insurers bring for those services. Representatives for some insurance companies disagree with this assessment. They stated that they already negotiate the most competitive rates possible for services.

BALANCING MEDICAL, SOCIAL, AND FINANCIAL CONSIDERATIONS

The proposed mandate is not consistent with the role of insurance because it would not fill a critical need for helping patients finance necessary health care costs. For patients with malignant brain tumors, health insurance already provides a means for addressing these costs. In addition, it appears that a relatively small number of Virginians, those with brain tumors who are also enrolled in HMO plans without the proposed coverage, would need or request this coverage. Therefore, the need for insurance coverage of treatment of malignant brain tumors at NCI-designated cancer centers does not appear critical, even if the financial impact of the proposed mandate on the total cost of health care is modest.

a. Social Need/Consistent With Role of Insurance

Based on the premise that the role of insurance is to promote public health, to encourage the use of preventative care, and to provide protection from catastrophic financial expenses for unexpected illnesses, the proposed mandate does not appear consistent with the role of health insurance. As previously discussed, the proposed mandate will not have a substantial positive impact on public health, and it will not impact the use of preventative care because it is directed at treatment of an often fatal disease rather than prevention of this disease. The mandate does provide greater financial security, but it is for an option a patient may elect (location of treatment), rather than providing financial security for the cost of needed medical treatment. In addition, it appears that many patients already have access to care at locations which may provide a similar quality of health care to NCI-designated cancer centers, such as locations that perform a high volume of brain surgeries.

b. Need Versus Cost

The need for the insurance coverage proposed in HB 623 does not appear to outweigh its cost. The need for insurance coverage appears limited to a small number of Virginians, primarily patients with malignant brain tumors who are enrolled in HMO plans that do not include NCI-designated cancer centers in their networks. This number of individuals is estimated to be at most 828 annually. As a result of the proposed mandate, insurance companies will likely pay approximately at least 10 percent more for the treatment of malignant brain tumors for a limited number of patients, thereby increasing the total cost of health care. Premiums are expected to increase by an amount similar to those of existing mandates.

Patients with malignant brain tumors who are enrolled in HMO plans that do not include a designated NCI cancer center in their networks still can receive treatment at other locations. If a high volume of surgeries for malignant brain tumors is performed at these locations, then the health benefits of going to an NCI-designated center instead may be modest. Also, although some patients may not have access to an NCI cancer center through their provider network, occasionally HMOs make exceptions to their policies. Staff from several HMOs contacted indicated that if it was medically necessary for a patient to be treated at an NCI-designated cancer center, then the option would probably be available. Overall, it does not appear there is compelling rationale for the benefit of the proposed mandate.

The costs of the proposed mandate include the expected higher treatment costs and a potential increase in the number of uninsured Virginians due to higher insurance premiums. Specifically, the proposed mandate could increase utilization of designated NCI cancer centers where the cost of treatment for a malignant brain tumor is approximately ten percent higher compared to other locations. Insurance companies could also potentially provide greater payments to providers, even within their networks, for the treatment of malignant brain tumors because insurers will not be able to guarantee a high enough volume of patients to secure the best reimbursement rates. Insurers may be able to recoup these higher costs through their negotiations with providers on other benefits. However, if not, even a small increase in cost could result in a large increase in total expenditures for treating brain tumors, when multiplied by the number of patients with malignant brain tumors. Such an increase in total expenditures could seem excessive, given the small number of patients expected to request the proposed coverage. Compared to the estimated premium impact of existing mandates, the estimated premium impact of the proposed mandate falls in the middle of the range. Despite the estimated

modest premium impact of the proposed mandate, the need for it does not appear to outweigh these costs.

c. Mandated Offer

Mandated Offer
A mandated offer requires health insurers to offer for purchase the coverage described in the mandate for an additional fee.

