Implications of Neurological diseases to the oral health care provider

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Topics to cover

- Epilepsy
- Multiple sclerosis
- Parkinsons disease
- Stroke/cerebrovascular accident

Epilepsy

Epilepsy – definitions

- **Seizure** is a paroxysmal alteration of neurologic function caused by the excessive, hypersynchronous discharge of neurons in the brain.
- Various causes of seizures:
  - Epileptic seizures – abnormal neuronal firing
  - Non-epileptic seizures – e.g. psychogenic seizures, hypoglycemia, fever. Some are from reversible causes and are secondary in nature.
- **Epilepsy is the condition of recurrent, unprovoked seizures.**
  - Epilepsy syndrome is a group of clinical characteristics that consistently occur together

Stafstrom et al 2015

Epilepsy – epidemiology

- Gender: slight male predilection
- Age: 75% begins in childhood
- Incidence: 61.4 new cases per 100 000 persons per year
- Prevalence: 1% of the population, 0.33% refractory epilepsy (i.e. epilepsy not controlled by >2 AEDs).

(Beghi 2020)

Epilepsy – Diagnosis and classification

International league against epilepsy (ILAE):

- Categories of seizures:
  - Generalised
    - Originate from bilateral distributed neuronal networks
  - Focal (used to be called partial)
    - Originate from neuronal networks limited to part of one cerebral hemisphere
  - Spasms

Seizures can begin focally and later generalize

Seizures can originate in the cortex or subcortical structures

(Fisher et al 2017)

