The Importance of Specialized Centers of Excellence in Neurosurgical Care

Christopher A. Sarkiss, MD
Neurosurgical Oncology Fellow
Department of Neurosurgery
University of Miami Health System
No Disclosures
Introduction

• With recent changes to the healthcare landscape, there has been an increasing rise of the formation of hospital health systems.

• Smaller hospital centers are being incorporated into larger centers both academic and private.

• This has led to rise of specialized centers of excellence programs in various clinical departments across hospital systems.
Outline

• Review my experience with 2 clinical studies that were made possible by specialized centers of excellence

• Review an international paper that demonstrates that specialist trained surgeons have better outcomes than general neurosurgeons in glioma resection

• Understand the importance of specialized centers of excellence
EARLY POST-OPERATIVE (POD#1) DISCHARGE IN PITUITARY ADENOMA PATIENTS
Introduction

- Neoplasms of the sellar/parasellar regions are unique tumors that require distinct diagnostic and treatment considerations.
- Treatment paradigm aided by advances in endoscopic transsphenoidal surgery and neuroimaging.
- Shorter lengths of stay and quicker recoveries.
- Meta-analysis 5.3-8.3 days LOS for microscopic approaches and 3.1-3.7 days LOS for endoscopic
- Some centers have demonstrated a shortened LOS 2.5 days.
- Factors prolong overall LOS including:
  - old age
  - greater than 2 medical risk factors
  - diabetes mellitus
  - lack of employment
Study Design

- Implemented a post-operative day #1 discharge paradigm through detailed pre-operative evaluation and review of both medical and socioeconomic factors.
- This paradigm involves a multidisciplinary approach including contributions from endocrine, neuro-ophthalmology, and ENT.
- We analyze our initial series of POD#1 pituitary patients and their clinical outcome with attention to the global limitations to discharge.
Methods

- The experience of a single neurosurgeon/ENT surgeon team was reviewed

- Comprehensive, retrospective database was generated to identify the first 30 patients who underwent resection of pituitary lesions during the implementation of our POD #1 paradigm.

- Inclusion criteria:
  - any pituitary tumor (secretory or non-secretory)
  - elective admission
  - adult population
  - at least 3 months follow-up
Methods

- Assessed age, gender, tumor characteristics, LOS, complications, detailed neuro-ophthalmologic evaluation, insurance type, 30 day re-admission, and medical comorbidities.

- Additional variables that were also analyzed include post-operative steroid use, antibiotic dosing, and development of central diabetes insipidus (DI; defined as Na>140).

- Statistical analysis via Statistical Analysis System (SAS Institute Inc. Cary, NC) was used to assess the significance of the results.
Algorithm for Safe Discharge on Postoperative Day One

Patient with pituitary mass referred for adenoma evaluation

- Patient deemed non-operative
  - Schedule follow-up as needed

- Patient deemed operative
  - Pre-operative assessment

  - Pre-operative assessment
    - Schedule ENT Appointment

    - Schedule Endocrine Appointment, if not already completed

    - Schedule Neuro-Ophthalmology Appointment, if not already completed

  Neurosurgeon explains endoscopic approach, DII/endocrine function monitoring, visual exam assessment, and expectation of POD1 discharge; social worker involved, if needed, to coordinate post-operative care based on insurance status

  Day of Surgery

  - Both Neurosurgeon/ENT surgeon meet patient in holding area and re-explain procedure

  Pituitary nurse practitioner meets with patient and explains post-operative course

Morning After Surgery

- Visual and endocrine assessments completed; social worker meets with patient to schedule follow-up appointments and ensure proper post-operative and at-home care

Day After Discharge

- Nurse calls patient at home for assessment

- Nurse ensures proper appointments and prescriptions have been obtained
Algorithm for Safe Discharge on Postoperative Day One

Patient with pituitary mass referred for adenoma evaluation

- Patient deemed non-operative
  - Schedule follow-up as needed
- Patient deemed operative
  - Pre-operative assessment*
Algorithm for Safe Discharge on Postoperative Day One (Cont.)

