

Ontario Acquired Brain Injury (ABI) Dataset Project Phase III

Highlights: Alternate Level of Care (ALC) Days, Length of Stay, and Discharge Disposition of ABI Patients

Acquired Brain Injury (ABI), which includes brain injury from traumatic (e.g., falls, motor vehicle collisions) and non-traumatic (e.g., anoxia, brain tumours) causes, is a leading cause of death and disability in Canada. ABI is more common than breast cancer, HIV/AIDS, spinal cord injury, and multiple sclerosis combined. Despite the large number of persons affected, ABI stakeholders have not previously benefited from a centralized data source to assist in planning and evaluation of services dedicated to ABI across the continuum.

The ABI Dataset Project, funded by the Ontario Neurotrauma Foundation, addressed this need by utilizing existing administrative data to answer important research questions about ABI in Ontario. Data were obtained from emergency departments (ED) from the National Ambulatory Care Reporting System (NACRS), acute hospital admission data from the Discharge Abstract Database (DAD), and inpatient rehabilitation admissions from the National Rehabilitation Reporting System (NRS). The data were obtained directly from the Ontario Ministry of Health Long-Term Care and housed at the Toronto Rehabilitation Institute. The project examined data from fiscal years 2003/04-2009/10.

The strengths of the project include:

- ✦ the ability to analyze **vast amounts of readily available data** from our publicly insured health-services in a cost-efficient manner
- ✦ identification of **acquired brain injury cases using ICD-10 diagnosis** for both traumatic (TBI) and non-traumatic brain injury (nTBI)
- ✦ the ability to **analyze and report data by geographical region over time, and across the continuum of care**

The overall research questions addressed occurrence of ABI, causes of injury, outcomes, service provision, flow of service, and geographical information. The following report will discuss **alternate level of care (ALC), length of stay (LOS), the Canadian Triage and Acuity Scale (CTAS) for episodes of TBI and nTBI, discharge disposition, and re-admissions.**

The fact sheet provides highlights from our report available on the ABI Research Lab website (www.abiresearch.utoronto.ca), Ontario ABI Dataset.



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Alternate Level of Care (ALC)

ALC days is a data element available in acute care records only. ALC patients are “those who no longer need acute services but are waiting to be discharged to a setting more appropriate to their needs”¹. In this fact sheet, only episodes with at least one day in ALC were included.

In 2009/10, 18% of TBI and 15% of nTBI acute care episodes had ALC days. 10% of TBI and 7% of nTBI acute care episodes had an ALC length of stay of 10 days or greater. The mean number of ALC days for TBI in 2009/10 was 24 days and 20 days for nTBI. The mean number of ALC days for TBI and nTBI from 2003/04 to 2009/10 increased from 21 days to 24 days and from 19 days to 20 days respectively (see Figure 1).

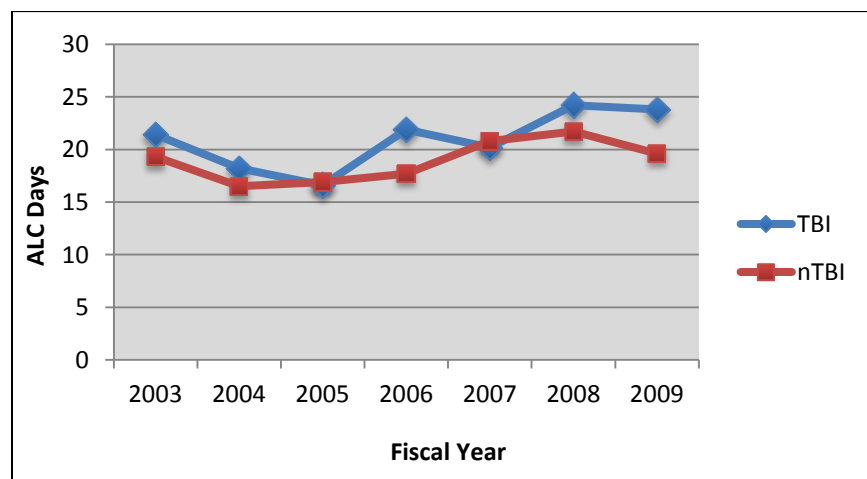


Figure 1. Mean ALC Days in Acute Care by Fiscal Year, 2003/04 – 2009/10

¹ Canadian Institute for Health Information, 2009

Characteristics of ALC Patients

The majority of patients with ALC days were aged 65 years or older for both TBI (63%) and nTBI (65%) patients (see Table 1).

