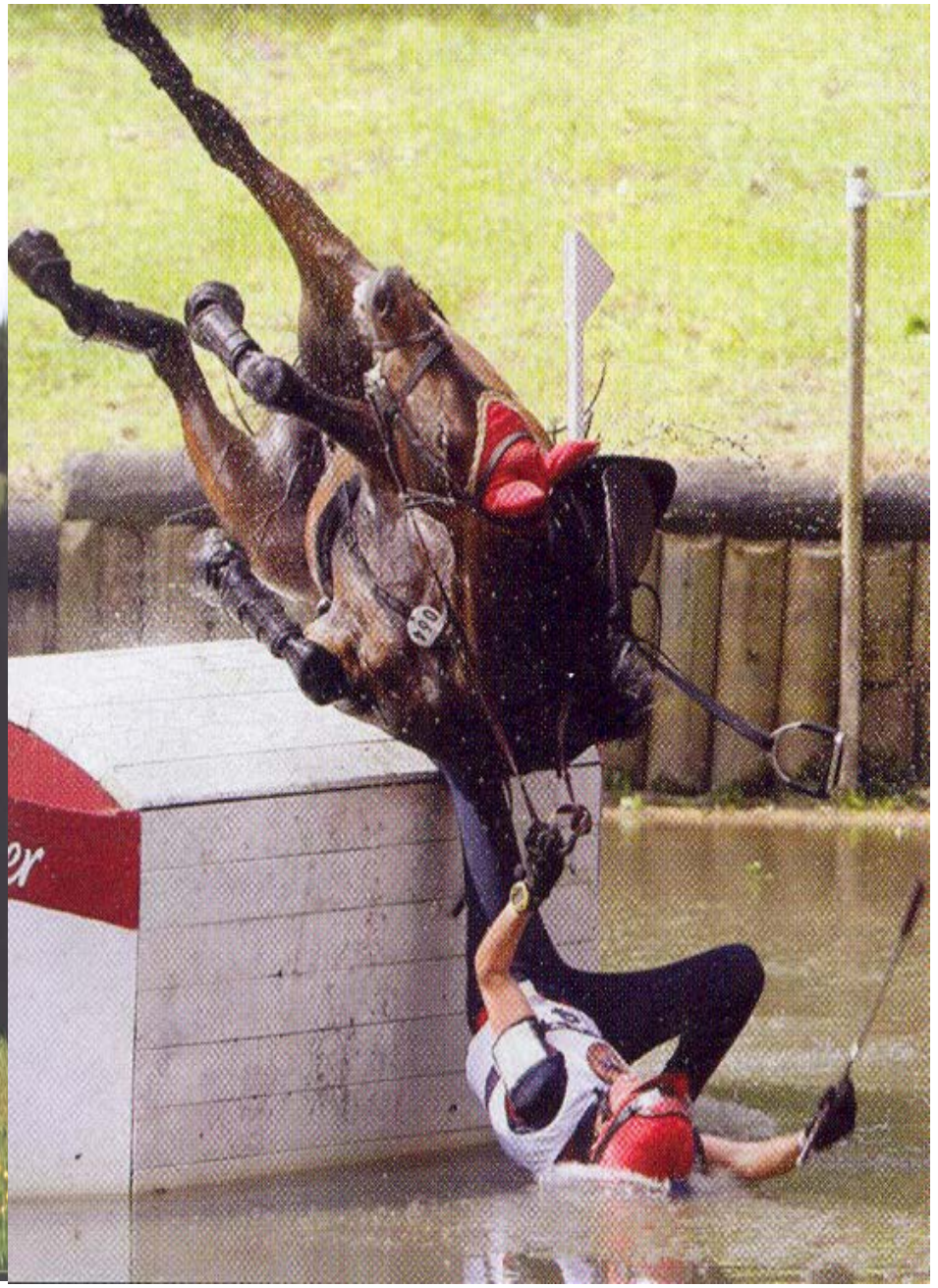
CONCUSSION
EQUESTRIAN SPORTS NZ WORKSHOP
October 8th 2018
WHERE ARE WE UP TO?

Dr Stephen Kara

Axis Sports Concussion Clinic



Number of horse related injuries decreasing, but still costing millions

Stuff March 2017

Since 2014, injuries caused by horses have been declining, with 7862 people injured last year, costing $8,280,058, according to ACC.