Pre-operative assessment

Schedule ENT Appointment

Schedule Endocrine Appointment, if not already completed

Schedule Neuro-Ophtalmology Appointment, if not already completed

Neurosurgeon explains endoscopic approach, DI/endocrine function monitoring, visual exam assessment, and expectation of POD1 discharge; social worker involved to coordinate post-operative care based on insurance status
Importance of Dual Neurosurgery-ENT Team Approach

- Within our algorithm, all patients undergo preoperative ENT evaluation of sinus anatomy for preparation of surgery, allowing minimal nasal manipulation in order to achieve surgical exposure needed to resect the pituitary pathology. This leads to less postoperative nasal discomfort and pain, which is a significant factor that leads to early discharge.

- A well-structured team with good organization not only increases quality of care but also improves outcomes.

- To build a successful collaboration, time and effort for training as well as institutional support is needed.
Day of Surgery

Both Neurosurgeon/ENT surgeon meet patient in holding area and re-explain procedure

Pituitary NP meets with patient and explains post-operative course

Morning After Surgery

Visual and endocrine assessments completed; social worker meets with patient to schedule follow-up appointments and ensure proper post-operative and at-home care
Algorithm for Safe Discharge on Postoperative Day One (Cont.)

Day After Discharge

Nurse calls patient at home for assessment

Nurse ensures proper appointments and prescriptions have been obtained
<table>
<thead>
<tr>
<th>Table 1: Demographics/Multiple Axes of Patient Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
</tr>
<tr>
<td>Male (n=14):</td>
</tr>
<tr>
<td>Female (n=16):</td>
</tr>
<tr>
<td>Overall (n=30):</td>
</tr>
<tr>
<td><strong>Tumor Type:</strong></td>
</tr>
<tr>
<td>Non-secretory:</td>
</tr>
<tr>
<td>Secretory:</td>
</tr>
<tr>
<td>Growth Hormone:</td>
</tr>
<tr>
<td>Prolactin:</td>
</tr>
<tr>
<td>Gonadotropin-Releasing Hormone:</td>
</tr>
<tr>
<td><strong>Tumor Size:</strong></td>
</tr>
<tr>
<td>Non-secretory (n=22):</td>
</tr>
<tr>
<td>Secretory (n=8):</td>
</tr>
<tr>
<td>Overall (n=30):</td>
</tr>
<tr>
<td>Co-Morbidities</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Diabetes Mellitus:</td>
</tr>
<tr>
<td>Hypertension:</td>
</tr>
<tr>
<td>Hyperlipidemia:</td>
</tr>
<tr>
<td>Obesity (BMI&gt;30):</td>
</tr>
<tr>
<td>Cardiac disease:</td>
</tr>
</tbody>
</table>

| Length of Stay:                              | 1.5 +/- 0.7 days |

<table>
<thead>
<tr>
<th>Insurance Status:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Public:</td>
<td>15</td>
</tr>
<tr>
<td>Private:</td>
<td>15</td>
</tr>
</tbody>
</table>

| Diabetes Insipidus (Na>145):                 | 4/30 (transient), 0/30 (permanent) |
| Pre-Existing Sinus Disease:                  | 12/30 |
| Post-Op Steroids:                            | 28/30 |
| 30-Day Readmission:                          | 1 (SIADH) |
Insurance Status

- Private: 50%
- Public: 50%
Medical Co-Morbidities

Abbreviations: Cerebrovascular Disease (CVD), Diabetes Mellitus (DM), Hyperlipidemia (HLD), Hypertension (HTN)
### Table 2: Factors Leading to LOS > 1 day

