



# Isolated Head Trauma

## Neurosurgery Consultation Referral Guidelines

**Legend:**

- Next Morning Referral
- Emergent/Urgent
- Life or Limb

### Clinical Presentation

- GCS = 15
- AND** evidence of:
  - No visible skull fracture
  - No neurological deficit

- GCS = 14-15
- AND** evidence of one or more of:
  - Open skull fracture
  - Mild focal neurological deficit
    - With/without headache

- GCS ≤ 13
- AND** evidence of one or more of:
  - Penetrating head injury
  - Rapid onset, progressive neurological deterioration

*If no CT/MR scan services available but significant neurological deficit (GCS <12), seek consultation through CritiCall Ontario prior to arranging for transfer for CT/MR imaging.*

### Imaging: Abnormal CT/MRI Findings

*CT/MRI images should be interpreted by the local radiologist prior to seeking neurosurgical consultation via CritiCall Ontario, unless the hospital does not have CT/MRI services.*

**AND** evidence of one or more of:

- Chronic subdural hematoma
- Closed, linear skull fracture

**AND** evidence of one or more of:

- Intracerebral hemorrhage
- Acute subdural hematoma
- Epidural hematoma
- Brain contusion
- Chronic subdural hematoma
- Confirmation of skull fracture
- Diffuse brain injury (i.e., brain swelling, cisternal or sulcul obliteration)

**AND** evidence of one or more of:

- Intracerebral hematoma
- Acute subdural hematoma
- Epidural hematoma
- Brain contusion
- Diffuse brain injury (i.e., brain swelling, cisternal or sulcul obliteration)

### Referral Directive

Next Morning Referral

Emergent/Urgent

Life or Limb

CONSULT WITH NEUROSURGEON NEXT MORNING (7 AM)\*\*

CALL CRITICALL ONTARIO 1-800-668-4357

\*\* Local arrangements can be made to determine the preferred time to consult with a neurosurgeon for Next Morning Referrals.



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### Disease Specific Management

**ISOLATED HEAD TRAUMA:**

- Give Dilantin 15-20 mg/kg if documented seizure or GCS ≤ 8.
- Give Mannitol 1.5g/kg for suspected raised ICP.
- Do not use steroids for raised ICP.
- Assume C-Spine injury and maintain spine precautions.
- If penetrating object, stabilize but do not remove.



# Brain Tumours

## Neurosurgery Consultation Referral Guidelines

**Legend:**

- Next Morning Referral
- Emergent/Urgent
- Life or Limb

### Clinical Presentation

- GCS = 15
- AND** evidence of one or more of :
  - With/without headache
  - Medically controlled seizures
  - Mild or no focal neurological deficit

- GCS = 14\*-15
- AND** evidence of one or more of:
  - With/without headache
  - Progressive focal neurological deficit (cranial nerve or motor deficit)
  - Multiple and/or uncontrolled seizures
  - Not fully recovering, postictal
  - Indications of raised intracranial pressure (nausea, vomiting, and headache)
- \* With the exception of mild confusion due to existing dementia or a focal deficit related to the lesion (e.g., dysphasia)

- GCS ≤ 13
- AND** evidence of one or more of:
  - With/without headache
  - Uncontrolled seizures
  - Severe and/or progressive focal neurological deficit (e.g., motor weakness that is stable or very slowly progressive)
  - Signs of raised ICP (e.g., headache with nausea and vomiting and/or bradycardia)
  - Clinical evidence of herniation
    - Consider patient for transfer if clinical evidence of herniation

### Imaging: Abnormal CT/MRI Findings

CT/MRI images should be interpreted by the local radiologist prior to seeking neurosurgical consultation via CritiCall Ontario, unless the hospital does not have CT/MRI services.

- Evidence of tumor/neoplasm
- NB: May be incidental findings for other investigations

- Evidence of tumor/neoplasm

- Evidence of tumor/neoplasm
- AND** evidence of one or more of:
  - Obstructive hydrocephalus
  - Intratumoural hemorrhage

### Referral Directive

Next Morning Referral

Emergent/Urgent

Life or Limb

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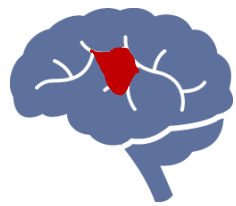
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### Disease Specific Management

- BRAIN TUMOURS:**
- Give Dilantin 15-20 mg/kg for documented seizures.
  - Give Decadron 10 mg loading dose followed by 4 mg IV q6H.



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# Intracerebral Hemorrhage

## Neurosurgery Consultation Referral Guidelines

**Legend:**

- Next Morning Referral
- Emergent/Urgent
- Life or Limb

### Clinical Presentation

- GCS = 15
- AND** evidence of:
  - Neurologically stable
  - With/without headache

- GCS = 14\*-15
- AND** evidence of one or more of:
  - Mild focal neurological deficit with no/slow progression
  - With/without headache
- \* With the exception of mild confusion due to existing dementia or a focal deficit related to the lesion (e.g., dysphasia)*

- GCS ≤ 13
- AND** evidence of one or more of:
  - Progressive neurological deterioration

### Imaging: Abnormal CT/MRI Findings

CT/MRI images should be interpreted by the local radiologist prior to seeking neurosurgical consultation via CritiCall Ontario, unless the hospital does not have CT/MRI services.

