Neurology Update

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30/3/15

Overview

- Neurological Assessment
  - Approach to the neurological patient
  - Neuroanatomy & Localisation
- Interactive Cases I & II
- 60 second neurological examination
- 10 things I want my GP to know about neurology
- Q&A

NEUROLOGICAL ASSESSMENT

Approach to the Neurological Patient

- Is it neurological?
- If so where is the problem?
- What is the differential?
- What is the most likely and what is the scariest diagnosis?
- How urgent is the problem?
- What tests need to be done?
- What therapy options are available?
- What are the patients concerns?

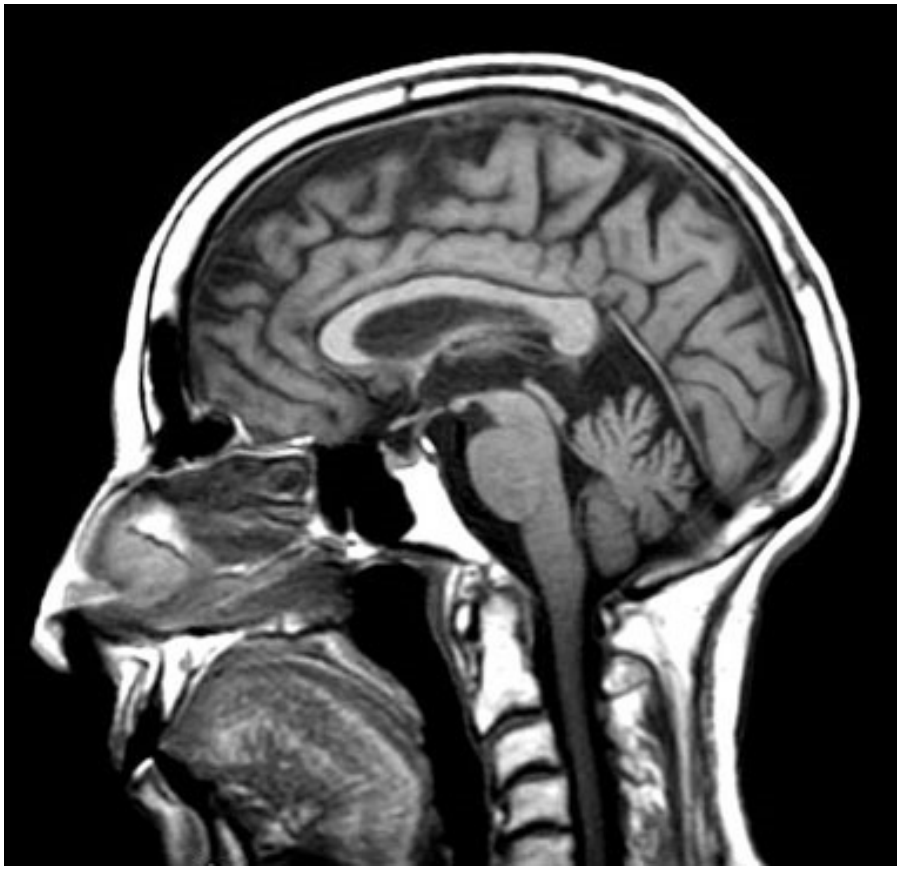
Importance of History

- Symptom distribution → Modality and Location
- Symptom onset, duration, and course
  - Sudden vs. gradual (sec, min, hrs, days, weeks, months, or years?)
  - Intermittent, worsening, improving
- Associated symptoms
  - Anatomically near?
- Risk Factors
  - Vascular, psychiatric, family history, headaches

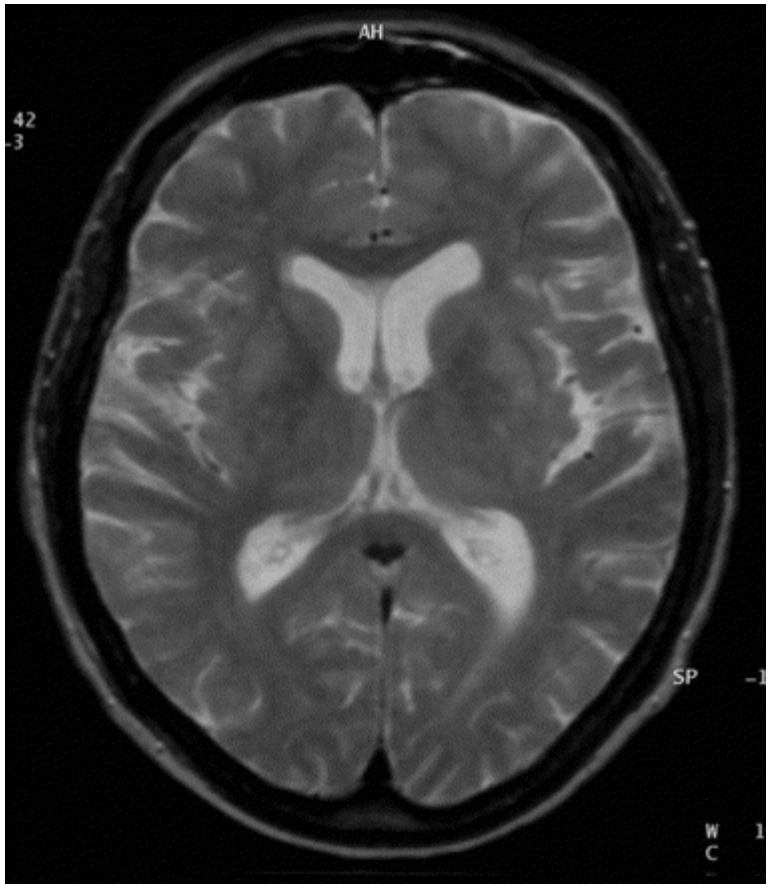
The Neurologic System

- Brain
- Spinal Cord
- Nerve Roots
- Plexus
- Nerves
- Neuromuscular junction
- Muscle

Brain MRI: Sagital Cut



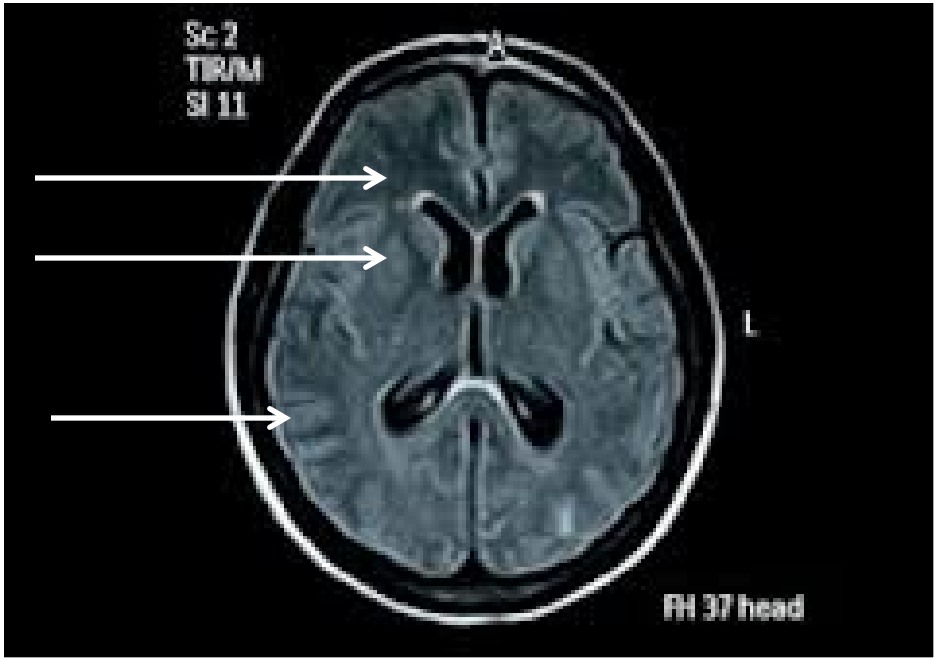
Brain MRI: axial cut



Brain: Supra-tentorial

- Cortex: Memory, Decisions, Mood, Language, Praxis …all the cool stuff
- + U/L motor/sensory
- Whitematter: Connecting fibres
- Basal Ganglia: U/L motor modulation i.e either not enough or two much
- Thalamus: U/L sensory

Brain MRI:



