



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 $\leq$ 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.*

Disease Specific Management

ISOLATED HEAD TRAUMA:

- Give Dilantin 15-20 mg/kg if documented seizure or GCS $\leq$ 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

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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 CitiCall 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

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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.



Intracerebral Hemorrhage

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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 $\leq$ 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 CitiCall Ontario, unless the hospital does not have CT/MRI services.

- AND** evidence of one or more of:
 - Any hemorrhage $\leq$ 2.0 cm
 - Vascular malformation with resolved intracranial hemorrhage

NB: Patients with hypertensive hemorrhagic stroke ($\leq$ 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 $\geq$ 3 cm
 - Lobar hemorrhage $\geq$ 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 CitiCall Ontario prior to arranging for transfer for CT/MR imaging.

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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.



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 CitiCall 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 CitiCall 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 CitiCall 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.