- AND** evidence of one or more of:
  - Any hemorrhage ≤ 2.0 cm
  - Vascular malformation with resolved intracranial hemorrhage
- NB: Patients with hypertensive hemorrhagic stroke (≤ 3.0cm) are medically managed by neurology and do not require urgent consultation.*

- AND** evidence of one ore more of:
  - Infratentorial intracranial hemorrhage without obstructive hydrocephalus
  - Intraventricular hemorrhage
  - Supratentorial hemorrhage: 2-5 cm
  - Non-traumatic subarachnoid hemorrhage

- AND** evidence of one more of:
  - Obstructive hydrocephalus
  - Infratentorial intracranial hemorrhage ≥ 3 cm
  - Lobar hemorrhage ≥ 5 cm
  - Non-traumatic subarachnoid hemorrhage
- If no CT/MR scan services available but significant neurological deficit (e.g., lateralizing signs, GCS < 12, presence of xanthochromia in lumbar puncture), seek consultation through CritiCall Ontario prior to arranging for transfer for CT/MR imaging.*

### Referral Directive

Next Morning Referral

Emergent/Urgent

Life or Limb

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### Disease Specific Management

#### NON-TRAUMATIC SUBARACHNOID HEMORRHAGE:

- Keep systolic blood pressure (SBP) between 120mmHG and 180mmHG (use pressors or antihypertensives as necessary).
- Consult neurosurgeon prior to giving Mannitol.

#### INTRACEREBRAL HEMORRHAGE:

- Give Dilantin 15-20 mg/kg for documented seizures.
- Manage and set target BP in consultation with neurosurgeon.
- Discuss with neurosurgeon the appropriateness of transfer using CT and clinical criteria.



**Legend:**

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- Life or Limb

### Clinical Presentation

- Radiculopathy with mild or no weakness
- Spine pain

- Acute radiculopathy with significant weakness
- Stable or slowly progressive quadriparesis
- Stable or slowly progressive paraparesis

- Quadriplegia
  - Paraplegia
  - Rapidly progressive quadriparesis
  - Rapidly progressive paraparesis
- OR**
- Cauda Equina Syndrome **AND** one or more of:
    - Decreased rectal tone
    - Saddle anesthesia
    - Bilateral motor weakness
- If history of trauma and new, severe deficit, arrange for urgent MRI and/or CT.*

### Imaging: Abnormal X-Ray/CT/MRI Findings

CT/MRI images should be interpreted by the local radiologist prior to seeking neurosurgical consultation via CritiCall Ontario, unless the hospital does not have CT/MRI services.

- AND** evidence of one or more of:
- Stable compression fracture
  - Evidence of spinal column tumour
  - Cervical or lumbar disc herniation
- NB: Degenerative and deformity findings should be referred to primary care provider for follow-up/management. See Quality-Based Pathway for Clinical Handbook for Non-Emergent Integrated Spine Care*

- AND** evidence of one or more of:
- Spinal column fracture
  - Subluxation/dislocation facet joints in cervical spine
  - Collapse of vertebral body
  - Cervical or lumbar disc herniation with significant canal compromise
  - Spinal cord compression due to new mass (tumour or infection)
- If no CT scan services available but significant neurological deficit and abnormalities on plain x-rays, seek consultation through CritiCall Ontario prior to arranging for transfer for CT/MR imaging.*

- AND** evidence of one or more of:
- Thecal sac compression
  - Severe spinal canal compromise
- If no local CT/MRI services available, seek CritiCall Ontario consultation prior to arranging for transfer for CT/MR imaging.*

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### Disease Specific Management

**CAUDA EQUINA SYNDROME**

- The absence of urinary retention indicates the exclusion of possible Cauda Equina Syndrome.

Next steps

- Once clinical diagnosis established, must be corroborated by MRI to establish diagnosis prompting referral.
- Optimize laboratory values (i.e., coagulation) for operative intervention.

**SPINAL CORD INJURY**

CT scan is first line imaging modality.

Cervical:

- Be vigilant in patients with new deficit and/or significant neck pain after trauma with normal CT scan. These patients require MRI to rule out spinal cord injury without radiographic abnormality.
- Immobilize in rigid cervical collar.

Thoracolumbar

- Assess bowel and bladder function.
- Keep on bedrest with head of bed flat.
- Investigate for associated spinal and systemic injuries (e.g., bowel injury, occult spinal injury).

**ACUTE (<48 hours) SPINAL CORD COMPRESSION (METASTATIC) Management**

- Delineate primary lesion, if applicable.
- Avoid hypotension (SBP <100).
- Give Dexamethasone 16 mg IV x1.
- Look for lesions; the whole spine must be imaged with MRI + Gadolinium.



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