<table>
<thead>
<tr>
<th>Reason</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Stay (LOS) &gt; 1 Day</td>
<td>12 Patients</td>
</tr>
<tr>
<td><strong>Reasons:</strong></td>
<td></td>
</tr>
<tr>
<td>Insurance/Social Disposition</td>
<td>8</td>
</tr>
<tr>
<td>Two or more medical comorbidities</td>
<td>5</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>3</td>
</tr>
<tr>
<td>Polyuria/Polydipsia or Concern for Diabetes Insipidus</td>
<td>3</td>
</tr>
<tr>
<td>Panhypopituitarism</td>
<td>2</td>
</tr>
<tr>
<td>Age &gt;70</td>
<td>2</td>
</tr>
<tr>
<td>Hyponatremia</td>
<td>1</td>
</tr>
<tr>
<td>Other (i.e. nausea, vomiting, rhinorrhea, blurry vision)</td>
<td>1</td>
</tr>
</tbody>
</table>
Results

- Factors that contributed to length of stay greater than one day included:
  - diabetes mellitus
  - pan hypopituitarism
  - poor visual acuity
  - diabetes insipidus
  - public insurance status

- The most significant correlative factor to their delay in discharge was their socioeconomic disposition and not medical or surgical status
Limitations

- Limited pilot study; statistical analysis may therefore be anecdotal.
- However, within data set, clear trends were observed and consistent relative to many other varied parameters.
- The detail of the clinical parameters analyzed that gives our study some validity.
- Among these thirty patients, Cushing’s disease was not noted.
- Therefore, testing of this protocol in such patients was not undertaken. However, we believe that close collaboration with endocrinology and monitoring of cortisol levels with proper replacement dosing can lead to the implementation of our protocol in Cushing’s disease as well.
Study Conclusions

- The implementation of a POD#1 discharge plan for pituitary tumors is feasible and safe for elective patients.
- No increased morbidities or follow-up complications are encountered.
- The thorough evaluation by a multi-disciplinary team enables identification of appropriate risk factors, which can almost all be addressed.

- Interestingly, the consistent limitation to early discharge was their socioeconomic status.
- Therefore efforts that incorporate analysis of social disposition parameters, such as insurance status, with proper management of clinical sequelae are crucial to maintenance of ideal length of stay and optimal patient outcomes.
- In the growing model of quality assessment and healthcare cost analysis, we believe that socioeconomic factors will become even more relevant for improved patient outcomes.
Day of Surgery Impacts Outcome: Rehabilitation Utilization on Hospital Length of Stay in Patients Undergoing Elective Meningioma Resection
Introduction

• Meningiomas account for 1/3 of all brain tumors (35.8%) in US. In high-volume medical centers, the average (LOS) for a patient is 6.8 days vs. 8.8 days in low volume centers with median total admission charges equaling approximately $55,000.

• Following hospital discharge from meningioma surgery, 67% of patients released to home or self-care, 21.5% to a skilled nursing facility, and 9.2% to home health care.

• Few studies have evaluated day of surgery and its effect on hospital LOS.

• Early commencement of rehabilitation has been shown to improve the functional outcome for patients with brain tumors.

• The primary goal of this study was to analyze patient outcome as a direct result of surgical date, as well as to characterize the individual variables that may impact their hospital course, early access to rehab, and long-term functional status.
Methods

• Retrospective database generated for cranial meningioma patients who underwent elective surgical resection at Mount Sinai over a 3-year study period (2011-2014), IRB (HS#: 14-00698/GCO#: 14-1492)

• Inclusion criteria: underwent elective meningioma resection and discharged either home or to a rehab facility with at least six months follow-up.

• Exclusion criteria: not discharged after resection, i.e. expired.

• Each patient's medical record was evaluated for basic demographics, including age, gender, medical co-morbidities, date of surgery, LOS, PT recommendations

• Tumor profile, insurance status, post-operative complications, functional status, and 30-day readmission rates were noted.

• Given that patients who undergo surgical resection of meningiomas have a national median LOS of 6 days, we subdivided the patients into two cohorts: early discharge (LOS<3) and late discharge (LOS≥3).