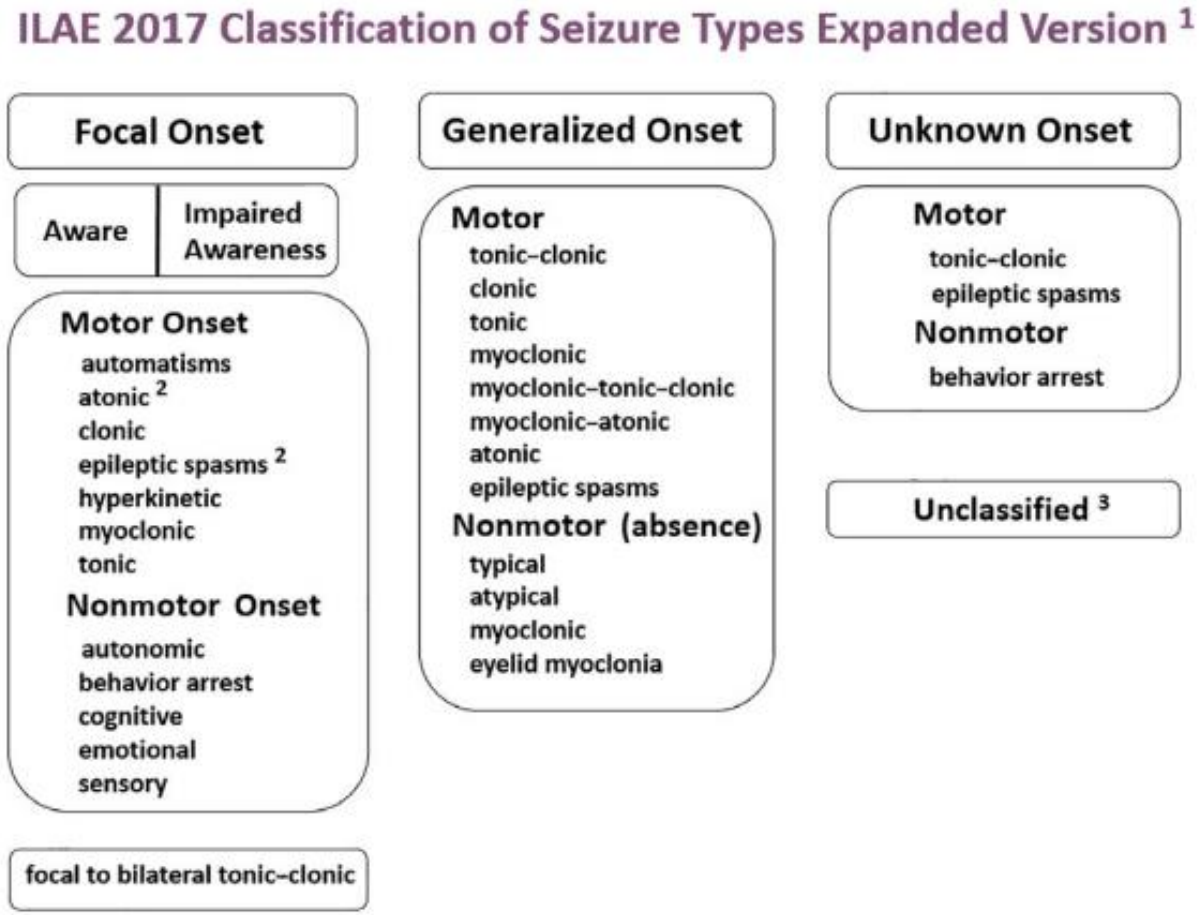
Epilepsy –Classification

International league against epilepsy (ILAE):

- Categories of seizures:
  - Generalised seizures
    - Further classified into:
      - Absence (petit mal)
        - *Starting with unresponsiveness to external verbal stimuli, sometimes with eye blinking or head nodding*
      - Generalised tonic-clonic (GTC) (grand mal)
        - *Bilateral symmetric convulsive movements of all limbs with impairment of consciousness*
      - Myoclonic
        - *Sudden brief (lightning fast) movements that are not associated with any obvious disturbance of consciousness*
          - *These can be general or focal*
      - Atonic
        - Involve the loss of body tone, often resulting in a head drop or fall
  - Focal seizures
    - *Clinical manifestation depends on area of cortex involved*
  - Epileptic Spasms
    - *Sudden extension or flexion of extremities, held for several seconds, then reoccur in clusters.*

(Fisher et al 2017)

Epilepsy –Classification



(Fisher et al 2017)

Epilepsy – Diagnosis

- History and examination
- EEG, preferably:
  - Wakefulness, drowsiness and sleep.
- Neuroimaging
  - Usually MRI
  - CT is useful in the acute setting – to detect hemorrhage, calcification or tumors.
- Metabolic evaluation
- Genetic testing

(Fisher et al 2017)

Epilepsy – comorbidities

- Psychiatric disorders:
  - **Depression**, anxiety, learning disability, ADHD, intellectual disability and autism
  - Previously considered secondary to uncontrolled seizure or medication, are now recognised as an integral part of the disorders, sometimes even preceding the seizures.

(Stafstrom et al 2015)

Epilepsy – Dental chairside management

- **Medical history – including the level of control of seizures**
- Placement of ligated mouth prop at the beginning of procedure
- Supine position

If seizure occurs during the procedure:

- Clear the area
- Turn the patient to the side (to avoid aspiration)
- Passively restrain*

After the seizure:

- Examine traumatic injuries
- Discontinue treatment, arrange for patient transport
- If it's a first seizure, patient should be evaluated in the emergency room.

(Little et al 2018)

Epilepsy – Dental chairside management

Most tonic-clonic seizures end in 1-2 minutes. There is also a post-ictal phase.

Status epilepticus occurs when:

- The active part of a tonic-clonic seizure lasts 5 minutes or longer
- A person goes into a second seizure without recovering consciousness from the first one
- If a person is having repeated seizures for 30 minutes or longer

(Wylie et al 2023)

Epilepsy – Dental chairside management

Non-convulsive Status epilepticus

- Long or repeated absence or complex partial seizures

- The person may be confused or not fully aware of what is going on, but they are not ‘unconscious’, like in a tonic clonic seizure.
- These situations can be harder to recognize than convulsive seizures. Symptoms are more subtle and it’s hard to tell seizure symptoms from the recovery period.
- There is no consistent time-frame on when these seizures are called an emergency. It depends in part on how long a person’s typical seizures are and how often they occur.

(Wylie et al 2023)

Multiple sclerosis

Multiple sclerosis

- Definition: MS is an autoimmune disease of the CNS, which is characterized by inflammation, axonal injury, demyelination and gliosis and neuronal loss (Tafti et al 2024)

- Epidemiology (Dobson et al 2019):
  - Gender: 3:1 F:M ratio
  - Age: Onset typically 20-40 years of age, but can present at any age. Almost 10% of cases are present before the age of 18.
  - Race:
    - Higher in Europeans vs non-European populations (i.e. East Asian and African descent).
    - Interestingly has shown latitude based prevalence – i.e. higher in northern latitudes of Europe and the US.

