Neurosurgery focuses on the central, peripheral and autonomic nervous systems. Practitioners diagnose problems through physical examination with the aid of such tools as MRI, CT scans and laboratory tests and frequently provide surgical treatment. Neurosurgery includes management of diseases of the skull, the brain, the pituitary and the spinal cord. Management of head and spinal injuries is a major challenge. As many head injuries and acute intracranial emergencies occur in off-hours, this is not a specialty for those who value lifestyle. It is, however, a very challenging and rewarding career.

Neurosurgery as a discipline arose as a result of an increasing need for special expertise in the surgical and non-surgical treatment of various diseases affecting the nervous system and supporting structures. Therefore, it involves the ability to diagnose, and the technical expertise for the effective surgical treatment of congenital and acquired abnormalities. It also requires expertise in trauma and diseases affecting the nervous system that can be potentially prevented, alleviated or cured.
This specialty requires the physician to be well-grounded in the principles of both neurosurgery and surgery in general. Thus, the fully-trained resident must demonstrate proficiency and expertise in the:

- care of neurosurgical emergencies;
- principles of pre- and post-operative general surgical care;
- treatment of deep vein thrombosis;
- management of fluid and electrolyte disturbances;
- treatment of sepsis, the use of antibiotic therapy and an understanding of the implications of antibiotic prophylaxis;
- understanding of vascular shock and its treatment;
- an understanding of the diagnostic importance of disordered blood gas analyses and their treatment;
- acute, subacute and chronic management of parenteral nutritional support.

A neurosurgical resident must have knowledge, clinical ability and surgical skill as these apply to surgical diseases of the nervous system. They must have familiarity with, and knowledge of, the related disciplines of basic neuroscience, neurology, neuropathology, neuroimaging and neuropsychology.
Neurosurgical residents must also demonstrate a detailed knowledge of the normal structure and function of the nervous system and of the pathological processes that unbalance it. They must develop learning strategies to enhance their knowledge and expertise so as to maintain excellent and current standards of care. Interprofessional skills are imperative as they must become effective neurosurgical consultants with respect to patient care, education of colleagues and the provision of medical legal opinions. Finally, and most importantly, the neurosurgical resident is expected to demonstrate unequivocal high moral and ethical behaviour.

Upon completion of medical school, it takes an additional six years of Royal College-approved training to become certified in neurosurgery. This period must include: 2 years of core training in surgery and 3 years of Royal College-approved resident training in neurosurgery. Up to six months of this period may be spent in pediatric neurosurgery. It also requires 1 year of training that must include 3 months of residency in neurology, 3 months of residency in neuropathology, and 3 months of residency in neuroimaging.

For further details on training requirements go to:  
http://www.royalcollege.ca/portal/page/portal/rc/credentials/start/routes/traditional_route

Canadian Neurological Sciences Federation  
## Number of physicians and physicians/100,000 population in Neurosurgery in Canada, 2015

<table>
<thead>
<tr>
<th>Province/Territory</th>
<th>Physicians</th>
<th>Phys/100k pop'n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland/Labrador</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>8</td>
<td>0.8</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>10</td>
<td>1.3</td>
</tr>
<tr>
<td>Quebec</td>
<td>76</td>
<td>0.9</td>
</tr>
<tr>
<td>Ontario</td>
<td>110</td>
<td>0.8</td>
</tr>
<tr>
<td>Manitoba</td>
<td>12</td>
<td>0.9</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>10</td>
<td>0.9</td>
</tr>
<tr>
<td>Alberta</td>
<td>40</td>
<td>1.0</td>
</tr>
<tr>
<td>British Columbia</td>
<td>45</td>
<td>1.0</td>
</tr>
<tr>
<td>Territories</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>CANADA</strong></td>
<td><strong>314</strong></td>
<td><strong>0.9</strong></td>
</tr>
</tbody>
</table>

Source: 2015 CMA Masterfile
Physicians/100,000 population in Neurosurgery in Canada, 1995 to 2015