• Statistical analysis was performed using SPSS 21.0 to assess the significance of the results.
Results

• 139 (114 female, 25 male) meningioma patients met inclusion criteria during the 3-year study period.
• 70 of these patients had surgery during the early week (defined as Monday, Tuesday, Wednesday)
• 69 had surgery in the later week (Thursday, Friday)
• Median age for both early and late groups was 58 years.
• Median diameter of the tumor was 3.1 cm and 3.3 cm, respectively.
<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Early (N=70)</th>
<th>Late (N=69)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex - no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>55 (79)</td>
<td>59 (86)</td>
<td>0.378</td>
</tr>
<tr>
<td>Male</td>
<td>15 (21)</td>
<td>10 (15)</td>
<td></td>
</tr>
<tr>
<td>Age – median (IQR)</td>
<td>58 (46-66)</td>
<td>58 (48-70)</td>
<td>0.476</td>
</tr>
<tr>
<td>Diabetes - no. (%)</td>
<td>14 (20)</td>
<td>13 (19)</td>
<td>0.863</td>
</tr>
<tr>
<td>Hypertension - no. (%)</td>
<td>26 (37)</td>
<td>30 (44)</td>
<td>0.492</td>
</tr>
<tr>
<td>Hyperlipidemia - no. (%)</td>
<td>21 (30)</td>
<td>17 (25)</td>
<td>0.569</td>
</tr>
<tr>
<td>Cardiac disease - no. (%)</td>
<td>5 (7)</td>
<td>6 (9)</td>
<td>0.764</td>
</tr>
<tr>
<td>Obesity (BMI&gt;30) - no. (%)</td>
<td>16 (23)</td>
<td>11 (16)</td>
<td>0.392</td>
</tr>
<tr>
<td>Prior CVA - no. (%)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>0.496</td>
</tr>
<tr>
<td>Insurance - no. (%)</td>
<td></td>
<td></td>
<td>0.931</td>
</tr>
<tr>
<td>None</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>38 (54)</td>
<td>39 (57)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>31 (44)</td>
<td>29 (42)</td>
<td></td>
</tr>
<tr>
<td>Size – median max diameter, cm. (IQR)</td>
<td>3.1 (2.5-4.8)</td>
<td>3.3 (2.5-4.1)</td>
<td>0.659</td>
</tr>
<tr>
<td>Midline shift – no. (%)</td>
<td>19 (27)</td>
<td>12 (17)</td>
<td>0.222</td>
</tr>
<tr>
<td>Pre-operative functional limitation – no. (%)</td>
<td>8 (11)</td>
<td>8 (12)</td>
<td>0.976</td>
</tr>
</tbody>
</table>
Table 2: Univariate Analysis of Post-Operative Variables of Early versus Late Meningioma Patients*

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Early (N=70)</th>
<th>Late (N=69)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical therapy recommendation - no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>52 (74)</td>
<td>40 (58)</td>
<td>0.042</td>
</tr>
<tr>
<td>Acute rehab</td>
<td>18 (26)</td>
<td>29 (42)</td>
<td></td>
</tr>
<tr>
<td>Post-operative functional deficit - no. (%)</td>
<td></td>
<td></td>
<td>0.450</td>
</tr>
<tr>
<td></td>
<td>7 (10)</td>
<td>10 (15)</td>
<td></td>
</tr>
<tr>
<td>Post-operative Complications- no. (%)</td>
<td></td>
<td></td>
<td>0.441</td>
</tr>
<tr>
<td></td>
<td>5 (7)</td>
<td>2 (3)</td>
<td></td>
</tr>
<tr>
<td>Length of stay – median (IQR)</td>
<td></td>
<td></td>
<td>0.148</td>
</tr>
<tr>
<td></td>
<td>3 (2-5)</td>
<td>4 (3-5)</td>
<td></td>
</tr>
<tr>
<td>Length of stay over 3 days - no. (%)</td>
<td></td>
<td></td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>29 (41)</td>
<td>41 (59)</td>
<td></td>
</tr>
</tbody>
</table>

*Significant p-value in bold and italics
Figure 1: Physical Therapy (PT) Recommendations for Early versus Late Week Meningioma Resection Patients

- Early (n=70)
- Late (n=69)

\[ P = 0.042; \text{ Mann-Whitney} \]
Figure 2: Analysis of LOS <3 days or 3 days for Early versus Late Week Patients
This effect is driven by the high percentage of late surgery AR patients who have >3 days LOS.
Why?