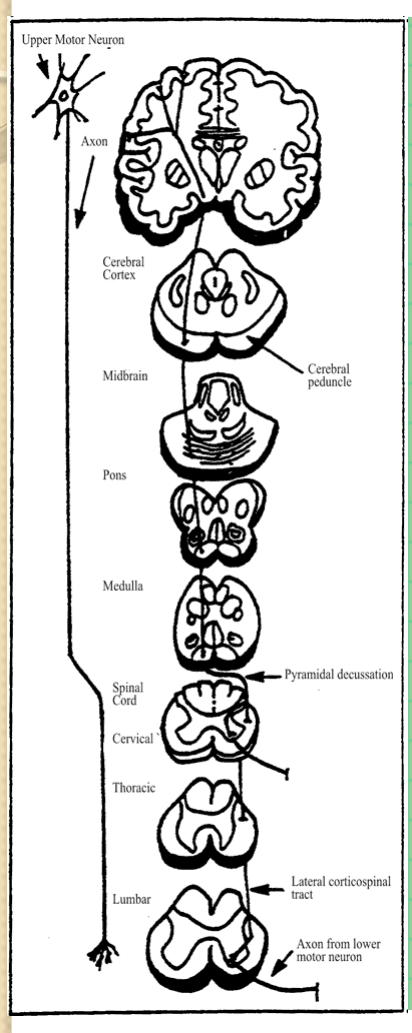
Brain: Infra-tentorial

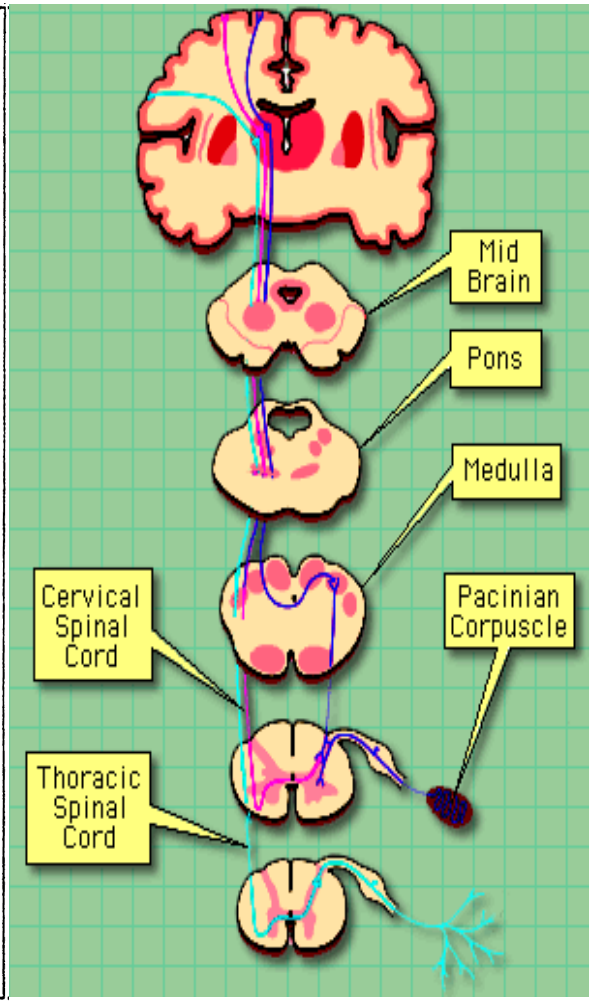
- Cerebellum: Coord – motor U/L/truncal
- Brain Stem: Cranial nerves (e.g. diplopia) – sensory/motor U/L, B/L, or mixed/crossed

Spinal Cord

- Major connecting highway
- Sensory and motor
- Crossed and uncrossed pathways
  - Brown-Sequard Syndrome
- UMN

Spinal Cord Pathways



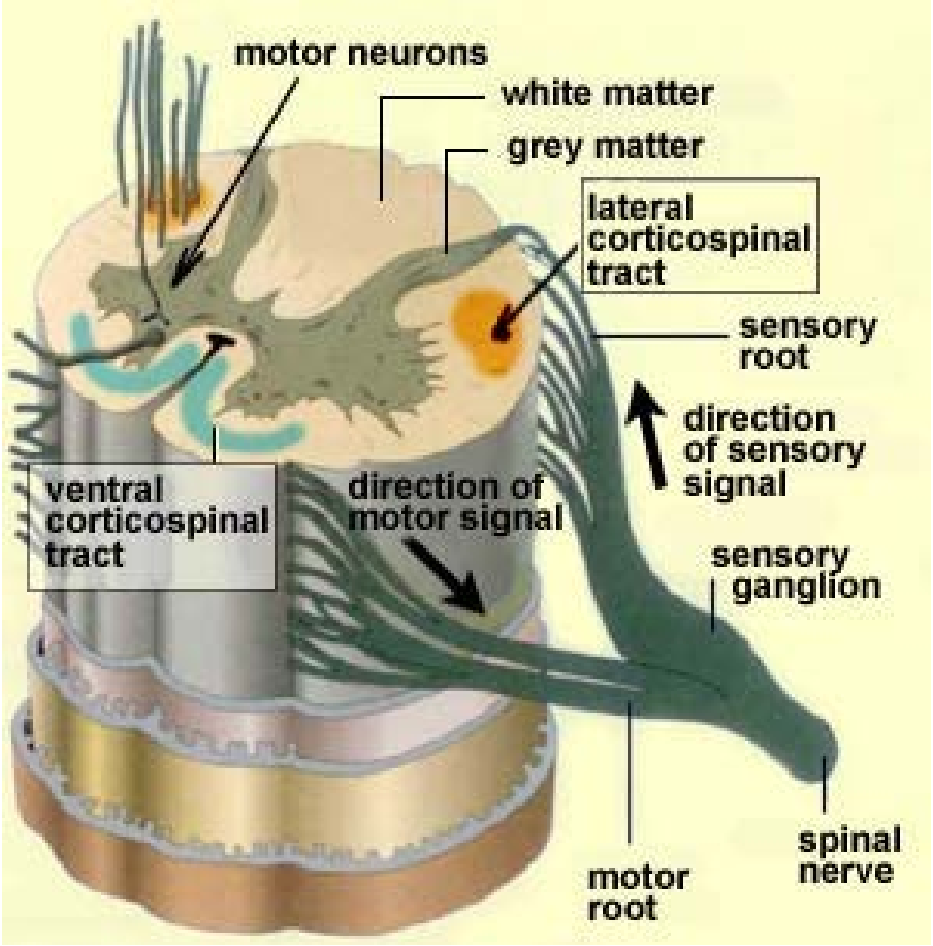


- UMN
- Corticospinal Tract
  - Motor
  - Crosses at Brain Stem
- Dorsal Column
  - Vibration/position
  - Crosses at Brain Stem
- Spinothalamic tract:
  - Pain/temp
  - Crosses at spinal level

Nerve Roots

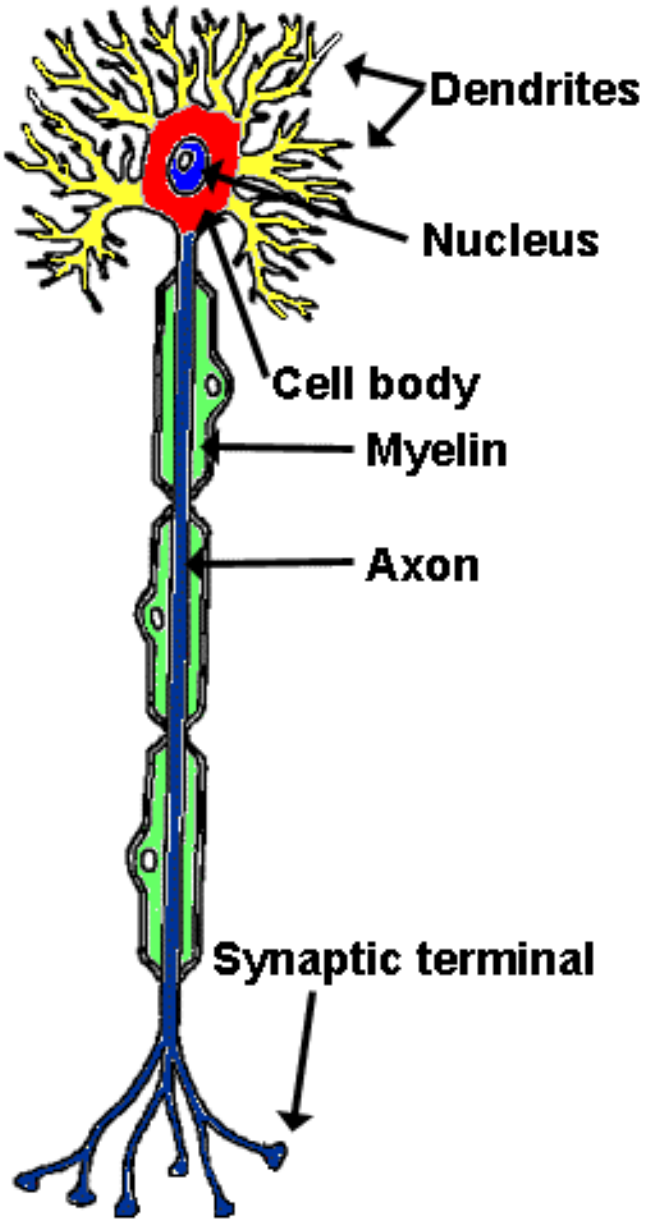
- LMN
- Dorsal and Ventral Horns - compressive
- Plexi – compressive/inflammatory