A mandated offer instead of a mandated benefit would probably not meet the need for coverage of malignant brain tumors at NCI cancer centers. The proposed mandate addresses a relatively rare condition, and most purchasers of health insurance will probably not view having more choices for the location of treatment as a critical need. In addition, with fewer purchasers of this benefit, the cost is higher. Insurers that responded to the BOI survey in all cases at least doubled the estimated premium for providing the benefit as a mandated offer rather than a mandated benefit. Furthermore, the average estimated monthly premium impact for a mandated offer for group coverage was $10.80 compared to $0.99 for a mandated benefit. Because it is expected that many persons and companies would choose not to purchase the optional benefit, either due to the cost or because they do not perceive the benefit as critical, coverage for treatment of malignant brain tumors at NCI-designated cancer centers would not likely increase with a mandated offer.

ACKNOWLEDGMENTS

JLARC staff would like to acknowledge the expertise, assistance, and information provided by staff at the Virginia Commonwealth University Massey Cancer Center and the University of Virginia Health System. JLARC would also like to thank Dr. Robert Valdez, President of Valdez and Associates, for his suggestions and expertise as a public health consultant. In addition, JLARC would like to thank the Virginia State Corporation Commission Bureau of Insurance, the Virginia Association of Health Plans, the Department of Human Resource Management, and the Department of Health for their assistance.

Appendix A Statutory Authority for JLARC Evaluation of Proposed Mandated Health Insurance Benefits

CHAPTER 413

An Act to amend and reenact §§ 2.2-2503 and 30-58.1 of the Code of Virginia, relating to staffing of the Special Advisory Commission on Mandated Health Insurance Benefits; Joint Legislative Audit and Review Commission.

[H 614]
Approved March 31, 2006

Be it enacted by the General Assembly of Virginia:

1. That §§ 2.2-2503 and 30-58.1 of the Code of Virginia are amended and reenacted as follows:

§ 2.2-2503. Special Advisory Commission on Mandated Health Insurance Benefits; membership; terms; meetings; compensation and expenses; staff; chairman's executive summary.

A. The Special Advisory Commission on Mandated Health Insurance Benefits (the Commission) is established as an advisory commission within the meaning of § 2.2-2100, in the executive branch of state government. The purpose of the Commission shall be to advise the Governor and the General Assembly on the social and financial impact of current and proposed mandated benefits and providers, in the manner set forth in this article.

B. The Commission shall consist of 18 members that include six legislative members, 10 nonlegislative citizen members, and two ex officio members as follows: one member of the Senate Committee on Education and Health and one member of the Senate Committee on Commerce and Labor appointed by the Senate Committee on Rules; two members of the House Committee on Health, Welfare and Institutions and two members of the House Committee on Commerce and Labor appointed by the Speaker of the House of Delegates in accordance with the principles of proportional representation contained in the Rules of the House of Delegates; 10 nonlegislative citizen members appointed by the Governor that include one physician, one chief executive officer of a general acute care hospital, one allied health professional, one representative of small business, one representative of a major industry, one expert in the field of medical ethics, two representatives of the accident and health insurance industry, and two nonlegislative citizen members; and the State Commissioner of Health and the State Commissioner of Insurance, or their designees, who shall serve as ex officio nonvoting members.

C. All nonlegislative citizen members shall be appointed for terms of four years. Legislative and ex officio members shall serve terms coincident with their terms of office. All members may be reappointed. However, no House member shall serve more than four consecutive two-year terms, no Senate member shall serve more than two consecutive four-year terms, and no nonlegislative citizen member shall serve more than two consecutive four-year terms. Vacancies occurring other than by expiration of a term shall be filled for the unexpired term. Vacancies shall be filled in the manner as the original appointments. The remainder of any term to which a member is ap-

pointed to fill a vacancy shall not constitute a term in determining the member's eligibility for reappointment.

D. The Commission shall meet at the request of the chairman, the majority of the voting members or the Governor. The Commission shall elect a chairman and a vice-chairman, as determined by the membership. A majority of the members of the Commission shall constitute a quorum.