- Patients with resection earlier in the week (Monday-Wednesday) compared to later in the week (Thursday-Friday) have an overall shorter LOS and a greater chance of being discharged to home vs. rehab.

- **Hypothesis:** We believe that this is predominantly due to earlier access to physical therapy and social work consults. Those patients that need acute rehab after discharge are able to find accepting facilities faster if their surgery is earlier in the week.
Rehab/Social Work Services

• Following neurosurgery, patients receive inpatient interdisciplinary rehabilitation from several teams including:
  • Speech & occupational therapy
  • PT/rehabilitation therapy
  • Recreational therapy
  • Social workers
  • Rehabilitation nursing
  • Case management

• This then allows a proper assessment of the patients’ clinical function and subsequent need for acute rehabilitation.

• Patients who have surgery earlier in the week are able to access these inpatient services earlier with less interference of the weekend, and therefore convalesce faster having less of a requirement for post-hospital inpatient rehabilitation.
Limitations

• One of the major limitations in this study was its retrospective nature, and the inherent limitations that come with such a study.

• These results are likely only generalizable to those hospital centers that have limited weekend ancillary services.

• While we believe that this may be the case for the majority of centers in the United States, these findings may not apply to those hospitals that have full weekend coverage of such services.

• These results may not fully apply to those patients admitted for emergent surgery and/or have large tumors with extensive edema causing major neurological symptoms.
Further Limitations

• Another factor that may play a role: differences in surgeons operating on different days of the week

• In present study, the 3 surgeons who operated on the majority of the patients in our dataset had 1 scheduled operating day in both early and late groups

• Other intraoperative/perioperative factors such as time of surgery, surgical approach, use of neuronavigation, intraoperative blood loss, and postoperative blood transfusion may present a statistical bias and warrant further prospective studies
• Day of surgery may play a significant role in LOS for meningioma patients.

• Clinicians should remain aware of those factors that may delay optimal patient discharge and early access to rehabilitation facilities.

• Arranging surgeon block time with these results in mind may impact LOS and hospital costs.

• Further studies will need to be performed to assess the social variables that may affect LOS, as well as the financial implications for such extended hospital courses.
Treatment by specialist surgical neurooncologists improves survival times for patients with malignant glioma

Ursalan A. Khan, MB, ChB, MRes, Amar Bhavsar, MBBS, BSc, Hasan Asif, Konstantina Karabatsou, FRCS(SN), James R. S. Leggate, FRCS, Ajit Sofat, FRCS(SN), and Ian D. Kamaly-Asl, MD, MBChB, FRCS(SN)

1Department of Neurosurgery, Greater Manchester Neurosciences Centre, Salford Royal Hospital, Salford; and 2Faculty of Medicine, Imperial College London, London, United Kingdom

OBJECT Surgeries for CNS tumors are frequently performed by general neurosurgeons and by those who specialize in surgical neurooncology. Subspecialization in neurosurgical practice has become common and may improve patient morbidity and mortality rates. However, the potential benefits for patients of having their surgeries performed by surgical neurooncologists remain unclear. Recently, a shift in patient care to those who practice predominantly surgical neurooncology has been lacking and therefore requires fundamental investigation.

METHODS The authors conducted a case-control study of neurooncology patients who underwent surgery for glioblastoma and anaplastic astrocytoma during 2006–2009. Outcomes were compared for patients whose surgery was performed by general neurosurgeons (generalists) or by specialist neurooncology neurosurgeons (specialists). An electronic record database and a picture archiving and communication system were used to collect data and assess the extent of tumor resection. Mortality rates and survival times were compared. Patient comorbidity and postoperative morbidity were assessed by using the Waterlow, patient handling, and falls risk assessment scores. Effects of case mix were adjusted for by using Cox regression and a hazards model.