Nerve Roots (where UMN→LMN)



Nerves

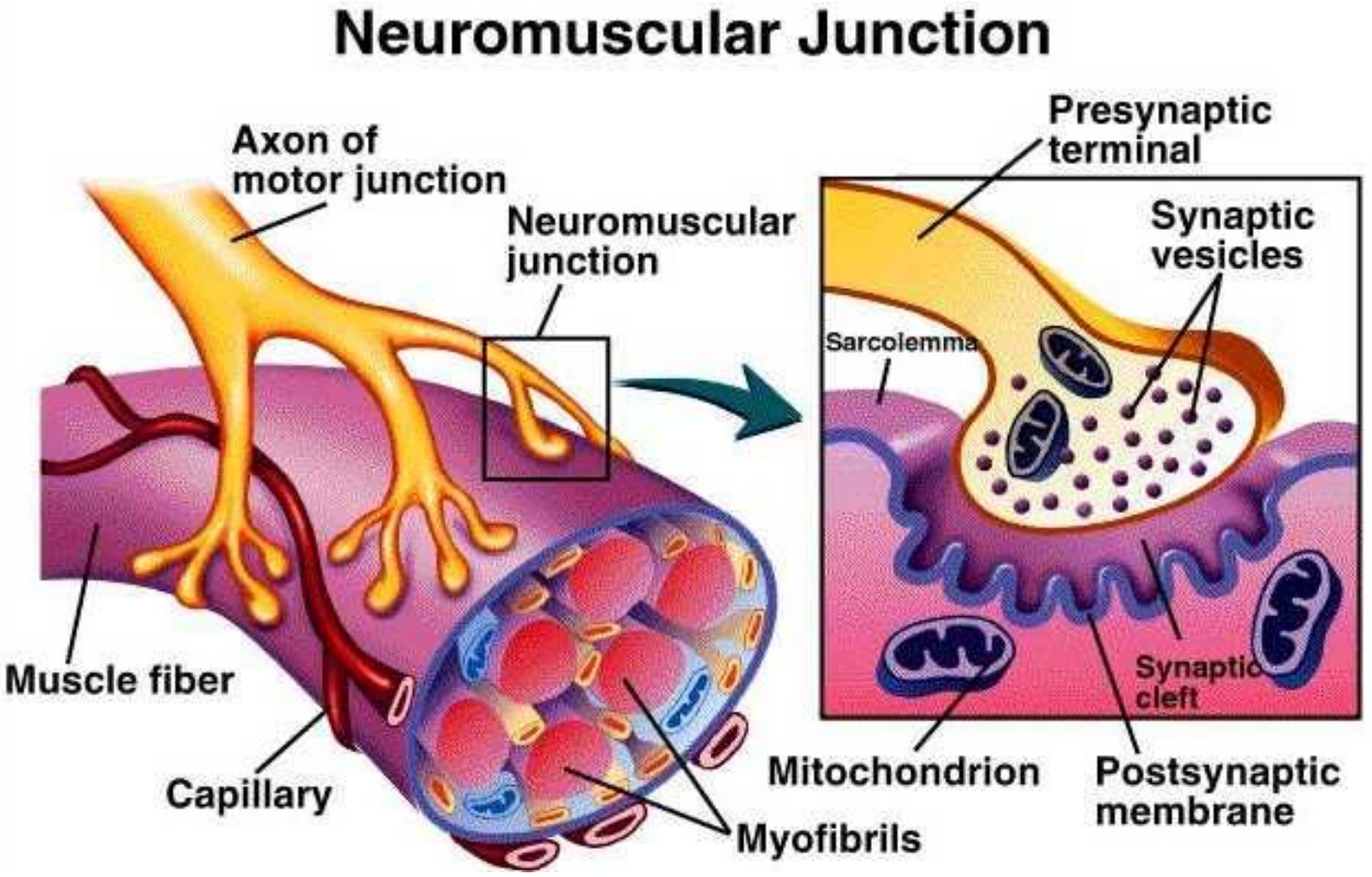
- LMN
- Large or small nerves
- Sensory or motor
- Demyelinating or axonal
- Symmetric or patchy



Peripheral Nerve

Neuromuscular junction

- Prototype disease
  - Myasthenia Gravis
- Others:
  - Botulism
  - Venoms
  - NM blockers
- Pre- versus post synaptic



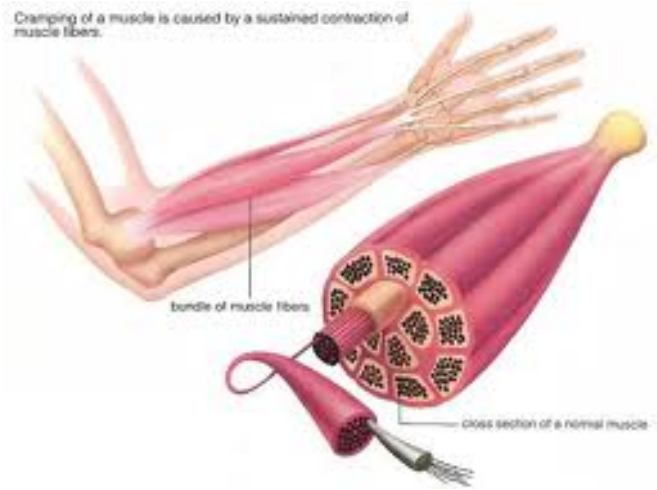
- Motor only; symmetric, ocular muscles
- Fatigable or facilitated
- Autoimmune or toxin

Muscle

- Motor only
- Reflexes normal or down

- Inflammatory (Polymyositis)
- Toxic/Metabolic (EtOH, Statin, Steroid)
- Hereditary (Dystrophies)
- Traumatic

Muscle

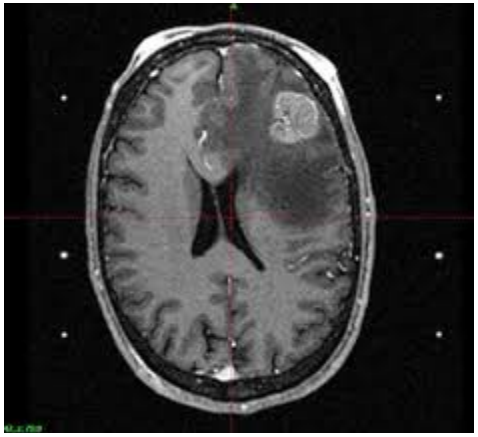


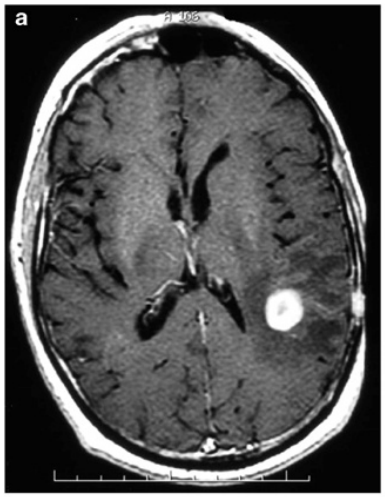
- LMN
- Motor only
- Bilaterally symmetric
- Reflexes normal or down
- Inflammatory (Polymyositis)
- Toxic/Metabolic (EtOH, Statin, Steroid)
- Hereditary (Dystrophies)

INTERACTIVE CASES I

Case 1

- 58 year old man with weakness

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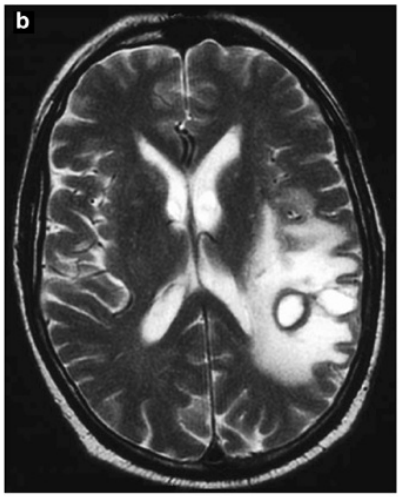
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Headaches: Red Flags