In 2014, there were 8916 reported injuries costing $14,302,234 and in 2015 there were 8897 costing $13,235,413.

HEAD – BRAIN – FACE – NECK
TORSO
LIMBS

Journal of Paediatrics and Child Health **53** (2017) 543–550

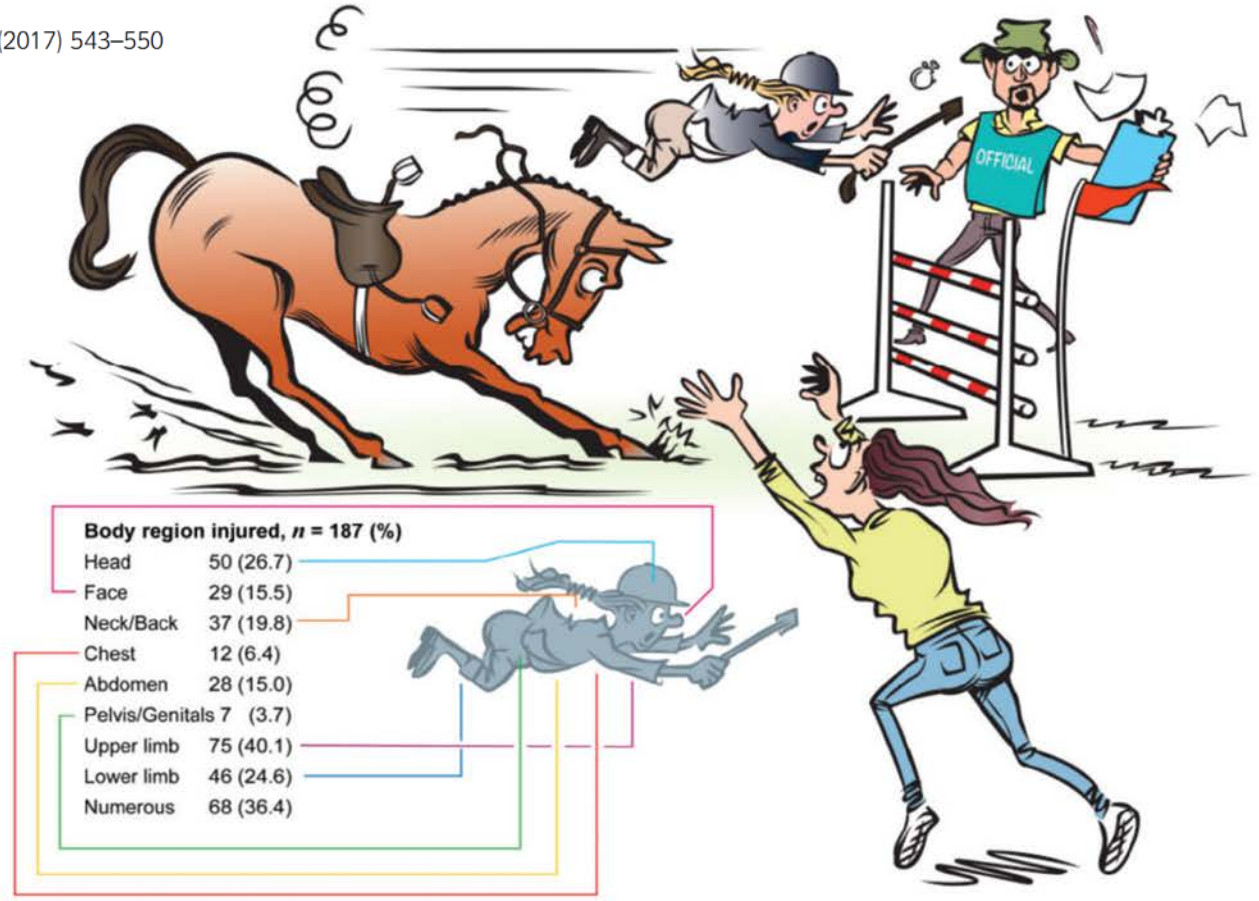


Fig. 4 Injuries to body regions.