RESULTS Outcomes for 135 patients (65 treated by generalists and 70 by specialists) were analyzed. Survival times were longer for patients whose surgery was performed by specialists (p = 0.026) and after correction for case mix (p = 0.019). Extent of tumor resection was greater when performed by specialists (p = 0.005) and correlated with increased survival times (p = 0.004). There was a trend toward reduced surgical deaths when surgery was performed by specialists (2.8%) versus generalists (7%) (p = 0.102), and inpatient stays were significantly shorter when surgery was performed by specialists (p = 0.008).

CONCLUSIONS The prognosis for glioblastoma multiforme remains dire, and improved treatments are urgently needed. This study provides evidence for a survival benefit when surgery is performed by specialist neurooncology neurosurgeons. The benefit might be attributable to increased tumor resection. Furthermore, specialist neurooncology surgical care may reduce the number of surgical patient deaths and length of inpatient stay. These findings support the recommendations for subspecialization within surgical neurooncology and advocate for care of these patients by specialists.

http://thejns.org/doi/abs/10.3171/2014.10.JNS132057

KEYWORDS glioma; glioblastoma multiforme; subspecialization; neurooncology; oncology
Methods

- Case-control study of neurooncology patients who underwent surgery for supratentorial glioblastoma and anaplastic astrocytoma during 2006–2009 were studied
- Outcomes were compared for patients whose surgery was performed by general neurosurgeons (generalists) or by specialist neurooncology neurosurgeons (specialists)
- Assessed the extent of tumor resection
- Morbidity & Mortality rates and survival times as well as LOS compared
Results

- Outcomes for 135 surgical patients (65 treated by generalists and 70 by specialists) were analyzed.
- Survival times were longer for patients whose surgery was performed by specialists ($p = 0.026$) and after correction for case mix ($p = 0.019$).
- Extent of tumor resection was greater when performed by specialists ($p = 0.005$) and correlated with increased survival times ($p = 0.004$).
- There was a trend toward reduced surgical deaths when surgery was performed by specialists (2.8%) versus generalists (7%) ($p = 0.102$)
- Inpatient stays were significantly shorter when surgery was performed by specialists ($p = 0.008$).
<table>
<thead>
<tr>
<th>Confounding variable</th>
<th>Surgery Performed by Generalist</th>
<th>Surgery Performed by Specialist</th>
<th>Statistical Test</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor histology (GBM/other)</td>
<td>63/7</td>
<td>53/12</td>
<td>Fisher exact</td>
<td>0.122</td>
</tr>
<tr>
<td>Chemotherapy (yes/no)</td>
<td>34/36</td>
<td>36/29</td>
<td>Chi-square</td>
<td>0.268</td>
</tr>
<tr>
<td>Radiotherapy (yes/no)</td>
<td>52/18</td>
<td>55/10</td>
<td>Chi-square</td>
<td>0.102</td>
</tr>
<tr>
<td>Mean performance status score</td>
<td>51</td>
<td>45</td>
<td>Student t</td>
<td>0.807</td>
</tr>
<tr>
<td>Mean age (yrs)</td>
<td>57</td>
<td>54</td>
<td>Student t</td>
<td>0.07</td>
</tr>
<tr>
<td>Mean seizure score</td>
<td>63.1</td>
<td>62.8</td>
<td>Student t</td>
<td>0.947</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median survival time (days)</td>
<td>196</td>
<td>290</td>
<td>Log-rank</td>
<td>0.026</td>
</tr>
<tr>
<td>Extent of resection (total/subtotal)</td>
<td>12/58</td>
<td>25/40</td>
<td>Chi-square</td>
<td>0.005</td>
</tr>
<tr>
<td>Mean length of stay (days)</td>
<td>9</td>
<td>5</td>
<td>Student t</td>
<td>0.008</td>
</tr>
<tr>
<td>No. of deaths w/in 30 days</td>
<td>10</td>
<td>4</td>
<td>Chi-square</td>
<td>0.122</td>
</tr>
</tbody>
</table>
FIG. 1. Kaplan-Meier survival curves comparing survival after total resection of a malignant supratentorial glioma with survival after subtotal resection and biopsy.