Multiple sclerosis

- Etiology:
  - Genetic susceptibility – HLA-DRB1*15
  - EBV
    - Symptomatic EBV infection increases the risk of getting MS
    - Mechanism: heterogenous, however the prevailing theory is molecular mimicry
  - Vitamin D deficiency (UVB)
  - Latitude based theory – however this trend appears to be decreasing.
  - Females (interestingly early 1900s M:F was 1:1. The increasing female trend has been attributed to smoking).

(Dobson et al 2019)

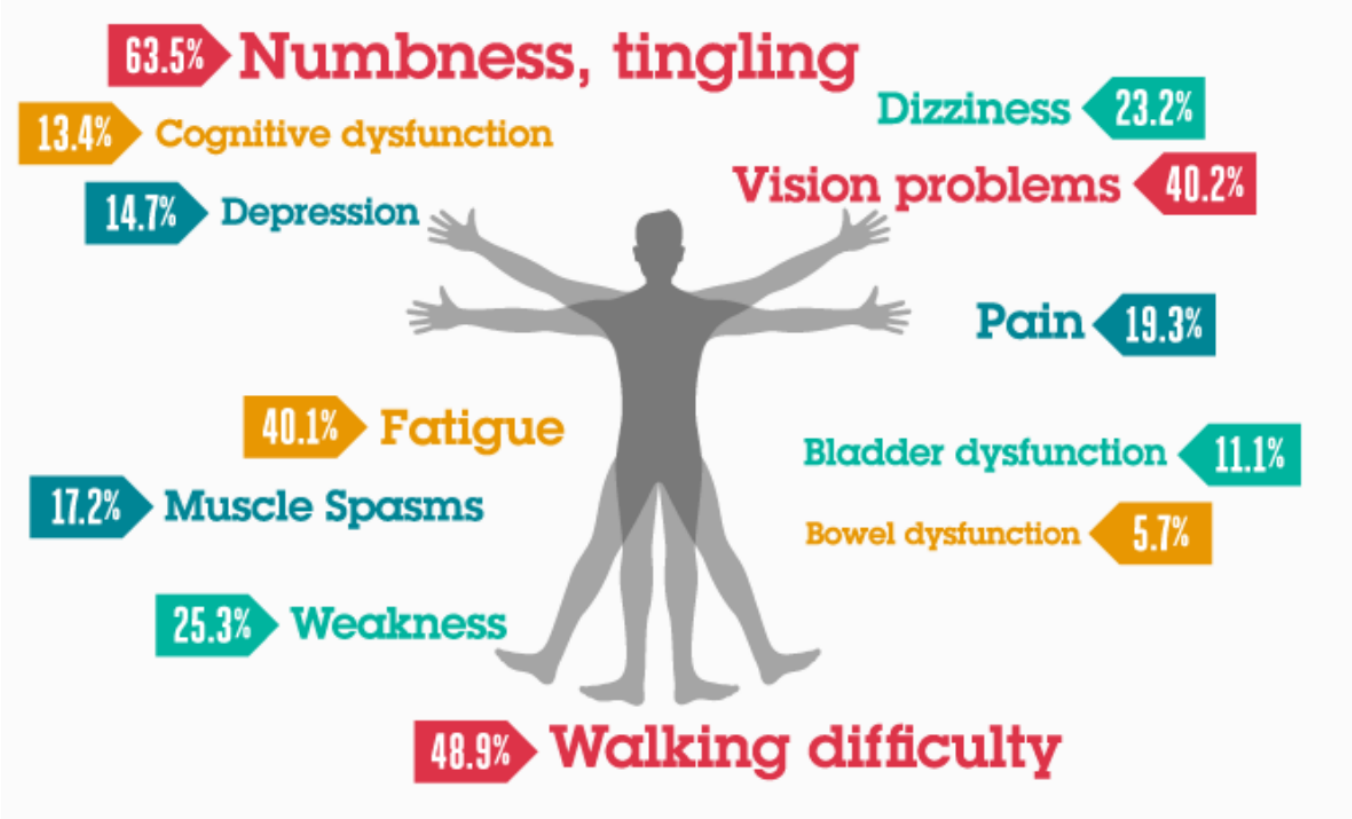
Multiple sclerosis

- Pathogenesis:
  - Pathologic hallmark of MS in perivenular inflammatory lesions, leading to demyelinating plaques.
    - Common in: periventricular area, pons and spinal cord
  - Inflammatory infiltrates contain:
    - Predominantly CD8+ T lymphocytes
    - B cell and plasma cells also present in much lower numbers
  - Neurodegeneration involving microscopic damage to various components of the CNS, such as axons, neurons and synapses.

(Dobson et al 2019)

Multiple sclerosis

- Clinical features:



(USF Health 2024)

Multiple sclerosis

- Classification:
  - Relapsing-remitting (RR):
    - 70-80% of MS
    - New or recurrent neurological symptoms that are consistent with MS
    - Symptoms lasting 24-48 hours
    - Symptoms developing over days to weeks
  - Primary progressive (PP):
    - 15-20% of MS
    - Gradual deterioration from onset without relapses
  - Secondary progressive (SP):
    - Following initial relapsing course, there is a more gradual neurological decline.
  - Progressive relapsing (PR)
    - 5% of MS cases.
    - Gradual deterioration with superimposed relapses
  - Fulminant:
    - Severe MS with multiple relapse and rapid progression
  - Benign:
    - Overal mild disability course with rare relapses
- Diagnosis: history, physical and MRI

(Tafti et al 2024)

Multiple sclerosis

- Management:
  - Short term goals focus on decreasing MRI lesion activity
    - *Addressing possible underlying causes that could have triggered relapse (infection or metabolic derangement)*
    - *Symptomatic management of neurologic symptoms*
    - *Short course corticosteroids – particularly in an acute flare*
      - IV methylprednisolone 3-7 days course of 500 to 1000mg daily – followed by short taper
      - Oral pred – 1250mg/day with or without short taper
      - PLEX – every other day for a total of 3-7 treatments