Characteristics	TBI (%)	nTBI (%)
Age (65+ years)	63	65
Psychiatric Diagnoses	32	24
Charlson Comorbidity ² 4+	5	39
Discharged Disposition		
Long Term Care	52	46
Other Institutions	17	14
Home	10	8

Table 1. Profile of ALC Patients Aged 18+ Years, 2003/04 – 2009/10

² The Charlson Comorbidity Index estimates the risk of death from comorbid diseases and is calculated as an indicator of the need of patients with ABI.

What was the Length of Stay (LOS) for ED Visits?

The mean LOS in ED among TBI patients increased from 4 to 5 hours from 2003/04 to 2009/10 and 6 to 7 hours for nTBI (see Figure 2). The median LOS among TBI patients during this period was 3 hours and the median was 5 hours for nTBI patients.

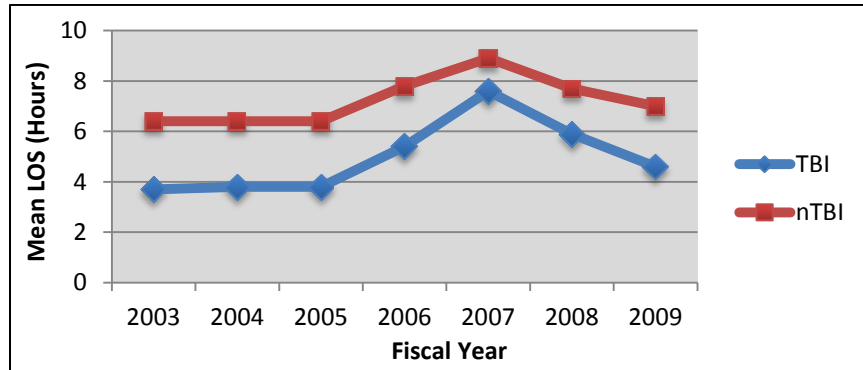


Figure 2. Mean LOS (Hours) in ED by Fiscal Year, 2003/04 – 2009/10

How Severe were the Cases?

Using the Canadian Triage and Acuity Scale (CTAS) to assess severity in ED, 49% of TBI patients had a CTAS 3 (urgent care), 23% had a CTAS 2 (emergent care), 5% had a CTAS 1 (requires resuscitation), and 23% were non-serious admissions (CTAS 4 and 5). Among nTBI patients, 43% had a CTAS 3, 40% had a CTAS 2, 7% had a CTAS 1, and 9% had a CTAS 4 and 5 (see Figure 3).

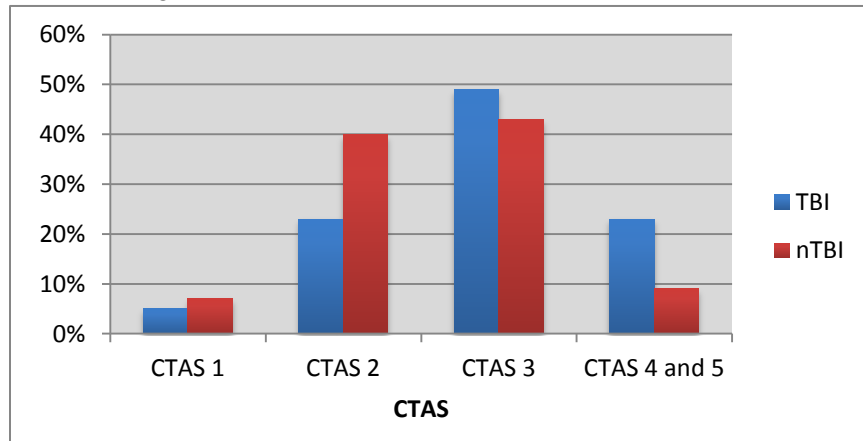


Figure 3. CTAS of ED Episodes, 2009/10.