FIG. 2. Kaplan-Meier survival curves showing longer survival after surgical intervention for malignant supratentorial glioma performed by specialist surgical neurooncologists than by general neurosurgeons.
FIG. 3. Box plot with error bars showing shorter inpatient stays after surgical intervention for malignant supratentorial glioma performed by specialist surgical neurooncologists than by general neurosurgeons.
Limitations

- Single-center experience
- Retrospective, non-randomized subject to selection bias; however bias was limited because they corrected for case mix effects by using a multivariate regression model
- Randomization agreement by patient to specialist vs generalist would be difficult
Study Conclusions

- Provides evidence for a survival benefit when surgery performed by specialist neurooncology neurosurgeons.
- Benefit might be attributable to increased tumor resection.
- Specialist neurooncology surgical care may reduce the number of surgical patient deaths and LOS.
- Multidisciplinary neurooncology team facilitates interaction with the whole team caring for patients with brain tumors, including oncologists, radiologists, and specialist nurses, enabling more timely interventions during the many steps in the treatment pathway of patients with CNS tumors.
- These findings support the recommendations for subspecialization within surgical neurooncology and advocate for care of these patients by specialists.
Importance of Specialized Centers of Excellence

1. provide comprehensive care and support to patients with neurological disorders
2. provide residency/fellowship training
3. contribute to research

Pituitary Centers of Excellence

Pituitary tumors and associated neuroendocrine disorders pose significant challenges in diagnostic and therapeutic management. Optimal care of the “pituitary patient” is best provided in a multidisciplinary collaborative environment that includes not only experienced pituitary practitioners in neurosurgery and endocrinology, but also in otorhinolaryngological surgery, radiation oncology, medical oncology, neuro-ophthalmology, diagnostic and interventional neuroradiology, and neuropathology. We provide the background and rationale for recognizing pituitary centers of excellence and suggest a voluntary verification process, similar to that used by the American College of Surgeons for Trauma Center verification. We propose that pituitary centers of excellence should fulfill 3 key missions: (1) provide comprehensive care and support to patients with pituitary disorders; (2) provide residency training, fellowship training, and/or continuing medical education in the management of pituitary and neuroendocrine disease; and (3) contribute to research in pituitary disorders. As this is a preliminary proposal, we recognize several issues that warrant further consideration including center and surgeon practice volume as well as oversight of the verification process.

KEY WORDS: Center of excellence, Endonasal endoscopic surgery, Multidisciplinary treatment, Pituitary adenoma, Transphenoidal surgery, Training
Importance of Specialized Centers of Excellence: Hospital Cost

- With utilization of quality assessment and healthcare cost analysis, socioeconomic factors more relevant for improved patient outcomes.

- Subspecialized surgical care incorporating a tested algorithm for treatment of specific pathology helps increase quality and lower costs.

- Studies show increased costs associated with low-volume centers and small hospitals compared to high-volume centers and large hospitals.

**Figure.** The multispecialty pituitary center of excellence.
Importance of Specialized Centers of Excellence: Hospital Cost

- Studies have established LOS as the most significant factor influencing hospital costs.

- As an example, surveys have shown that the average neurosurgeon only performs 4.45 pituitary tumor surgeries per year.

- To maximize optimal outcomes, regionalization of care to centers specializing in high-volume cases for various pathologies.
Conclusions

- Specialized centers of excellence allow for regionalization of care with high volume surgeons treating specific pathologies.

- Within a hospital system, one hospital can be known as center of excellence for one specific pathology and another hospital within same system can be known for a different pathology.

- This then allows for centralized centers for education and research.

- Studies have shown that such specialized centers lead to better patient outcomes, lower costs, greater patient satisfaction, and improved overall care.
THANK YOU!

- Dr. Joshua Bederson
- Dr. Kalmon Post
- Dr. Raj Shrivastava
- Dr. Satish Govindaraj
- Dr. Errol Gordon

- Dr. Ricardo Komotar
- Dr. Michael Ivan