  - Long term goals: prevent secondary progressive MS
    - *Glatiramer acetate, interferon beta preparations, natalizumab, mitoxantrone, fingolimod*
  - Post treatment challenges: ensuring patient compliance and monitoring for drug toxicity

(Tafti et al 2024)

Multiple sclerosis

- Prognosis:
  - Deterioration in functioning due to the disease, however patients do not die from the disease, rather the complications from it:
    - Infection (especially respiratory and urinary tract infections)
    - Conditions associated with advanced disability – aspiration pneumonia (due to dysphagia) and chronic respiratory disease in men
    - Sepsis
    - Skin disease

(Harding et al 2020)

Multiple sclerosis

- Dental management:
  - Oral manifestations 2-3%:
    - Facial pain:
      - TN (5% of MS patients) – possible absence of trigger zones, with continuous pain with lower intensity.
      - Trigeminal neuropathies – V2 and V3, burning, tingling, reduced sensation.
    - Visual disturbance
    - Dysarthria – slow, irregular speech with separation of syllables of words ('scanning speech').
    - During an attack, patients may experience facial paresthesia, and muscles of facial expression can undulate in a wave like motion (myokymia). Has been described as a 'bag of worms' on palpation
    - Muscle weakness

(Little et al 2018)

Multiple sclerosis

- Dental management:
  - Dental treatment:
    - Dental care to be completed during periods of remission
    - Monitoring for opportunistic infections (candidosis) after acute flares due to high dose corticosteroids
    - Xerostomia and medication induced hyposalivation
    - As fatigue is often reported in the afternoons, morning appts are preferable
    - Dental visits may need to be short depending on stage of disease
      - May require GA management in advanced stages

(Little et al 2018)

Parkinsons Disease

Parkinsons Disease

- Description:
  - Parkinsons disease is a progressive movement disorder of the nervous system (Armstrong et al 2020)
- Epidemiology (Bloem et al 2021):
  - Gender: M > F
  - Age: increasing incidence and prevalence with age.
    - However, 5-10 % < 50 and 25% < 65 years of age
    - Global burden has doubled in the last 2 decades
  - Incidence: 1100 Australians under 65 per year (young onset)
  - Prevalence: 150 000 patients with PD in Aus
    - 2nd most common neurological disease after dementia