- Sudden onset severe new headache lasting >1 hour usually > 24hours
- Neck stiffness, rash, ↓LOC, vomiting
- ↑ with valsalva/visual changes
- Associated neurological symptoms/signs
- Gradual worsening over weeks/months without relief (except if position related)
- New onset HA age>50

Case 2

- 34 year old woman with worsening headaches

Non-structural HA causes

- Analgesic Rebound/overuse HA
- Vitamin deficiency
  - Vitamin B12, (Vitamin B2, Vitamin D, Vitamin B6)
- Other deficiencies
  - Iron deficiency, (magnesium, copper and zinc)
- Metabolic causes
  - Hypothyroidism, diabetes
- Allergies
  - Gluten and Dairy
- Inflammatory conditions
- Sleep apnoea and CO poisoning

Benign Headaches

- Exclude analgesic rebound headache
- Migraine: 5,4,3,2,1 Rule
  - ≥ 5 episodes
  - 4 hours to 3 days
  - ≥ 2: unilateral, pulsating, mod-severe, ↑exer.
  - ≥ 1: nausea/vomiting, photo-, phonophobia
- Chronic Daily Headache
  - >15 Headache Days per month
- Tension type Headache

Patient Profile of Migraineurs

- General sensitivities: sun light, noise, smells
- Insomnia
- Nausea and motion sickness
- Paraesthesias
- Abdominal and chest pains
- "Growing pains"
- Dizziness, presyncope
- Anxious mood/worrier type
- Lower basal body temperature
- Strong familial component
- GI complaints (IBS)

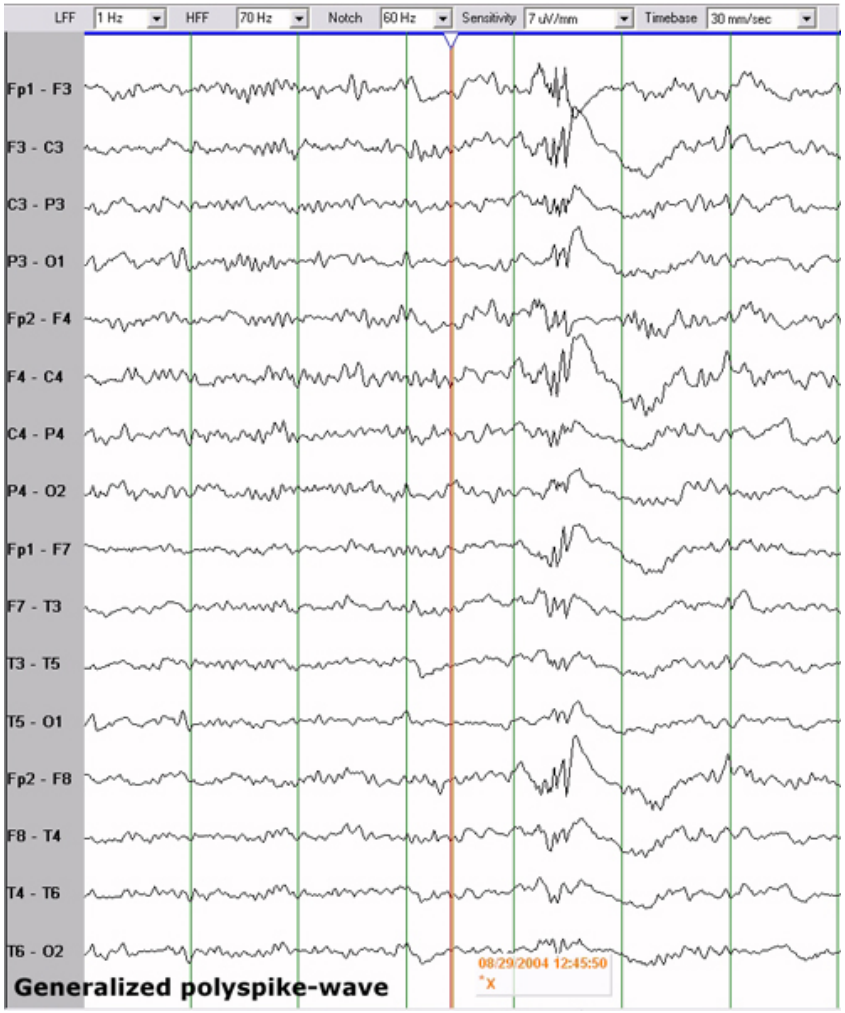
Treatment Plan

- Reassure patient; investigate fears
- Outline goals, responsibilities, and f/u plan
- Trigger identification and control
- Physical/Behavioural/Herbal Treatments
- Abortive medical treatments
- Preventive medical treatments
  - ≥ 6 (4) HA days/month
  - ≥ 4 (3) days of some impairment due to HA
  - ≥ 3 (2) days of bed rest/severe impairment/month
- Psychological counseling

Case 3

- 15 year old girl with collapse

EEG: Polyspike and wave



Diagnosing Seizures

- Does the turn fit with a seizure?
  - Auras
  - Blank stares
  - Automatisms
  - Fits
- Associated features
  - Post-ictal, tongue biting, urinary incontinence, jerks, triggers, focal signs/sx
- Syncopal Seizure

Pseudoseizures

- 'Non-epileptic' seizures; 'functional'
- Hip thrusting, head shaking, eyes closed
- Prolonged, fluctuating, asymmetric, bicycling,
- Triggers
- Urinary incontinence, tongue biting
- Location of events, soft-toy, psychiatric history, occupation

Diagnosing Epilepsy Criteria - New

- 2 seizures in >24 hrs → epilepsy
- 1 seizure and clear recurrence risk
- Focal (=Partial) vs generalised (b/l)
- Structural/metabolic ('Symptomatic') vs genetic ('idiopathic')
- Syndromes have remained the same
- Now possible to be 'cured' (either a self-limited epilepsy or 10 years without – 5 w/o meds)

Diagnostic Approach

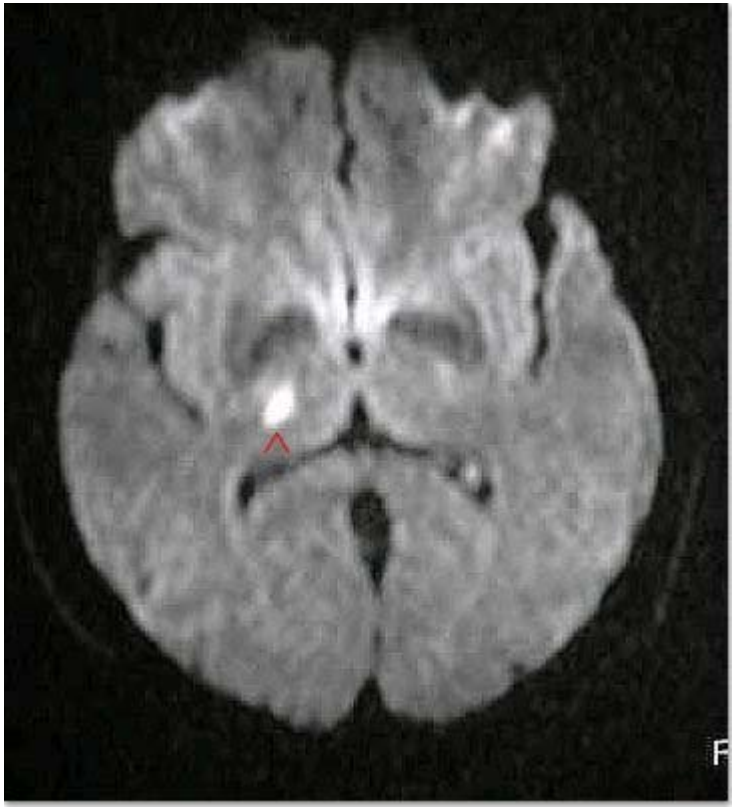
- First seizure presentation:
  - Was it a seizure and was it the first?
  - EEG: normal, focal, generalised
  - If normal/focal → MRI or CT with contrast
- Driving and seizure precautions

Treating Epilepsy

- Wait till second seizures; explore pt fears
- Choosing a drug
  - Type of epilepsy
  - Side effects
  - Clearance/Interactions
- Monitoring and checking levels
  - Phenytoin and Carbamezepine
  - Interactions
- Epilepsy surgery
- Counseling & Stigma (SUDEP 1/1000 – 1/150)

Case 4

- 75 year old man with weakness



TIA and Stroke

- Sudden onset of a focal neurological sign
- LOC or confusion are not typical stroke symptoms
- Most TIAs resolve rapidly (<1 hr)
- All strokes and TIAs require urgent assessment to maximise good outcome
- Triage to inpatient or rapid outpatient assessment based on risk category
- Even mild stroke need rehab assessment