Concussion Rates in Horse Riding range from 9 – 15% in a meta-analysis 2015 *(World Neurosurgery)*

30% of Injuries presenting to ED in Australian Study above

ACC INJURY DATA 2017

Traumatic Brain Injury (Serious)– 3

cost $50K per case*

Traumatic Brain Injury (Non-serious) - 141

cost $15K per case*

*Lifetime social rehab costs include actual paid costs to date plus estimated future cash costs adjusted for expected inflation.

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WHAT IS A CONCUSSION?

CONCUSSION IS A TRAUMATIC BRAIN INJURY

- Transient disturbance of neurological **function**
- Only <u>10% present with LOC</u>
- **lar**

PLAYER LOOKS AND FEELS TERRIBLE having sustained an impact that could have led to a concussive event

aviouralı

- <u>Direct or indirect</u> biomechanical forces

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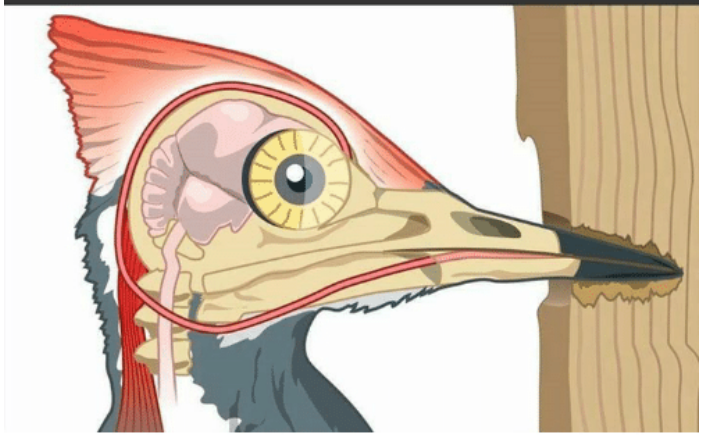
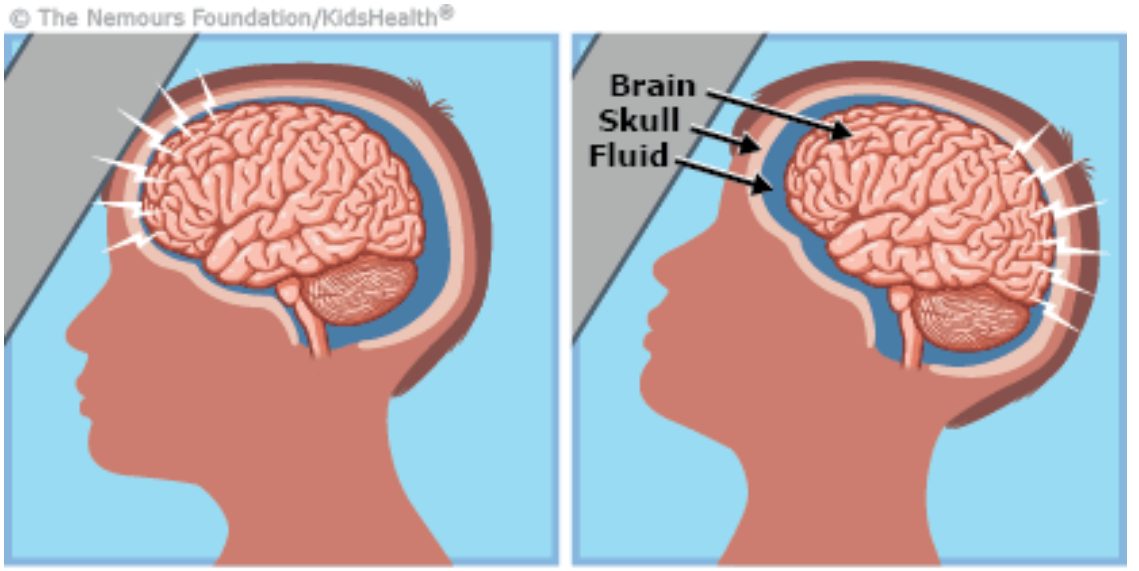
THE BEAUTY OF THE WOODPECKER

A Woodpecker's tongue actually wraps around their skull, which cushions their head and prevents brain damage.





A blow to the head causes the brain to move and hit the skull.