E. Legislative members of the Commission shall receive such compensation as provided in § 30-19.12, and nonlegislative citizen members shall receive such compensation for the performance of their duties as provided in § 2.2-2813. All members shall be reimbursed for all reasonable and necessary expenses incurred in the performance of their duties as provided in §§ 2.2-2813 and 2.2-2825. Funding for the compensation and costs of expenses of the members shall be provided by the State Corporation Commission.

F. The Bureau of Insurance, the State Health Department, *and the Joint Legislative Audit and Review Commission* and such other state agencies as may be considered appropriate by the Commission shall provide staff assistance to the Commission. *The Joint Legislative Audit and Review Commission shall conduct assessments, analyses, and evaluations of proposed mandated health insurance benefits and mandated providers as provided in subsection D of § 30-58.1, and report its findings with respect to the proposed mandates to the Commission.*

G. The chairman of the Commission shall submit to the Governor and the General Assembly an annual executive summary of the interim activity and work of the Commission no later than the first day of each regular session of the General Assembly. The executive summary shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

§ 30-58.1. Powers and duties of Commission.

The Commission shall have the following powers and duties:

A. Make performance reviews of operations of state agencies to ascertain that sums appropriated have been, or are being expended for the purposes for which such appropriations were made and to evaluate the effectiveness of programs in accomplishing legislative intent;

B. Study on a continuing basis the operations, practices and duties of state agencies, as they relate to efficiency in the utilization of space, personnel, equipment and facilities;

C. Make such special studies and reports of the operations and functions of state agencies as it deems appropriate and as may be requested by the General Assembly;

D. *Assess, analyze, and evaluate the social and economic costs and benefits of any proposed mandated health insurance benefit or mandated provider, including, but not limited to, the mandate's predicted effect on health care coverage premiums and related costs, net costs or savings to the health care system, and other relevant issues, and report its findings with respect to the proposed mandate to the Special Advisory Commission on Mandated Health Insurance Benefits; and*

E. Make such reports on its findings and recommendations at such time and in such manner as the Commission deems proper submitting same to the agencies concerned, to the Governor and to the General Assembly. Such reports as are submitted shall relate to the following matters:

1. Ways in which the agencies may operate more economically and efficiently;

2. Ways in which agencies can provide better services to the Commonwealth and to the people; and

3. Areas in which functions of state agencies are duplicative, overlapping, or failing to accomplish legislative objectives or for any other reason should be redefined or redistributed.

Appendix

B Proposed Mandated Benefit Requiring Coverage for Treatment of Malignant Brain Tumors at NCI-Designated Centers

HOUSE BILL NO. 623
Offered January 11, 2006
Prefiled January 10, 2006

A BILL to amend and reenact § 38.2-4319 of the Code of Virginia and to amend the Code of Virginia by adding a section numbered 38.2-3418.15, relating to health insurance coverage for treatment of malignant brain tumors.

Patron-- O'Bannon

Referred to Committee on Commerce and Labor

Be it enacted by the General Assembly of Virginia:

1. That § 38.2-4319 of the Code of Virginia is amended and reenacted and that the Code of Virginia is amended by adding a section numbered 38.2-3418.15 as follows:

§ 38.2-3418.15. Coverage for treatment of malignant brain tumors.

A. Notwithstanding the provisions of §38.2-3419, each insurer proposing to issue individual or group accident and sickness insurance policies providing hospital, medical and surgical, or major medical coverage on an expense-incurred basis; each corporation providing individual or group accident and sickness subscription contracts; and each health maintenance organization providing a healthcare plan for healthcare services shall provide coverage for treatment of a malignant brain tumor otherwise covered by the policy, contract, or plan that the covered patient elects to have performed at a medical center designated by the National Cancer Institute as a "center of excellence" that is located within 300 miles of the patient's residence.