Source: CMA Masterfile
Neurosurgeons by gender and year in Canada, 1995 to 2015

Source: CMA Masterfile
Neurosurgeons by age and gender in Canada, 2015

Gender
- Male: 90%
- Female: 10%

Age Group
- 35 - 44: 30%
- 45 - 54: 28%
- 55 - 64: 21%
- 65 and over: 17%
- 34 and under: 4%

Source: 2015 CMA Masterfile
# Neurosurgeons in Canada by age and gender, 2015

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 and Under</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>35-44</td>
<td>9</td>
<td>73</td>
</tr>
<tr>
<td>45-54</td>
<td>2</td>
<td>61</td>
</tr>
<tr>
<td>55-64</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>65 and over</td>
<td>0</td>
<td>50</td>
</tr>
</tbody>
</table>

- **Female**
- **Male**

Source: 2015 CMA Masterfile
Main work setting of **Neurosurgeons** in Canada, 2014

- **Academic Health Sciences Centre**: 57%
- **Private Office/Clinic**: 16%
- **Non-AHSC Teaching Hospital**: 9%
- **Community Hospital**: 6%
- **Free-standing Lab/Diag Clinic**: 5%
- **Other**: 3%
- **Nursing home/long term care facility/seniors’ residence**: 3%

Source: 2014 National Physician Survey. CFPC, CMA, Royal College
Practice organization for **Neurosurgeons** in Canada, 2014

Source: 2014 National Physician Survey. CFPC, CMA, Royal College
### Hours worked per week (excluding on-call) by Neurosurgeons in Canada, 2014

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours worked per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct patient care without teaching component</td>
<td>15.7</td>
</tr>
<tr>
<td>Direct patient care with teaching component</td>
<td>13.4</td>
</tr>
<tr>
<td>Teaching without patient care</td>
<td>3.8</td>
</tr>
<tr>
<td>Indirect patient care</td>
<td>5.5</td>
</tr>
<tr>
<td>Health facility committees</td>
<td>1.2</td>
</tr>
<tr>
<td>Administration</td>
<td>2.6</td>
</tr>
<tr>
<td>Research</td>
<td>4.8</td>
</tr>
<tr>
<td>Managing practice</td>
<td>1.8</td>
</tr>
<tr>
<td>Continued professional development</td>
<td>2.3</td>
</tr>
<tr>
<td>Other</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>TOTAL HOURS PER WEEK</strong></td>
<td><strong>51.5</strong></td>
</tr>
</tbody>
</table>

Source: 2014 National Physician Survey. CFPC, CMA, Royal College
On-call duty hours spent per month by **Neurosurgeons** in Canada, 2014

- **28%** spent up to 120 hours/month
- **36%** spent more than 120, up to 180 hours/month
- **23%** spent more than 180, up to 240 hours/month
- **11%** spent more than 240 hours/month
- **2%** had no response

Time spent on call in direct patient care = 56 hrs./month

Source: 2014 National Physician Survey. CFPC, CMA, Royal College
Remuneration for **Neurosurgeons** in Canada

**Primary payment method**\(^1\) in 2013

- 40% 90% + salary
- 23% 90% + fee-for-service
- 19% 90% + other *
- 12% Blended
- 7% NR

* Other includes capitation, sessional, contract and other methods

---

Average gross clinical earnings for Neurosurgeons in 2013/14 (those earning at least $60,000) = $415,051\(^2\)

Average percent overhead reported by all surgeons in 2010 = 28.4\(^3\)

---

1 National Physician Survey, 2013, CFPC, CMA, Royal College
2 National Physician Database, 2013/14, CIHI
3 National Physician Survey, 2010, CFPC, CMA, Royal College
Satisfaction among **Neurosurgeons** in Canada, 2013

- **Balance of personal & professional commitments**
  - Very dissatisfied: 8%
  - Dissatisfied: 7%
  - Neutral: 27%
  - Satisfied: 16%
  - Very satisfied: 39%
  - NR: 3%

- **Current professional life**
  - Very dissatisfied: 7%
  - Dissatisfied: 8%
  - Neutral: 10%
  - Satisfied: 40%
  - Very satisfied: 23%

Source: 2013 National Physician Survey. CFPC, CMA, Royal College
Neurosurgeons who are Royal College, CFPC or CMQ certified in Canada, 2014

Note: Subset of those who reported a certification. Physicians could indicate more than one certification body.