What was the Length of Stay for Acute Hospital Admissions?

The mean LOS in acute care among TBI patients was 14 days in 2003/04 and 13.8 days in 2009/10. Among nTBI patients, the mean LOS was 16.2 days in 2003/04 and 15.1 days in 2009/10 (see Figure 4). The median LOS for TBI cases ranged from 5 to 6 days compared to 7 to 8 days for nTBI.

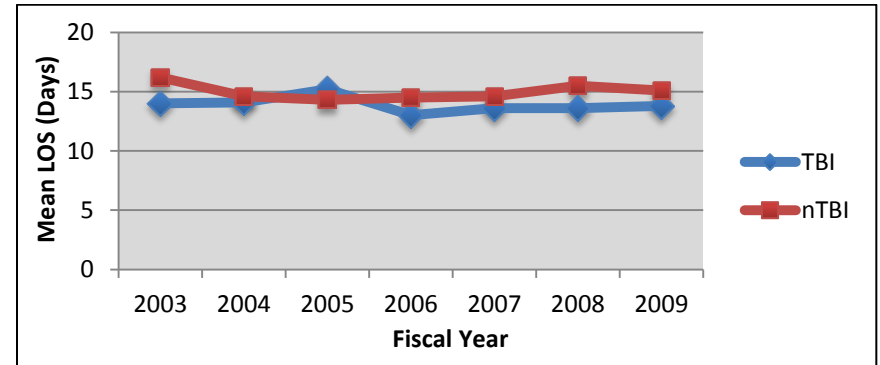


Figure 4. Mean LOS in Acute Care by Fiscal Year, 2003/04 – 2009/10

What was the Number of Special Care Days in Acute Care?

Special care days is the sum of all days in all intensive care units. The mean number of special care days among TBI patients increased from 6 days in 2003/04 to 7 days in 2009/10. Among nTBI patients, it also increased, from 7 days in 2003/04 to 8 days in 2009/10 (see Figure 5). The median number of days during this period for both TBI and nTBI patients was 3 days.

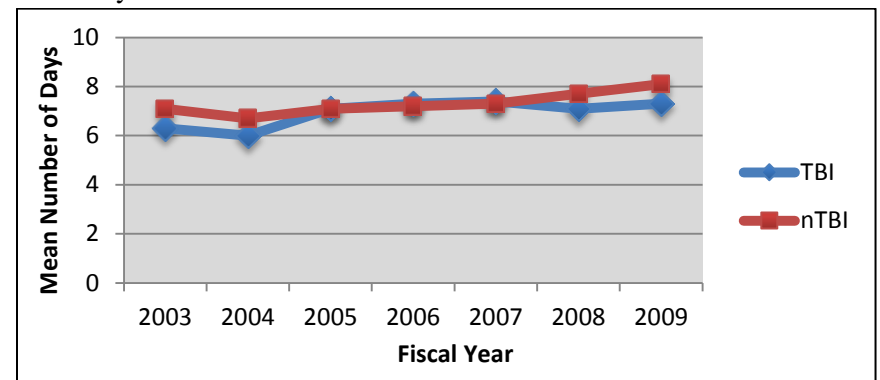


Figure 5. Mean Number of Special Care Days in Acute Care by Fiscal Year, 2003/04 – 2009/10

What was the Length of Stay for Inpatient Rehabilitation Admissions?

The mean LOS among patients with brain dysfunction in inpatient rehabilitation decreased from 2003/04 (53 days) to 2009/10 (51 days) (see Figure 6). The median LOS was 39 days in 2003/04 and 28 days in 2009/10. The decrease in LOS in 2006/07 may likely be due to increased pressure to admit patients from acute care and therefore, decreased the LOS in inpatient rehabilitation.