High Risk Patients

- "Active" TIA (symptoms ongoing ?stroke)
- ABCD2 score ≥4 (7 day stroke risk 6-12%)
- Crescendo TIAs (2 or more over past week)
- Atrial Fibrillation or on Anticoagulation
- → send to A&E for stroke team r/v within 24 hours or same/next day TIA clinic if available

Low Risk Patients

- ABCD2 score ≤ 3 (7 day stroke risk 1-2%)
- People who present late (after one week)

- → refer to TIA clinic or manage in the community;
- management to be completed within 7 days

Management

- Investigations: Labs, ECG, CT, +/- US
- Meds: Clopidogrel OR Aspirin +/- Dipyridamole, Statin, Antihypertensive
- Warfarin/Dabigatran instead of ASA if A. Fib
- → **decreases 90 day risk from up to 18% to 1-2%**
- IF started at FIRST point of contact (<6hrs)

- + Life-style advice and driving advice

New Developments

- Intra-arterial clot retrieval
  - Me CLEAN, EXTEND-IA, ESCAPE trials
  - 71% versus 40% independent at 90 days
  - 53% versus 29% independent at 90 days
  - 20% vs 10% death at 90 days
  - Highly selected patients; faster treatment times
  - → TIME is BRAIN act FAST
  - Also note dual antiplatelet Rx for 3 weeks after high risk TIA and minor stroke

FASTEST Trial

- Multi-centre cluster randomised controlled trial
- Either usual care or care using the bpac TIA/Stroke electronic decision support tool

Bpac TIA/Stroke EDS

- Provides diagnotic, triage, and management help to GPs – inherently educational
- Links to PMS, pre-populates fields, prescriptions, referrals
- Allows GP to manage in community and order tests, but defaults to specialist referral
- Goal is to increase referral of appropriate patients, better guideline adherence earlier BMT, improve health care efficiency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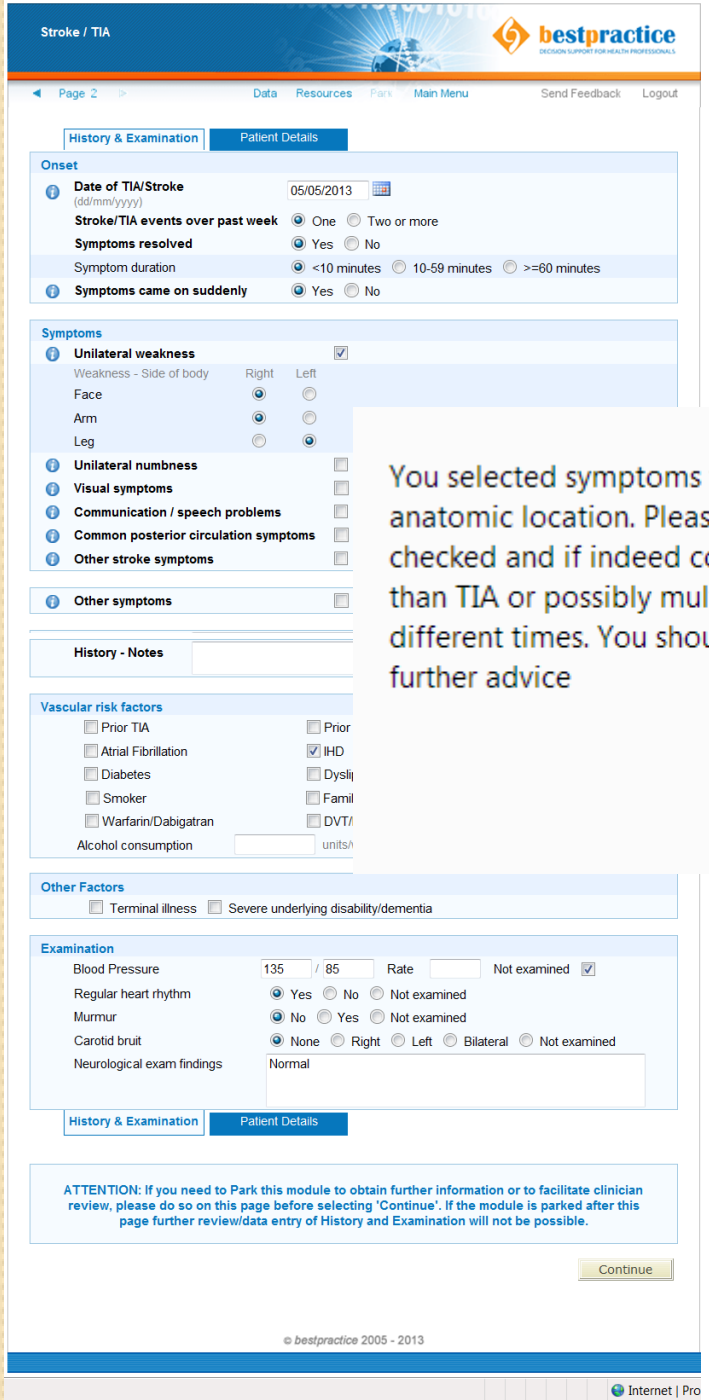
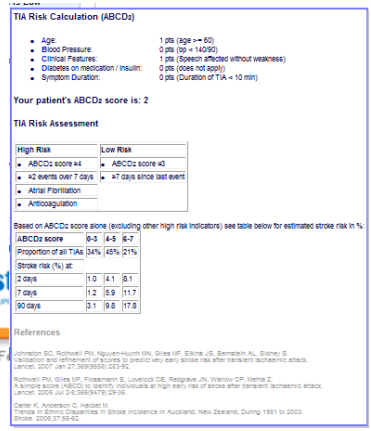
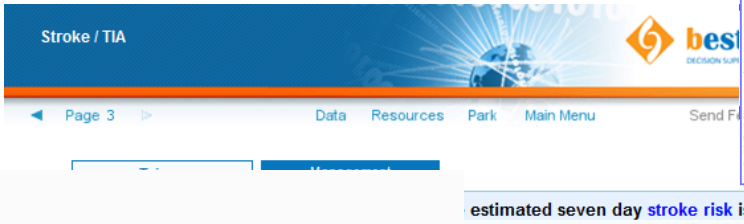


You selected symptoms that do not fall into a single anatomic location. Please double check the boxes that you checked and if indeed correct consider a diagnosis other than TIA or possibly multiple TIAs if symptoms occurred at different times. You should also consider specialist input for further advice

OK





estimated seven day stroke risk is Low

ry):

ILESS patient is on Warfarin or Dabigatran)

g for minimum of 1 month.

nmendations:

lass 1 and 2)

no driving for minimum of 1 month.

s: no driving for minimum of 3 months provided the condition has been investigated and treated.

2. **Vocational license (Classes 2-5 and/or a P,V,I or O license endorsement)**
   - Single TIA: no driving for a minimum of 6 months and then only if cause has been identified and satisfactorily treated, including a specialist assessment. Note that these individuals may resume private driving after a minimum of 1 month.
   - Multiple TIAs: people should not return to vocational driving. However the Director of Land Transport may consider granting a license 12 months after the last attack if an appropriate specialist report supports such an application.

ATTENTION: Please ensu
handing them to the patien

FASTEST Trial

- Multi-centre, single-blind, parallel, cluster randomized controlled trial (1:1) comparing management with or without electronic decision support

- Cluster (GP Practice) inclusion criteria:
  - Located in NZ districts with access to an organized guideline based specialist TIA service; Electronic health record system compatible with EDS
- Patient inclusion criteria:
  - Initial assessment through general practitioner (GP)
  - GP suspected likely TIA/stroke
- Outcomes:
  - Primary: 90 day stroke rate; guideline adherence
  - Secondary: 90 day 'stroke or TIA' rate, 90 day composite 'vascular event or death' rate; comprehensive counseling; adverse events, cost; user feedback
  - Sub-group analysis of confirmed TIAs and Strokes
- Multi-level mixed effects regression analysis fitting cluster as a random effect. ICC also reported. Stata 12.0

FASTEST: Main Outcomes

Variable	Intervention n=172	Control N=119	OR (95%CI)	p	OR (95%CI) (cluster)	P (cluster)
Guideline Adherence (%)	131 (76.2)	49 (41.2)	7.73(4.52-13.21)	<0.0001	7.8(2.3-27.1)	<0.001
Stroke at 90 days (%)	2 (1.2)	5 (4.2)	0.27(0.05-1.41)	0.098	*	*