Parkinsons Disease

- Etiology:
  - Genetics
    - SNCA, LRRK2, PRKN, PINK1 and GBA
    - Important for treatment*
  - Environment
    - Pesticides
    - Head injury and TBI
    - Possible COVID-19?
  - Negative associations:
    - Smoking – mechanism: high dopamine levels assoc with smokers
    - Coffee drinking
    - Anti-inflammatory drug use
    - High plasma urate levels
    - Physical activity

(Bloem et al 2021)

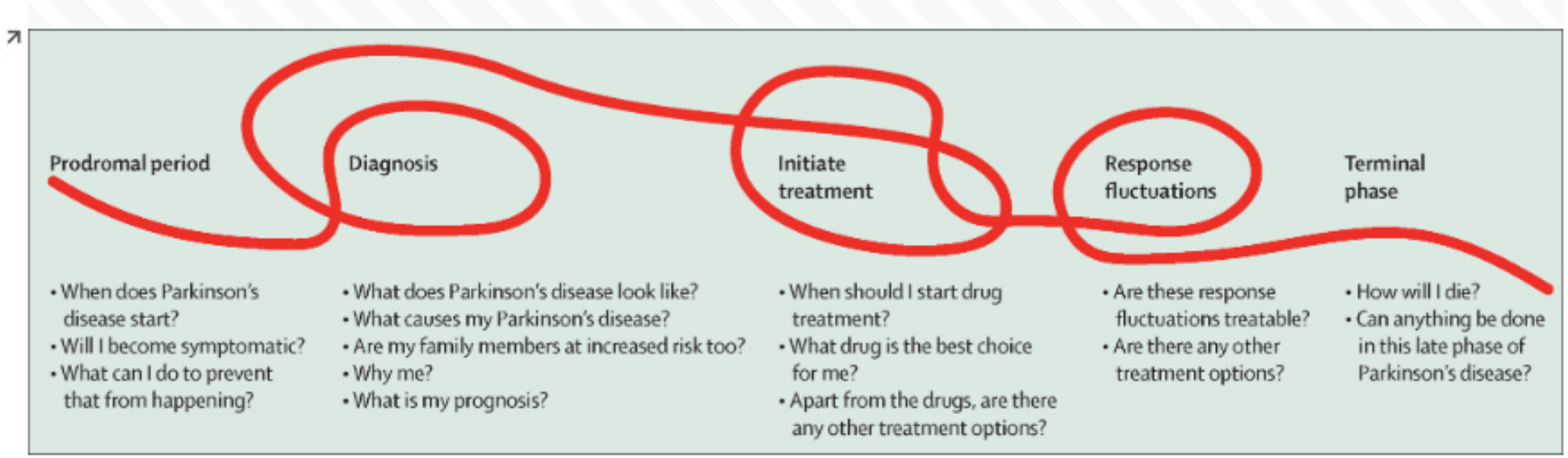
Parkinsons Disease

- Pathogenesis:
  - Complex interaction of:
    - Alpha synuclein aggregation
    - Dysfunction of mitochondria
    - Dysfunction of lysosomes or vesicle transport
    - Synaptic transport issues
    - Neuroinflammation
  - Resulting in:
    - Accelerated death of dopaminergic neurons
    - But involves multiple other motor and non-motor circuits.

(Bloem et al 2021)

Parkinsons Disease

- Management and prognosis:



Examples of the various questions that people with Parkinson's disease might have during the consecutive phases of the disease

(Bloem et al 2021)

Parkinsons Disease

- Oral manifestations:
  - Some evidence of increased risk of caries and periodontal disease:
    - Possible factors: motor impairment, apathy, depression and dementia
    - As the disease progresses, reliant on caregiver
  - Mastication disorders:
    - Mastication and facial movements can be impaired in moderate-advanced PD and increase with progression.
  - Bruxism:
    - Higher prevalence rhythmic masticatory muscle activity in REM and nREM sleep in PD compared to controls (Abe et al 2013)

(Zlotnik et al 2015)

Parkinsons Disease

- Oral manifestations:
  - Sialorrhea and drooling
    - Excessive saliva production OR decreased clearance of saliva
      - More likely the later related to dysphagia
    - Angular cheilitis due to changed environment