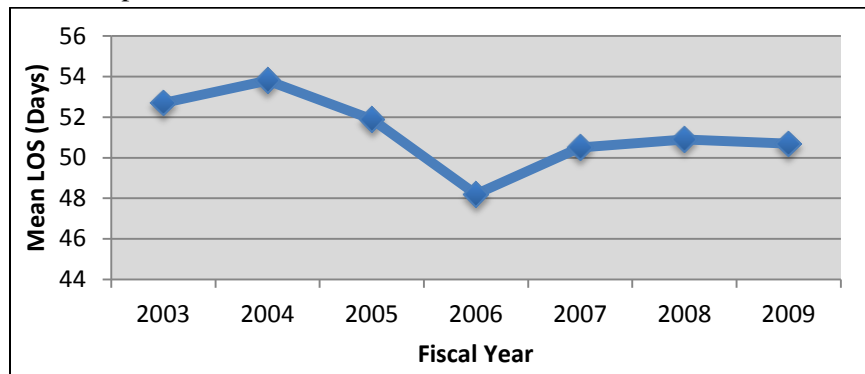


Figure 6. Mean LOS in Inpatient Rehabilitation by Fiscal Year, 2003/04 – 2009/10

Discharge Disposition from ED

The majority of TBI patients were discharged from ED (80%) compared to 38% of nTBI patients who were discharged from ED. Of those admitted, the majority of nTBI patients were admitted to acute care (52%) while 17% of TBI patients were admitted to acute care (see Figure 7).

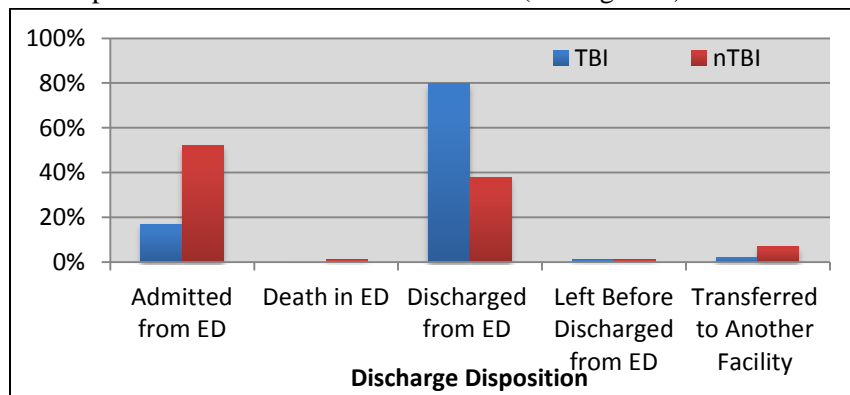


Figure 7. Discharge Disposition from ED, 2007/08 – 2009/10

Discharge Disposition from Acute Care

The majority of TBI patients were discharged home (52%) while 40% of nTBI patients were discharged home. 12% of TBI patients and 22% of nTBI patients died in acute care. Among TBI patients, 18% were transferred to long term care while 15% of nTBI patients were transferred to long term care (see Figure 8).