Secondary Outcomes

Variable	Intervention n=172	Control n=119	OR (95%CI)	p	OR (95%CI) (cluster)	p (cluster)
Stroke or TIA at 90 days (%)	3 (2.0)	10 (8.5)	0.26 (0.08-0.85)	0.018	0.26(0.07-0.97)	0.045
Vascular event or death at 90 days (%)	6 (3.5)	14 (11.9)	0.27(0.10-0.73)	0.006	0.27(0.09-0.78)	0.016
Comprehensive Counselling (%)	68 (39.5)	19 (16.0)	3.44(1.93-6.13)	<0.0001	3.44(1.89-6.27)	<0.001

Variable	Mean		Cost Difference	Cost Ratio	Unadjusted		Cluster Adjusted	
	Intervention N=172	Control N=119			95% CI	p	95% CI	P
Cost	$2,373	$3,852	-$1479	0.65	0.49-0.87	0.004	0.47-0.91	0.013

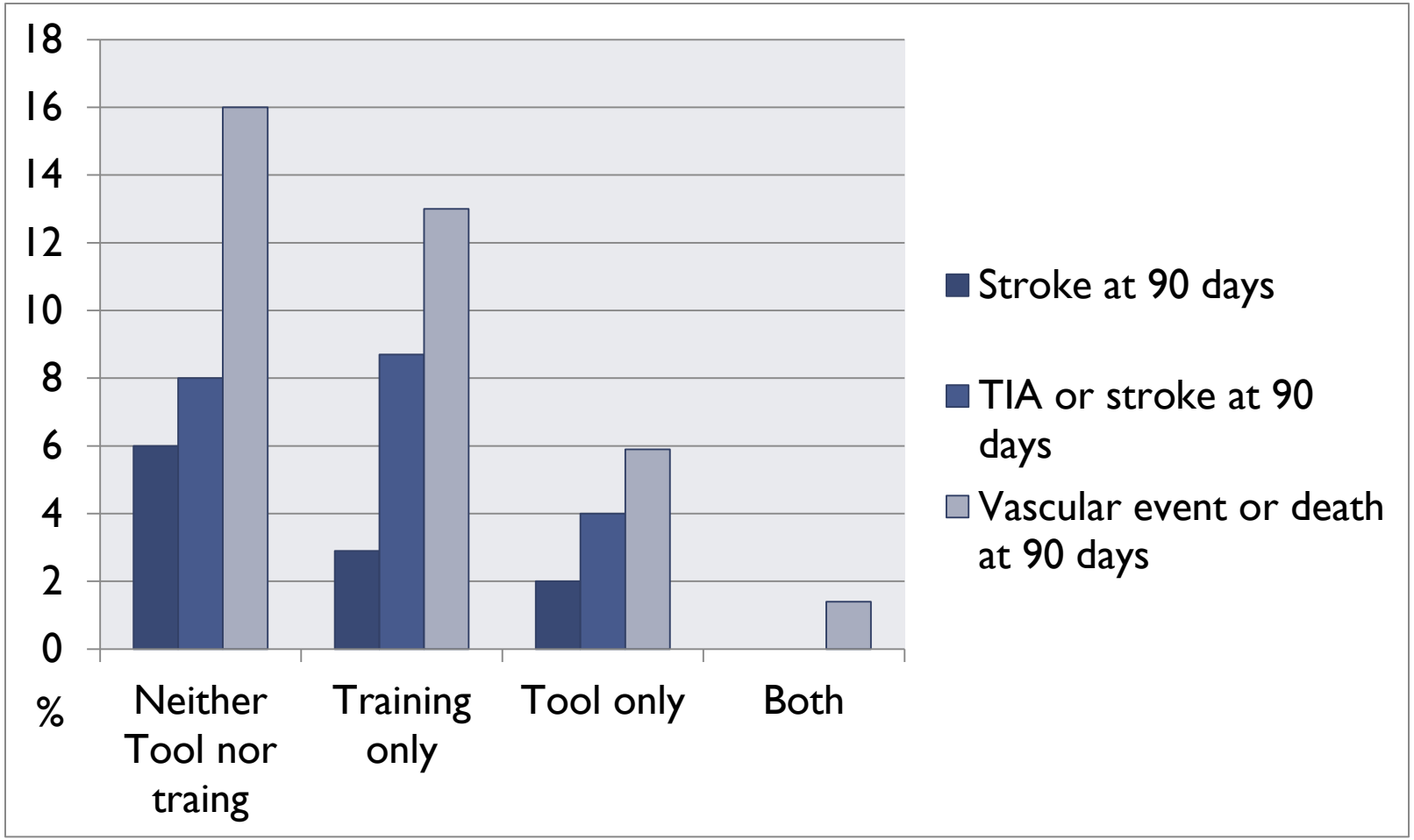
GP Feedback

- 55% of GPs would use all the time and 97% most of the time (control: 23%/48%)
- 'Allows quick evidence based decision making in a short consultation and no need to duplicate notes or letter'
- 'Especially good for situations where diagnosis unclear'
- 'Of all the things looked at this is the most professionally developed!'

Specialist Feedback

- "EDS use improved standard of referrals because of added core information."
- "Most people are arriving with Aspirin and Statin and some improved awareness about driving."
- "I think the advice about the secondary preventative measures to start them straight away and reminding GPs what they should prescribe is very good. It also helps them to identify true TIAs and sending referrals in a timely fashion."
- "Increased referrer confidence."

Effect of Training



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Cluster randomized controlled trial of TIA electronic decision support in primary care

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ABSTRACT

Objective: To test if TIA/stroke electronic decision support in primary care improves management.

Methods: Multicenter, single-blind, parallel-group, cluster randomized, controlled trial comparing TIA/stroke electronic decision support guided management with usual care. Main outcomes were guideline adherence and 90-day stroke risk. Secondary outcomes were cerebrovascular/vascular/death/adverse events, cost, and user feedback. Main analysis was logistic regression with a normal random effect for clusters using a generalized linear mixed model.

Results: Twenty-nine clinics were randomized to intervention, 27 to control, recruiting 172 and 119 eligible patients. More intervention patients received guideline-adherent care (131/172; 76.2%) than control patients (49/119; 41.2%) (adjusted odds ratio [OR] 4.57; 95% confidence interval [CI] 2.39–8.71; $p < 0.001$). Ninety-day stroke occurred in 2/172 (1.2%) intervention and 5/119 (4.2%) control patients (OR 0.27; 95% CI 0.05–1.41; $p = 0.098$). Ninety-day TIA or stroke occurrence was lower in the intervention group, 4/172 (2.3%) compared to 10/119 (8.5%) control (adjusted OR 0.26; 95% CI 0.70–0.97; $p = 0.045$). Fewer vascular events/deaths occurred in intervention, 6/172 (3.5%), than in control patients, 14/119 (11.9%) (adjusted OR 0.27; 95% CI 0.09–0.78; $p = 0.016$). Treatment cost ratio of 0.65 (95% CI 0.47–0.91; $p = 0.013$) favored the intervention without increased adverse events. Clinician feedback was positive.

Conclusion: Primary care use of the TIA/stroke electronic decision support tool improves guideline adherence, safely reduces treatment cost, achieves positive user feedback, and may reduce cerebrovascular and vascular event risk following TIA/stroke.

Classification of evidence: This study provides Class II evidence that a primary care electronic decision support tool improves guideline adherence and might reduce 90-day stroke risk.

Neurology® 2015;84:1–7

GLOSSARY

CI = confidence interval; **FASTEST** = Efficacy and Safety of a TIA/Stroke Electronic Support Tool; **GP** = general practitioner; **OR** = odds ratio.

Without optimal treatment, up to 10% of people with TIA or minor stroke will have a stroke within 90 days, most occurring within the first 7 days after a TIA/stroke.[1,2] Specialist assessment and treatment within 1–2 days of initial presentation can reduce this risk to between 1.2% and 2.1%.[2–6] However, most patients initially present to general practitioners (GP), who see very few such patients, struggle with diagnostic accuracy, and are often unfamiliar with optimum management strategies.[7–9] These circumstances can adversely impact on health care efficiency and inadvertently delay specialist review.[7,8] Furthermore, health delivery methods that are less reliant on specialist care are needed where access to specialist services is limited due to low population density, limited specialist resource availability, patient resource constraints, or cultural factors.[10–12] Initiatives that improve diagnostic/triaging accuracy and facilitate early implementation of secondary prevention in general practice may provide a widely applicable

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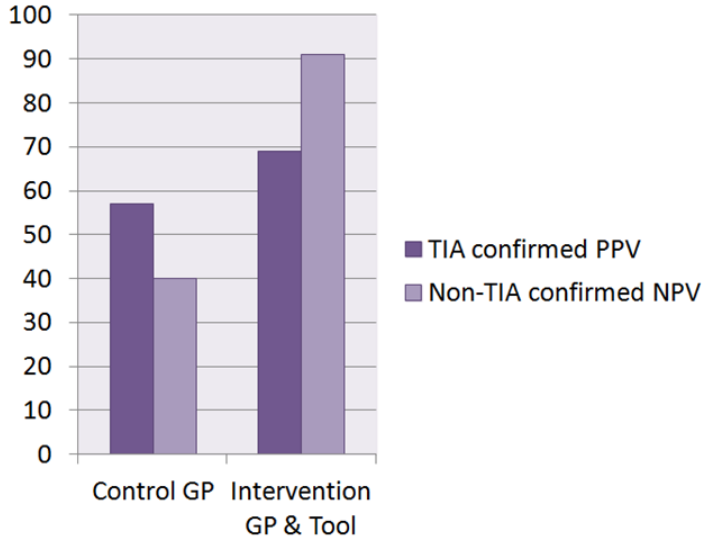
Go to Neurology.org for full disclosures. Funding information and disclosures deemed relevant by the authors, if any, are provided at the end of the article.