B. No insurer, corporation, or health maintenance organization shall impose upon any person receiving benefits pursuant to this section any copayment, fee, policy year or calendar year, or durational benefit limitation or maximum for benefits or services that is not equally imposed upon all individuals in the same benefit category.

C. The requirements of this section shall apply to all insurance policies, contracts, and plans delivered, issued for delivery, reissued, or extended in the Commonwealth on and after January 1, 2007, or at any time thereafter when any term of the policy, contract, or plan is changed or any premium adjustment is made.

D. This section shall not apply to short-term travel, accident-only, limited or specified disease, or individual conversion policies or contracts, nor to policies or contracts designed for issuance to persons eligible for coverage under Title XVIII of the Social Security Act, known as Medicare, or any other similar coverage under state or federal governmental plans.

§ 38.2-4319. Statutory construction and relationship to other laws.

A. No provisions of this title except this chapter and, insofar as they are not inconsistent with this chapter, §§ 38.2-100, 38.2-136, 38.2-200, 38.2-203, 38.2-209 through 38.2-213, 38.2-216, 38.2-218 through 38.2-225, 38.2-229, 38.2-232, 38.2-305, 38.2-316, 38.2-322, 38.2-400, 38.2-402 through 38.2-413, 38.2-500 through 38.2-515, 38.2-600 through 38.2-620, Chapter 9 (§ 38.2-900 et seq.), §§ 38.2-1017 through 38.2-1023, 38.2-1057, Article 2 (§ 38.2-1306.2 et seq.), § 38.2-1315.1, Articles 3.1 (§ 38.2-1316.1 et seq.), 4 (§ 38.2-1317 et seq.) and 5 (§ 38.2-1322 et seq.) of Chapter 13, Articles 1 (§ 38.2-1400 et seq.) and 2 (§ 38.2-1412 et seq.) of Chapter 14, §§ 38.2-1800 through 38.2-1836, 38.2-3401, 38.2-3405, 38.2-3405.1, 38.2-3407.2 through 38.2-3407.6:1, 38.2-3407.9 through 38.2-3407.16, 38.2-3411.2, 38.2-3411.3, 38.2-3411.4, 38.2-3412.1:01, 38.2-3414.1, 38.2-3418.1 through ~~38.2-3418.14~~ *38.2-3418.15*, 38.2-3419.1, 38.2-3430.1 through 38.2-3437, 38.2-3500, subdivision 13 of § 38.2-3503, subdivision 8 of § 38.2-3504, §§ 38.2-3514.1, 38.2-3514.2, 38.2-3522.1 through 38.2-3523.4, 38.2-3525, 38.2-3540.1, 38.2-3542, 38.2-3543.2, Chapter 52 (§ 38.2-5200 et seq.), Chapter 55 (§ 38.2-5500 et seq.), Chapter 58 (§ 38.2-5800 et seq.) and § 38.2-5903 of this title shall be applicable to any health maintenance organization granted a license under this chapter. This chapter shall not apply to an insurer or health services plan licensed and regulated in conformance with the insurance laws or Chapter 42 (§ 38.2-4200 et seq.) of this title except with respect to the activities of its health maintenance organization.

B. Solicitation of enrollees by a licensed health maintenance organization or by its representatives shall not be construed to violate any provisions of law relating to solicitation or advertising by health professionals.

C. A licensed health maintenance organization shall not be deemed to be engaged in the unlawful practice of medicine. All health care providers associated with a health maintenance organization shall be subject to all provisions of law.

D. Notwithstanding the definition of an eligible employee as set forth in § 38.2-3431, a health maintenance organization providing health care plans pursuant to § 38.2-3431 shall not be required to offer coverage to or accept applications from an employee who does not reside within the health maintenance organization's service area.

E. For purposes of applying this section, "insurer" when used in a section cited in subsection A of this section shall be construed to mean and include "health maintenance organizations" unless the section cited clearly applies to health maintenance organizations without such construction.