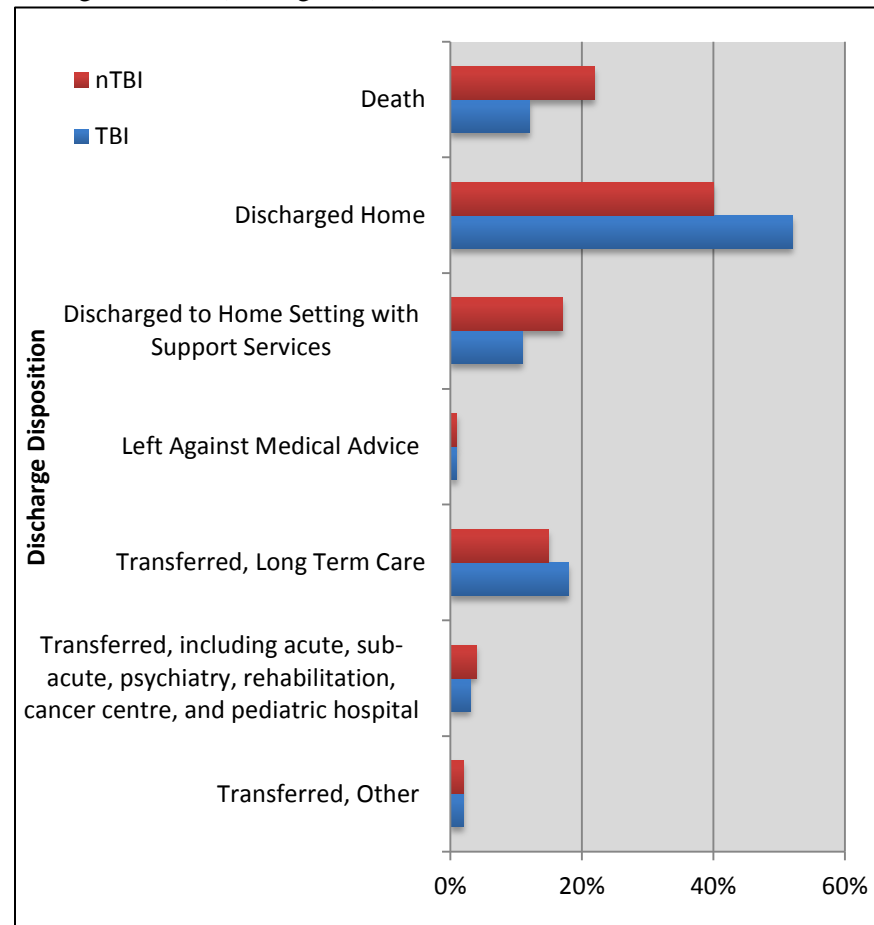


Figure 8. Discharge Disposition from Acute Care, 2007/08 – 2009/10

Referral Destination from Inpatient Rehabilitation

Using RCG groups from NRS to define ABI, the majority of patients with brain dysfunction in inpatient rehabilitation were referred to ambulatory care, home care, and residential care (53%) (see Figure 9).

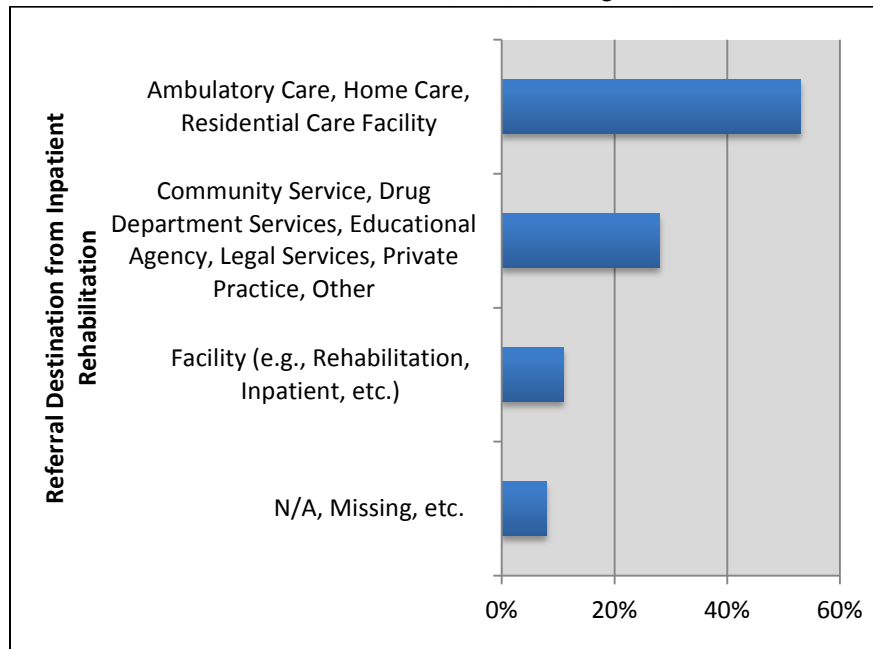


Figure 9. Referral Destination from Inpatient Rehabilitation, 2007/08 – 2009/10

Readmission to Acute Care with an ABI Diagnosis

The percentage of nTBI patients readmitted to acute care within one month was more than twice the percentage of TBI patients (see Figure 10).