Diagnostic Accuracy



Roll out

- MoH funding for national roll-out
- National roll-out will occur in phases beginning this winter

INTERACTIVE CASES 2

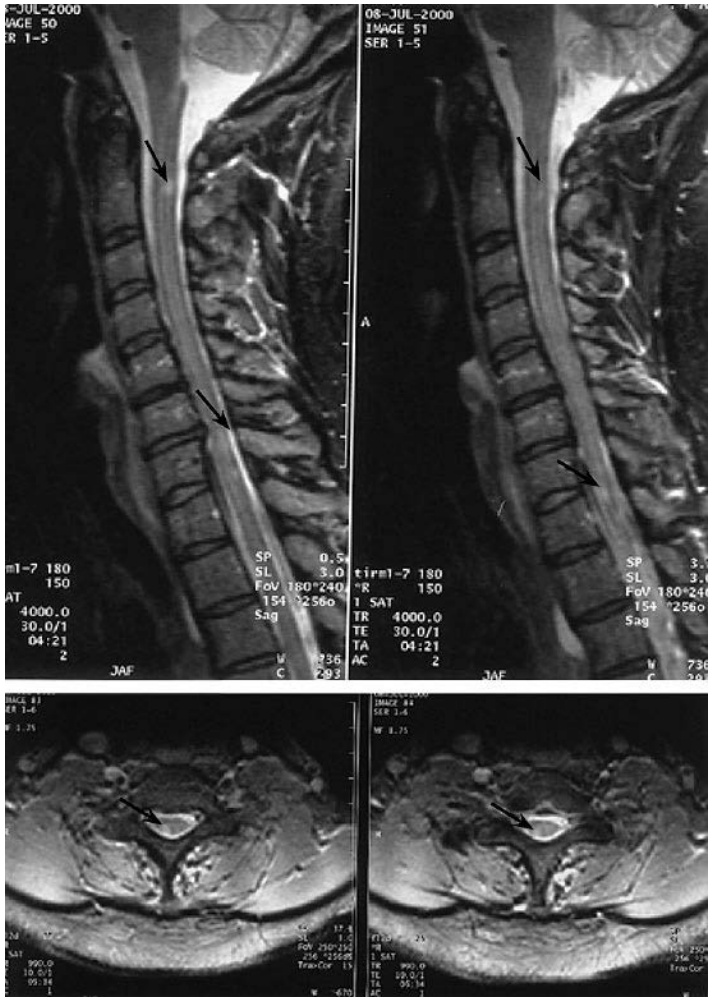
Case 5

- 35 year old woman with numbness

Approach to the numb patient

- Positive vs negative
- Anatomic pattern
  - Localisation
  - Affected modalities
- Duration (transient/progressive)
- Associated symptoms (weakness, headache, cranial nerves, ataxia)
- Risk factors (diabetes, migraine, hypertension, age)

Back to our 35 year old patient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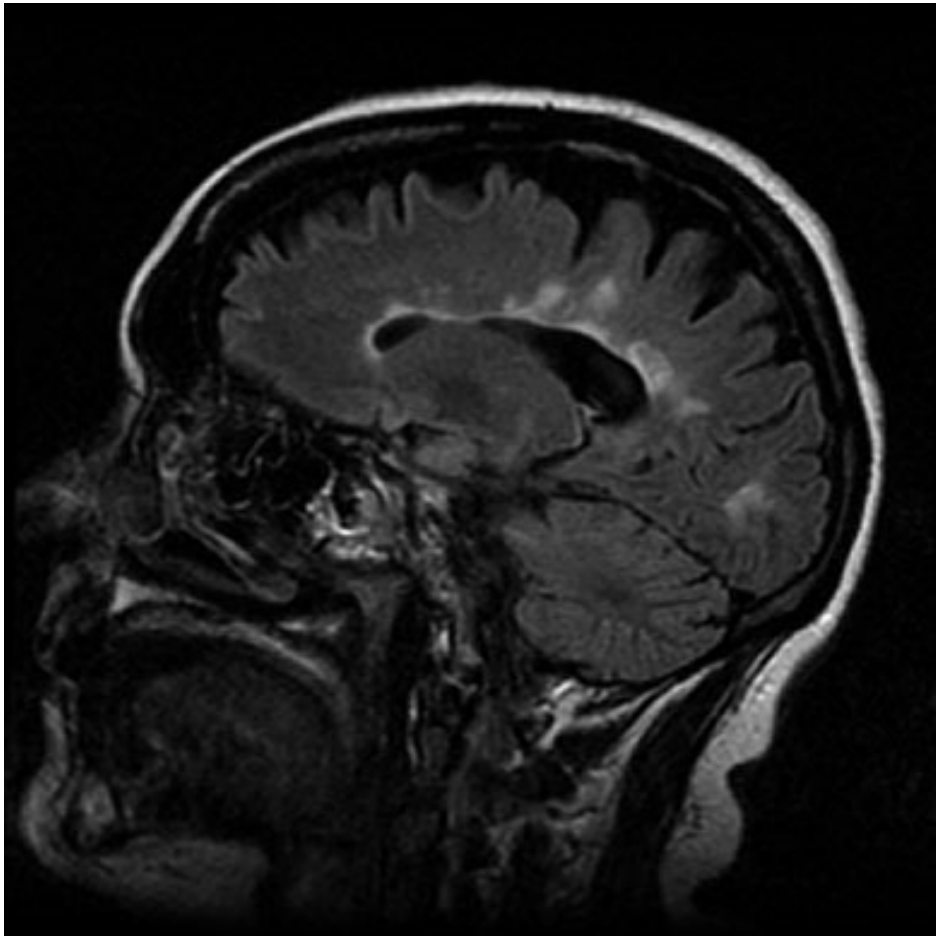


Multiple Sclerosis

- Separated in space and time
- Central nervous system disease
- MRI, LP, (EP)
- Many patients do well
- High dose steroids for acute attacks
- Disease modifying agents and documentation

NEW: MS Treatment with DMT

- CDMS (space/time - clinical), EDSS 0-4.0, stop if >4.0 (able to walk 500m unaided)
- Fingolimod
  - Daily oral
  - Immune suppression & Acute bradycardia
- Natalizumab
  - Monthly infusions
  - JCV
- Interferons/Copaxone

Case 6

- 69 year old woman with unsteady gait

Examining the unsteady patient

- CN: EOM, VF, facial symmetry, potentially dix-hallpike
- Motor: weakness, tone, tremor
- Sensory: detailed LE exam, Romberg
- Reflexes: Reduced? Babinski?
- Co-ordination: F→N, H→S, RAM, gait

Parkinson's Disease

- Parkinson's tremor
  - Focal onset
  - One limb initially (symmetric think PD+)
  - Worst at rest
  - No better with EtOH
- Diagnosis
  - Clinical and response to Dopamine
- Pitfalls
  - Impulse control and non-motor symptoms

Parkisnon's Disease Treatment

- Levodopa (Sinemet/Madopar)
- DA agonists (Ropinerole)
- MAO-B inhibitors (Selegiline)
- COMT inhibitors (Entecapone)
- Anticholinergics (Benztropine)
- Amantadine
- Deep Brain Stimulator
- PEJ dopa infusion