Appendix C

Evaluation Topic Areas and Criteria for Assessing Proposed Mandated Health Insurance Benefits

Topic Area	Criteria
1. Medical Efficacy	
a. Medical Efficacy of Benefit	The contribution of the benefit to the quality of patient care and the health status of the population, including the results of any clinical research, especially randomized clinical trials, demonstrating the medical efficacy of the treatment or service compared to alternatives or not providing the treatment or service.
b. Medical Effectiveness of Benefit *JLARC Criteria**	The contribution of the benefit to patient health based on how well the intervention works under the usual conditions of clinical practice. Medical effectiveness is not based on testing in a rigid, optimal protocol, but rather a more flexible intervention that is often used in broader populations.
c. Medical Efficacy of Provider	If the legislation seeks to mandate coverage of an additional class of practitioners: 1) The results of any professionally acceptable research, especially randomized clinical trials, demonstrating the medical results achieved by the additional class of practitioners relative to those already covered. 2) The methods of the appropriate professional organization to assure clinical proficiency.
d. Medical Effectiveness of Provider *JLARC Criteria**	The contribution of the practitioner to patient health based on how well the practitioner's interventions work under the usual conditions of clinical practice. Medical effectiveness is not based on testing in a rigid, optimal protocol, but rather more flexible interventions that are often used in broader populations.
2. Social Impact	
a. Utilization of Treatment	The extent to which the treatment or service is generally utilized by a significant portion of the population.
b. Availability of Coverage	The extent to which insurance coverage for the treatment or service is already generally available.
c. Availability of Treatment *JLARC Criteria**	The extent to which the treatment or service is generally available to residents throughout the state.
d. Availability of Treatment Without Coverage	If coverage is not generally available, the extent to which the lack of coverage results in persons being unable to obtain necessary health care treatments.
e. Financial Hardship	If the coverage is not generally available, the extent to which the lack of coverage result in unreasonable financial hardship on those persons needing treatment.
f. Prevalence/Incidence of Condition	The level of public demand for the treatment or service.
g. Demand for Coverage	The level of public demand and the level of demand from providers for individual or group insurance coverage of the treatment or service.

h. Labor Union Coverage	The level of interest of collective bargaining organizations in negotiating privately for inclusion of this coverage in group contracts.
i. State Agency Findings	Any relevant findings of the state health planning agency or the appropriate health system agency relating to the social impact of the mandated benefit.
j. Public Payer Coverage *JLARC Criteria**	The extent to which the benefit is covered by public payers, in particular Medicaid and Medicare.
k. Public Health Impact *JLARC Criteria**	Potential public health impacts of mandating the benefit.
3. Financial Impact	
a. Effect on Cost of Treatment	The extent to which the proposed insurance coverage would increase or decrease the cost or treatment of service over the next five years.
b. Change in Utilization	The extent to which the proposed insurance coverage might increase the appropriate or inappropriate use of the treatment or service.
c. Serves as an Alternative	The extent to which the mandated treatment or service might serve as an alternative for more expensive or less expensive treatment or service.
d. Impact on Providers	The extent to which the insurance coverage may affect the number and types of providers of the mandated treatment or service over the next five years.
e. Administrative and Premium Costs	The extent to which insurance coverage might be expected to increase or decrease the administrative expenses of insurance companies and the premium and administrative expenses of policyholders.
f. Total Cost of Health Care	The impact of coverage on the total cost of health care.
4. Effects of Balancing Medical, Social, and Financial Considerations	
a. Social Need/Consistent with Role of Insurance	The extent to which the benefit addresses a medical or a broader social need and whether it is consistent with the role of health insurance.
b. Need Versus Cost	The extent to which the need for coverage outweighs the costs of mandating the benefit for all policyholders.
c. Mandated Option	The extent to which the need for coverage may be solved by mandating the availability of the coverage as an option for policy holders.

*Denotes additional criteria added by JLARC staff to criteria adopted by the Special Advisory Commission on Mandated Health Insurance Benefits.