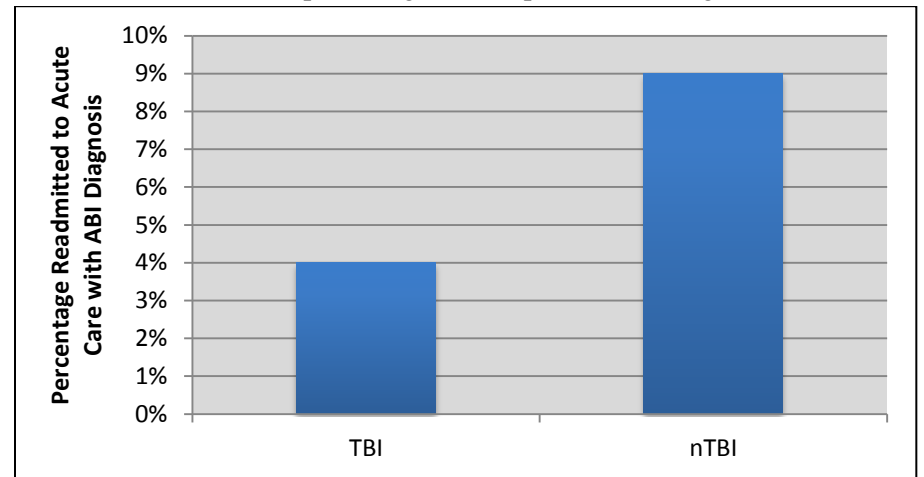


Figure 10. Readmission to Acute Care Within One Month, 2007/08 – 2009/10

Table 2. ICD-10 Definition of TBI in ED and Acute Care

Diagnosis	ICD-10 Code and Description
<p>1. Fracture and crushing of the skull and facial bones</p>	<ul style="list-style-type: none"> ✓ S02.0 Fracture of vault of skull ✓ S02.1 Fracture of base of skull ✓ S02.3 Fracture of the orbital floor ✓ S02.7 Multiple fractures involving skull and facial bones ✓ S02.8 Fractures of other skull and facial bones ✓ S02.9 Fractures of skull and facial bones, part unspecified ✓ S07.1 Crushing injury of skull
<p>2. Intracranial injury, excluding those with skull fracture</p>	<ul style="list-style-type: none"> ✓ S06.0 Concussion ✓ S06.1 Traumatic cerebral oedema ✓ S06.2 Diffuse brain injury ✓ S06.3 Focal brain injury ✓ S06.4 Epidural hemorrhage ✓ S06.5 Traumatic subdural hemorrhage ✓ S06.6 Traumatic subarachnoid hemorrhage ✓ S06.7 Intracranial injury with prolonged coma ✓ S06.8 Other intracranial injuries ✓ S06.9 Intracranial injury, unspecified
<p>3. Late effects of injuries</p> <p>The “sequelae” include conditions specified as such or as late effects, or those present one year or more after onset of the causal condition.</p>	<ul style="list-style-type: none"> ✓ F07.2 Post concussion syndrome ✓ T90.2 Sequelae of fracture of skull and facial bones ✓ T90.5 Sequelae of intracranial injury