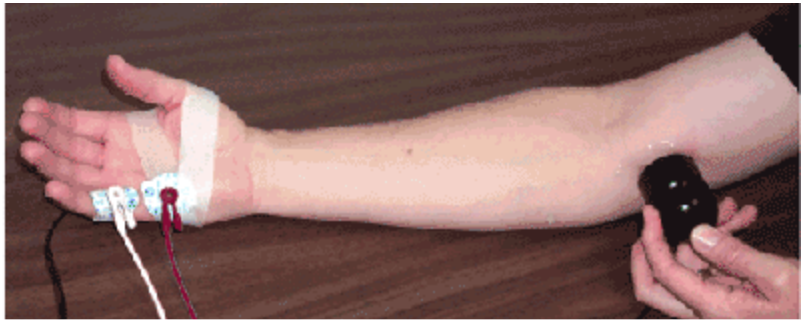
Case 7

- 49 year old man with weakness

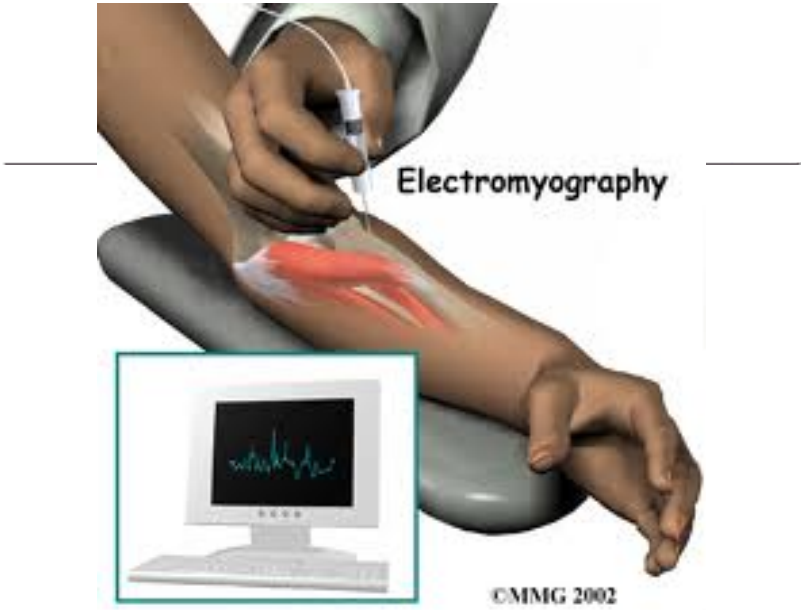
Neuropathy Causes

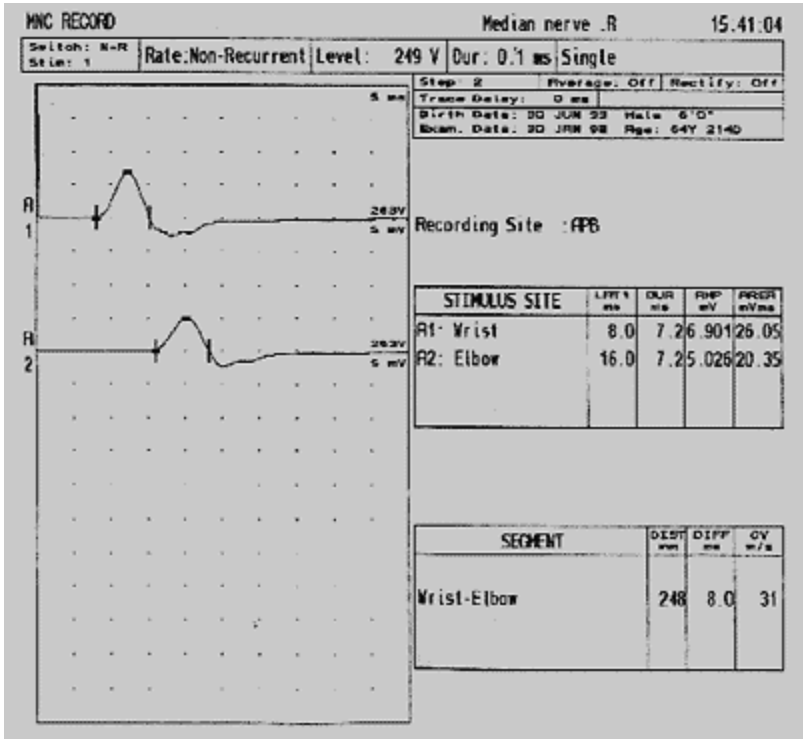
- Toxins: EtOH, metals, chemo, glucose
- Inflammatory: Sjogren's syndrome, lupus, RA, GBS, CIDP, vasculitis.
- Infections: VZV, EBV, HepC, HIV, leprosy
- Genetic: Charcot-Marie-Tooth
- Trauma/compression/tumours (para)
- Bone marrow: MM, lymphoma, amyloid
- Vitamin ↓: B-1, B-6 and B-12, E and niacin
- Other: renal, hepatic, thyroid, connective

Nerve conduction study



EMG





Case 8

- 60 year old woman with weakness

Motor Neuron Disease

- Motor only
- UMN and LMN signs (ALS)
- Need three body segments on EMG involved
- CPK moderately elevated
- DDx: spine disease, motor neuropathy, spinocerebellar atrophy, other MNDs
- Supportive care and Riluzole

Case 9

- 50 year old woman with weakness

Myasthenia Gravis

- Myasthenia Gravis:
  - Fatigability, provoked, diplolpia, ptosis
  - Can decompensate quickly
  - Long list of drugs that can cause exacerbations

PRACTICAL SESSIONS: 60 SECOND NEURO EXAM

60 sec Neuro exam

- Pre-test hypothesis → focused exam
- Big picture

1. Mental State: during interview
2. Cranial nerves: **VFs, EOM,** symmetry *(assess during interview)*
3. Motor: **drift,** HF
4. Sensory: F→N (+/- VB/temp at toes)
5. (Reflexes: +/- KJ/Babinski)
6. Co-ordination: **F→ N,** tandem gait (+/- Romberg) *(assess regular **gait** as patient enters/exits room)*

THE 10 THINGS I WAND MY GP TO KNOW ABOUT NEUROLOGY

- TIA/Stroke
  - Medical emergencies
  - Use pathway or call for help
- Headache
  - Know presentation of SAH/SOL
  - Beware of analgesic rebound & use prophylactics early
- Epilepsy
  - Drugs: know a couple then get help
  - Drug Levels: don't check without reason

- Multiple Sclerosis
  - Exacerbations need urgent treatment and specialist consultation
- Parkinson's
  - Consider and treat but beware of serious side effects
- Syncope
  - 99% cardiac origin if not seizure and not a sign of TIA or stroke
- NCS ≠ EMG

Specialist Referrals

- Phone calls
- Emails
- Letters
- Virtual Clinics and 'Note to GP'
- Neurologist workforce and health targets
- Pathways and Electronic Decision Support
- Use of private sector

Summary

- Neurology is very logical
- Memorisation isn't nearly as useful as a simple understanding of anatomy
- Before diagnosing try to localise
- Most of the answers are in the history
- When you are concerned consult pathways and call for help
- Tell us what we can do to help you more effectively

Thanks you!

QUESTIONS?

Case 1

- 58 year old man with headaches and mild right sided arm weakness
- HA x 2-3 months; worst in early a.m.
- Numbness only over past 1-2 weeks
- Has had two funny turns
- No PMH including no headaches
- On examination: B/L disc blurring, mild right arm and face weakness, right field cut, and right hyperreflexia/Babinski

Case 2

- 34 year old woman with worsening headaches
- HA for 12 weeks. On further questionstioning episodic headache since early 20s; taking neuropfen daily for four weeks.
- Occsional nausea, photosensitivity, pulsating, thrombbing
- Mostion sick
- Concerned about one episode of rigth

Case 3

- 15 year old girl with unwitnessed collapse
- Found by mum on floor next to bed
- Otherwise healthy girl
- Developmentally normal
- Maternal aunt with epilepsy
- No prior seizures
- Occasional funny jerks
- Normal neurological examination

Case 4

- 75 year old man with left sided numbness of face, arm, and leg
- Onset was sudden and has slightly improved
- No headache or change in mentation
- PMH: diabetes, hypertension, smoker
- Exam: BP 159/96, left sided numbness confirmed otherwise normal

Case 5

- 35 year old woman with right arm and leg weakness; face is fine
- Also noted difficulty telling temp on left
- Symptoms developed over 1-2 weeks
- No PMH except transient visual blurring 5 years earlier
- Sister with lupus

Case 6

- 69 year old woman with unsteady gait
- → r/v ddx first and show next slide
- Gradually worsening over 6 months
- No limb numbness or weakness
- Occasional tremor in the left arm
- Family thinks she is depressed, but she denies this
- No other significant PMH

Case 7

- GBS
- Feet numb/weak
- Pain in limbs
- Tachycardic
- 3 weeks getting worse

Case 8

- 60 year old man with 6 month h/o progressive left upper limb weakness
- Recently noted some problems on right
- Coughed a few times/choking
- Emotionally labile
- Noticed twitching

Case 9

- MG
- Weakness with arm lifting
- Progressive for 2-3 months
- Worse at end of day
- Diplopia