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KEEPING THINGS SIMPLE

6 R's

RECOGNISE

REMOVE

REFER

REST

RECOVER

RETURN

ESNZ POLICY STATEMENT

Non-medical personnel have an important role in observing possible concussion and its effects (e.g. behaviour/symptoms), and should take responsibility for removing the injured athlete from the sport/activity.

KEEPING THINGS SIMPLE

RECOGNISE

Mechanism of Injury -> Fall that rider does not land on feet

Rider does not look right

Rider acting differently

Concern from other riders

REMOVE

For the day & not to return

Issue a Blue Card

REFER

For a medical opinion re diagnosis

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Concussion and Serious Injury Blue Card

ESNZ takes concussion injuries very seriously. Concussion is the most common head injury in sport. In equestrian sports it occurs when a rider receives an impact to the head or body that causes the brain to shake inside the skull.

Concussion may occur with or without loss of consciousness. If concussion is suspected, it's everybody's responsibility to make sure the affected person is given the help they need. ESNZ supports officials in managing concussion and serious injuries with our **Concussion Policy** here and Blue Card process here.

Immediate Visual Indicators of Concussion Include

a) Loss of consciousness or responsiveness;

b) Lying motionless on the ground/slow to get up;

c) A dazed, stunned, blank or vacant expression;

d) Appears confused or disorientated

e) Appearing unsteady on feet, balance problems or falling over;

f) Grabbing or clutching of the head; or

g) Impact seizure or convulsion

If rider falls and does not land on feet be suspicious

Concussion Can Include One or More of the Following Symptoms

a) Somatic symptoms - headache, dizziness, 'feeling in a fog', noise or light sensitive, nausea, vomiting

b) Behavioural changes

c) Cognitive impairment - slowed reaction times, confusion/disorientation - not aware of location or event, poor attention and concentration, loss of memory for events up to and/or after the concussion.

d) Balance problems including dizziness, lightheadedness or vertigo

e) Blurred or double vision

f) Mood changes – more emotional, irritability, more nervous or anxious

g) Fatigue – more tired post riding than they usually are

h) Neck related pain & headache

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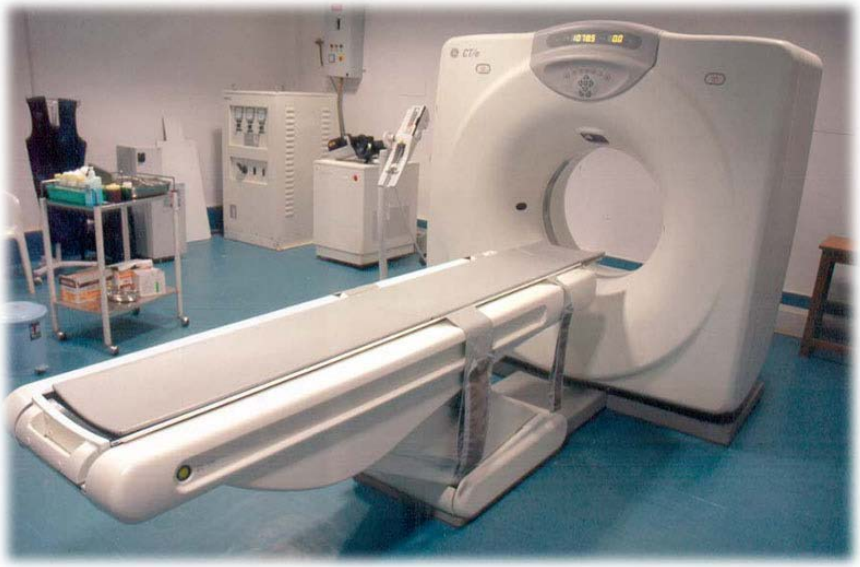
What Requires Hospitalisation?