Source: Special Advisory Commission on Mandated Health Insurance Benefits and JLARC staff analysis.

Appendix

D NCI Cancer Centers Included by Proposed Mandate

New York
1. Albert Einstein College of Medicine (Bronx)
2. NYU Cancer Institute (New York)
3. Memorial Sloan-Kettering Cancer Center (New York)
4. Herbert Irving Comprehensive Cancer Center (New York)

New Jersey
5. Cancer Institute of New Jersey (New Brunswick)

Pennsylvania
6. Abramson Cancer Center (Philadelphia)

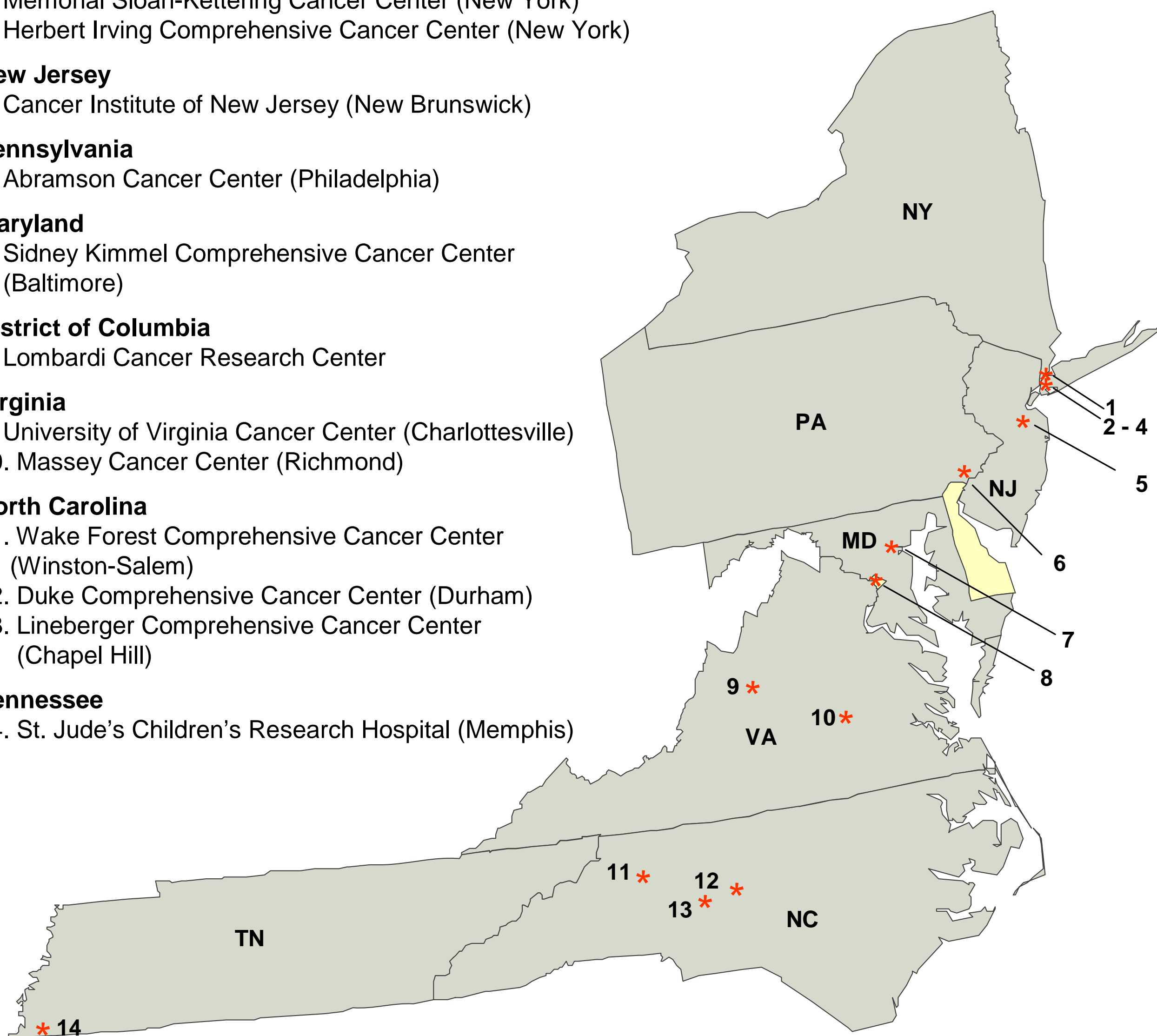
Maryland
7. Sidney Kimmel Comprehensive Cancer Center (Baltimore)