Table 3. ICD-10 Definition of nTBI in ED and Acute Care

Diagnosis	ICD-10 Code and Description
1. Toxic effect of substances, chiefly non-medical as to source	<ul style="list-style-type: none"> ✓ T40.5 Poisoning: cocaine ✓ T42.6 Poisoning by other antiepileptic and sedative-hypnotic drugs, Methaqualone, Valproic acid ✓ T51 Toxic effect of alcohol ✓ T56 Toxic effect of metals ✓ T57.0 Toxic effect of arsenic and its compounds ✓ T57.2 Toxic effect of manganese and its compounds ✓ T57.3 Toxic effect of hydrogen cyanide ✓ T58 Toxic effect of carbon monoxide ✓ T64 Toxic effect of aflatoxin and other mycotoxin food contaminants ✓ T65.0 Toxic effect of cyanides
2. Anoxia	<ul style="list-style-type: none"> ✓ G93.1 Anoxic brain damage (includes all causes of anoxia except those occurring following abortions, ectopic pregnancy, labour and delivery and newborn) ✓ T71 Asphyxiation, suffocation (by strangulation) ✓ T75.1 Drowning and nonfatal submersion ✓ R09.0 Asphyxia
3. Vascular insults (not captured in stroke analyses)	<ul style="list-style-type: none"> ✓ I62.0 subdural hemorrhage ✓ I62.9 Unspecified intracranial hemorrhage
4. Brain tumours	<ul style="list-style-type: none"> ✓ C70 Malignant neoplasm of brain ✓ C71 Malignant neoplasm of brain ✓ C79.3 Secondary malignant neoplasm of brain and cerebral meninges ✓ C79.4 Secondary malignant neoplasm of other and unspecified part of nervous system ✓ D32.0 Benign neoplasm of cerebral meninges ✓ D33.0 Benign neoplasm of brain, supratentorial ✓ D33.1 Benign neoplasm of brain, infratentorial ✓ D33.2 Benign neoplasm of brain, unspecified ✓ D33.3 Benign neoplasm of cranial nerves ✓ D42.0 Neoplasm of uncertain or unknown behavior of cerebral meninges ✓ D43 Neoplasm of uncertain or unknown behaviour of brain and central nervous system ✓ D43.2 Neoplasm of brain, unspecified ✓ G06.0 Intracranial abscess and granuloma ✓ G06.1 Intraspidal abscess and granuloma ✓ G06.2 Extradural and subdural abscess, unspecified ✓ G07 Intracranial and intraspinal abscess and granuloma in disease classified elsewhere ✓ G93.0 Cerebral cysts

Diagnosis	ICD-10 Code and Description
5. Encephalitis	<ul style="list-style-type: none"> ✓ A81.1 Subacute, sclerosing encephalitis ✓ A83.0 Japanese encephalitis ✓ A83.2 Eastern equine encephalitis ✓ A86.0 Unspecified viral encephalitis ✓ B00.4 Herpes viral meningoencephalitis ✓ B01.1 Varicella encephalitis ✓ B02.0 Zoster encephalitis ✓ B05.0 Postmeasles encephalitis ✓ B94.1 Sequelae of viral encephalitis ✓ G04.0 Acute disseminated encephalitis ✓ G04.2 Bacterial meningoencephalitis and meningomyelitis, not elsewhere classified ✓ G04.8 Other encephalitis, myelitis and encephalomyelitis ✓ G04.9 Encephalitis, myelitis, and encephalomyelitis, unspecified ✓ G05 Encephalitis, myelitis, and encephalomyelitis in diseases classified elsewhere ✓ G09 Sequelae of inflammatory diseases of central nervous system
6. Metabolic encephalopathies	<ul style="list-style-type: none"> ✓ E10.0 (Type I) ✓ E11.0 (Type II) ✓ E13.0 Other specified diabetes mellitus with coma ✓ E14.0 Unspecified diabetes mellitus with coma ✓ E15 Nondiabetic hypoglycaemic coma ✓ G92 Toxic encephalopathy ✓ G93.4 Encephalopathy, unspecified
7. Meningitis	<ul style="list-style-type: none"> ✓ A87 Viral meningitis ✓ B01.0 Varicella meningitis ✓ B37.5 Candidal meningitis ✓ G00 Bacterial meningitis, not elsewhere classified ✓ G01 Meningitis in bacterial diseases classified elsewhere ✓ G02 Meningitis in other infectious and parasitic diseases classified elsewhere ✓ G03 Meningitis due to other and unspecified causes
8. Other brain disorders and infections	<ul style="list-style-type: none"> ✓ G91.0 Communicating hydrocephalus ✓ G91.1 Obstructive hydrocephalus ✓ G91.2 Normal-pressure hydrocephalus ✓ G93.2 Benign intracranial hypertension ✓ G93.5 Compression of brain ✓ G93.6 Cerebral oedema ✓ G93.8 Other specified disorders of the brain (including post-radiation encephalopathy) ✓ G93.9 Disorder of the brain, unspecified ✓ G99.8 Other specified disorders of nervous system in diseases classified elsewhere ✓ R29.1 Meningismus