Source: 2014 National Physician Survey. CFPC, CMA, Royal College
Number of **Neurosurgeons** who retired during the **THREE year period of 2012 to 2014**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>65 +</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Source: CMA Masterfile – year over year comparisons

Note: “Retired” is based on giving up licence and is therefore excludes those who have retired from clinical practice but are still licensed; it includes physicians who have temporarily given up their licence but may return to practice at a later date.
### Total and Ministry funded postgraduate MD trainees in 2014/15 – Neurosurgery

<table>
<thead>
<tr>
<th>Faculty of Medicine</th>
<th>Ministry funded</th>
<th>Total</th>
<th>Faculty of Medicine</th>
<th>Ministry funded</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memorial U N&amp;L</td>
<td>0</td>
<td>0</td>
<td>McMaster U</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Dalhousie U</td>
<td>6</td>
<td>9</td>
<td>UWO</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>U Laval</td>
<td>5</td>
<td>6</td>
<td>NOSM</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>U Sherbrooke</td>
<td>5</td>
<td>7</td>
<td>U Manitoba</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>U Montréal</td>
<td>8</td>
<td>13</td>
<td>U Sask</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>McGill U</td>
<td>4</td>
<td>16</td>
<td>U Alberta</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>U Ottawa</td>
<td>6</td>
<td>16</td>
<td>U Calgary</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Queens U</td>
<td>0</td>
<td>0</td>
<td>UBC</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>U Toronto</td>
<td>26</td>
<td>62</td>
<td>Canada</td>
<td>114</td>
<td>210</td>
</tr>
</tbody>
</table>

Source: 2014/15 Annual Census of Post-MD Trainees, CAPER
First year and exiting postgraduate-MD trainees in 2014/15 – Neurosurgery

- First year
  - Female: 4
  - Male: 15
- Exits from postgrad
  - Female: 5
  - Male: 14

- First year
  - IMG: 14
  - GCMS: 14
- Postgrad exits
  - IMG: 5
  - GCMS: 14

Source: 2014/15 Annual Census of Post-MD Trainees, CAPER

IMG – International Medical Graduates
GCMS – Graduates of Canadian Medical Schools
Postgraduate-MD trainees in 2014/15 – Neurosurgery

• Total of 19 first year Neurosurgery trainees representing 17% of all Neurosurgery trainees.

• Total of 114 Neurosurgery trainees representing 1% of all Ministry funded trainees.

• Total of 75 visa trainees in Neurosurgery.

• Total of 19 Neurosurgery trainees completed postgraduate training in 2014.

Source: 2014/15 Annual Census of Post-MD Trainees, CAPER
Location of 2013 Postgraduate-MD exits in 2015 – Neurosurgery

Of the 23 exits in 2013, 13 (57%) were known to be practising in Canada

Source: 2014/15 Annual Census of Post-MD Trainees, CAPER
<table>
<thead>
<tr>
<th></th>
<th>Not stressful</th>
<th>Somewhat stressful</th>
<th>Very stressful</th>
<th>NR/NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FM resident</strong></td>
<td>43%</td>
<td>42%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Other spec res</strong></td>
<td>20%</td>
<td>50%</td>
<td>25%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: 2012 National Physician Survey of residents. CFPC, CMA, Royal College
Links to the organizations supplying information for this document

National Physician Survey
http://www.nationalphysiciansurvey.ca

Canadian Medical Association
http://www.cma.ca/pdc

Association of Faculties of Medicine of Canada
http://www.caper.ca/

Royal College of Physicians and Surgeons of Canada
http://www.royalcollege.ca/portal/page/portal/rc/credentials/start/routes/traditional_route

College of Family Physicians of Canada
http://www.cfpc.ca

Canadian Institute for Health Information
http://www.cihi.ca