Athlete complains of neck pain
Weakness or tingling/burning in arms or legs
Deteriorating conscious state
Double vision
Repeated vomiting
Severe or increasing headache
Seizure or convulsion
Unusual behaviour change
Increasing confusion or irritability
Amnesia >30mins
Prolonged LOC >5mins
Child <13yrs
Person on blood thinning medications
such as Aspirin / Warfarin
Personal Hx of bleeding or clotting disorder



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SECTION 2 - Pitch-side Head Injury Assessment - continued		
ANSWER ALL QUESTIONS – Any column 1 answer = NO return to play	**1**	**2**
Immediate memory (ABNORMAL result is a score < 12 or less than baseline)	Abnormal	Normal
Option 1 - elbow / apple / carpet / saddle / bubble		
Option 2 - candle / paper / sugar / sandwich / wagon		
Option 3 - baby / monkey / perfume / sunset / iron		
Digits backwards (ABNORMAL result is a score < 3 or less than baseline)	Abnormal	Normal
Option 1 numbers: 4-3-9 / 3-8-1-4 / 6-2-9-7-1 / 7-1-8-4-6-2		
Option 2 numbers (if needed): 6-2-9 / 3-2-7-9 / 1-5-2-8-6 / 5-3-9-1-4-8		
Tandem gait (NORMAL result is one score ≤ 14 seconds)	Abnormal	Normal
Tandem gait results in seconds 1_____ 2_____ 3_____ 4_____		
Symptom checklist	Yes	No
Do you have a headache?		
Do you have any dizziness?		
Do you have any 'pressure in your head'?		
Do you feel nauseated or do you feel like vomiting?		
Do you have any blurred vision?		
Does the light or noise worry you?		
Do you feel as though you are slowing down?		
Do you feel like you are 'in a fog'?		
Do you feel unwell?		
Delayed Recall (ABNORMAL is a score < 3 or less than baseline)	Abnormal	Normal
Test recall of immediate memory words		
Clinical signs	Yes	No
Emotional - sad, anxious, nervous, irritable		
Drowsy / has difficulty concentrating		
Doctor performing HIA suspects concussion despite above tests being normal		

Concussion Recognition Tool 5

CONCUSSION RECOGNITION TOOL 5©

To help identify concussion in children, adolescents and adults

Supported by

RECOGNISE & REMOVE

Head impacts can be associated with serious and potentially fatal brain injuries. The Concussion Recognition Tool 5 (CRT5) is to be used for the identification of suspected concussion. It is not designed to diagnose concussion.

STEP 1: RED FLAGS — CALL AN AMBULANCE

If there is concern after an injury including whether ANY of the following signs are observed or complaints are reported then the player should be safely and immediately removed from play/game/activity. If no licensed healthcare professional is available, call an ambulance for urgent medical assessment:

- **Neck pain or tenderness**
- **Double vision**
- **Weakness or tingling/ burning in arms or legs**
- **Severe or increasing headache**
- **Seizure or convulsion**
- **Loss of consciousness**
- **Deteriorating conscious state**
- **Vomiting**
- **Increasingly restless, agitated or combative**

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Assessment for a spinal cord injury is critical.
- Do not attempt to move the player (other than required for airway support) unless trained to so do.
- Do not remove a helmet or any other equipment unless trained to do so safely.

If there are no Red Flags, identification of possible concussion should proceed to the following steps:

STEP 2: OBSERVABLE SIGNS

Visual clues that suggest possible concussion include:

- Lying motionless on the playing surface
- Slow to get up after a direct or indirect hit to the head
- Disorientation or confusion, or an inability to respond appropriately to questions
- Blank or vacant look
- Balance, gait difficulties, motor incoordination, stumbling, slow laboured movements
- Facial injury after head trauma

STEP 3: SYMPTOMS

- Headache
- "Pressure in head"
- Balance problems
- Nausea or vomiting
- Drowsiness
- Dizziness
- Blurred vision
- Sensitivity to light
- Sensitivity to noise
- Fatigue or low energy
- "Don't feel right"
- More emotional
- More Irritable
- Sadness
- Nervous or anxious
- Neck Pain
- Difficulty concentrating
- Difficulty remembering
- Feeling slowed down
- Feeling like "in a fog"

STEP 4: MEMORY ASSESSMENT

(IN ATHLETES OLDER THAN 12 YEARS)

Failure to answer any of these questions (modified appropriately for each sport) correctly may suggest a concussion:

- "What venue are we at today?"
- "Which half is it now?"
- "Who scored last in this game?"
- "What team did you play last week/game?"
- "Did your team win the last game?"

Athletes with suspected concussion should:

- Not be left alone initially (at least for the first 1-2 hours).
- Not drink alcohol.
- Not use recreational/ prescription drugs.
- Not be sent home by themselves. They need to be with a responsible adult.
- Not drive a motor vehicle until cleared to do so by a healthcare professional.