District of Columbia
8. Lombardi Cancer Research Center

Virginia
9. University of Virginia Cancer Center (Charlottesville)
10. Massey Cancer Center (Richmond)

North Carolina
11. Wake Forest Comprehensive Cancer Center (Winston-Salem)
12. Duke Comprehensive Cancer Center (Durham)
13. Lineberger Comprehensive Cancer Center (Chapel Hill)

Tennessee
14. St. Jude's Children's Research Hospital (Memphis)



Source: National Cancer Institute. "NCI-designated Cancer Centers (P30) Cancer Centers Listed by State." Sept. 14, 2006. http://www3.cancer.gov/cancercenters/centerslist.html.

Appendix

E Annotated Bibliography

PEER-REVIEWED RESEARCH

Barker, FG 2nd. (2004). Craniotomy for the resection of metastatic brain tumors in the U.S., 1988-2000: decreasing mortality and the effect of provider caseload. Cancer, 100(5):999-1007.

Methodology: Analysis of data from the Nationwide Inpatient Sample between 1988-2000, specifically of 13,685 patients who underwent craniotomies for resection of metastatic brain tumors. Conclusions: Larger volume centers were found to have lower mortality rates for intracranial metastasis resection. For surgeon caseload, mortality was lower with higher-caseload providers.

Barker FG 2nd, Curry WT Jr, Carter BS. (2005). Surgery for primary supratentorial brain tumors in the United States, 1988 to 2000: the effect of provider caseload and centralization of care. Neuro-Oncology, 7(1):49-63.

Methodology: Analysis of data from the Nationwide Inpatient Sample between 1988-2000, specifically 38,028 patients who underwent biopsy or resection for a suprtentorial primary brain tumor. Conclusions: Large volume locations had lower in-hospital postoperative mortality rates than low volume locations for craniotomies and needle biopsies. .

Birkmeyer NJ, Goodney PP, Stukel TA, Hillner BE, Birkmeyer JD. (2005). Do cancer centers designated by the National Cancer Institute have better surgical outcomes? Cancer, 103(3):435-41.

Methodology: Analysis of data in the national Medicare data base (1994-1999), specifically of 27,021 patients who underwent one of the six procedures reviewed. Conclusions: NCI cancer centers had lower adjusted surgical mortality rates than control hospitals for 4 of the six procedures reviewed. There were no important differences in five -year mortality rates.

Cowan JA Jr, Dimick JB, Leveque JC, Thompson BG, Upchurch GR Jr, Hoff JT. (2003). The impact of provider volume on mortality after intracranial tumor resection. Neurosurgery, 52(1):48-53.

Methodology: Analysis of data in the national Medicare data base for 1996 and 1997, specifically of 7,547 patients older than 19 years who had a diagnosis of a malignant central nervous system neoplasm and underwent craniotomy or craniectomy. Conclusions: Higher volume hospitals and surgeons have superior mortality rates after surgical resection of malignant intracranial tumors.

Long DM, Gordon T, Bowman H, Etzel A, Burleyson G, Betchen S, Garonzik IM, Brem H. (2003). Outcome and cost of craniotomy performed to treat tumors in regional academic referral centers. Neurosurgery, 52(5):1056-63.

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