(Zlotnik et al 2015)

Parkinsons Disease

- Oral manifestations:
  - Xerostomia:
    - Drug induced
      - TCAs, other antidepressants, antipsychotics, anticholinergics, beta blockers and antihistamines.
      - Patients suffering from urinary disorders which require xerogenci drugs
  - Taste disturbances:
    - Some reports indicating higher frequency of taste disturbance in this group of patients
    - Tends to increase with disease progress
    - Possible causes:
      - CNS degeneration
      - Depression, reduced salivary secretion, poor HI, GI diseases (causing Zn deficiency), medications and smoking.

(Zlotnik et al 2015)

Parkinsons Disease

- Oral manifestations:
  - BMS
    - Lots of paper and literature suggest higher prevalence of BMS in PD patients – brought on by Clifford 1998 showing 24% prevalence in PD patients.
    - However more recent data of BMS in PD patients shows prevalence is 1.9%-5.1%.
      - All BMS in PD patients have been through postal surveys or questionnaires
    - Prevalence of BMS in clinical based epidemiological studies is: 1%-5.4%.
      - Little difference
      - Moreover, it is likely diagnosis of BMS in PD patients would decrease after clinical examination. Xerosomtia, loose fitting dentures etc are frequently reported in this population.
    - Case report of BMS being triggered after prescription of levodopa
      - One of the cross-sectional studies looking at BMS in PD patients found increasing prevalence of BMS on higher average levodopa equivalent dose.
    - Korean incidence study which compared BMS development in PD patient's vs controls found no difference

(O et al 2023)

Parkinsons Disease

- Dental management:
  - Ensure rigorous hygiene plan for patient, involving the patient and caregivers. Recalls should be tailored to the individual.
  - COMT inhibitors – used to prolong the effect of levodopa
    - Tolcapone, entacapone
    - Can potentially interact with adrenaline in LA, however no reports of this.
    - However, be mindful not to go beyond to carpules containing 1:100 000 epinephrine (36micrograms)
    - Orthostatic hypotension is common in PD patients + side effect of COMT inhibitors
      - Chair should be inclined slowly for patients at the end of the appt
  - Pramipexole (dopamine agonist) interacts with erythromycin
  - Timing of appointment: during time of day at which their medication has maximum effect. Need to check this with patient. Usually, 1-3 hours after consuming medication.

(Little et al 2018)

Stroke/Cerebrovascular accident

Stroke/Cerebrovascular accident

Definition: sudden interruption of oxygenated blood to the brain.

- Subsequently, there is ischemic injury which leads to focal necrosis.

Risk factors:

- Hypertension, congestive heart failure, diabetes mellitus, previous CVA or transient ischemic attacks, >75 years, hypercholesterolemia, coronary atherosclerosis, smoking

(Little et al 2018)

Stroke/Cerebrovascular accident

Complications:

- Death
  - Ischemic stroke: 8%
  - Hemorrhagic stroke: 38-47%
  - Overall, 23% die within the 1st year.
- Survive:
  - 10% will recover with no impairment
  - 50% will have mild residual disability
  - 15-30% are disabled will require special services
  - 10-20% require institutionalization

(Little et al 2018)

Stroke/Cerebrovascular accident

Oral manifestations:

- Slurred speech
- Weak muscles
- Difficulty swallowing
- Unilateral paralysis of the facial musculature
- Loss of sensation
- Difficulty maintaining oral hygiene due to motor impairment

(Little et al 2018)

Stroke/Cerebrovascular accident

Dental implications:

- Defer elective treatment until patient is stable
- Physical disability:
  - Assistance in oral hygiene measures
  - Chairside assistance to maneuver
- Good anxiety control, short, stress-free appointment
- Patient likely on antiplatelet and or anti-coagulant therapy as a preventative
  - Medication interactions e.g. with warfarin

(Little et al 2018)

Stroke/Cerebrovascular accident

Communication tips:

- Face the patient
- Use slower, more deliberate speech
- Use drawings to explain procedures
- Get immediate feedback
- Do not underestimate or overestimate abilities
- Do not wear a mask when talking to the patient
- Communicate with personal carer

(Little et al 2018)

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