ANY ATHLETE WITH A SUSPECTED CONCUSSION SHOULD BE IMMEDIATELY REMOVED FROM PRACTICE OR PLAY AND SHOULD NOT RETURN TO ACTIVITY UNTIL ASSESSED MEDICALLY, EVEN IF THE SYMPTOMS RESOLVE

© Concussion in Sport Group 2017

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Riding Specific Maddocks like Questions

Failure to answer any of these questions may suggest a concussion.

- Where are you riding today?
- What time is it now?
- How did you go in your last event?
- What day/month is it?
- What just happened?

NUMEROUS APPS TO DOWNLOAD

- Useful as a possible diagnostic tool in the community

BUT NEVER TO RETURN A RIDER TO COMPETITION

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Why is it important to stop sport participation after sustaining a concussion?

- Exposure to further head impacts can (rarely) result in the development of **second impact syndrome** and death
- Increased risk of developing **Post Concussion Syndrome = Persistent Concussion Symptoms** (longer to recover)
- Increased risk (<3x) of **further concussion or other injury** due to impaired cognition / thinking, reaction time and balance
- **Impaired personal and team performance**.
- Potentially increased risk of developing **long term neurodegenerative problems including Chronic Traumatic Encephalopathy (CTE**).

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KEEPING THINGS SIMPLE

6 R's

RECOGNISE

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What should I expect from my health professional?

History

- mechanism / events / subsequent symptoms (physiological, vestibular, cervical)
- impact of exertion and cognition on symptoms
- ability to perform usual tasks

Modifiers to Recovery

- number of previous concussions and recovery time
- mental health disorders (past & current)

Physical Examination

- SCAT 5 Form for patient reported symptom load
- SCAT 5 Form for neurocognitive testing including balance assessment
- cervical spine examination
- neurological examination: cranial nerves I – VIII & peripheral nervous system
- vestibular examination (VOMS Tool)

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STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:							of 22
Symptom severity score:							of 132
Do your symptoms get worse with physical activity?						Y	N
Do your symptoms get worse with mental activity?						Y	N

STEP 3: COGNITIVE SCREENING

Standardised Assessment of Concussion (SAC)[4]

ORIENTATION

What month is it?	0	1
What is the date today?	0	1
What is the day of the week?	0	1
What year is it?	0	1
What time is it right now? (within 1 hour)	0	1
Orientation score		of 5

List	Alternate 5 word lists					Score (of 5) Trial 1	Trial 2	Trial 3
A	Finger	Penny	Blanket	Lemon	Insect			
B	Candle	Paper	Sugar	Sandwich	Wagon			
C	Baby	Monkey	Perfume	Sunset	Iron			
D	Elbow	Apple	Carpet	Saddle	Bubble			
E	Jacket	Arrow	Pepper	Cotton	Movie			
F	Dollar	Honey	Mirror	Saddle	Anchor			
					Immediate Memory Score			of 15
					Time that last trial was completed			

CONCENTRATION

DIGITS BACKWARDS

Please circle the Digit list chosen (A, B, C, D, E, F). Administer at the rate of one digit per second reading DOWN the selected column.

I am going to read a string of numbers and when I am done, you repeat them back to me in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7.

Concentration Number Lists (circle one)					
List A	List B	List C			
4-9-3	5-2-6	1-4-2	Y	N	0
6-2-9	4-1-5	6-5-8	Y	N	1
3-8-1-4	1-7-9-5	6-8-3-1	Y	N	0
3-2-7-9	4-9-6-8	3-4-8-1	Y	N	1
6-2-9-7-1	4-8-5-2-7	4-9-1-5-3	Y	N	0
1-5-2-8-6	6-1-8-4-3	6-8-2-5-1	Y	N	1
7-1-8-4-6-2	8-3-1-9-6-4	3-7-6-5-1-9	Y	N	0
5-3-9-1-4-8	7-2-4-8-5-6	9-2-6-5-1-4	Y	N	1

MONTHS IN REVERSE ORDER

Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November. Go ahead.

Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan	0 1
Months Score	of 1
Concentration Total Score (Digits + Months)	of 5

STEP 4: NEUROLOGICAL SCREEN

See the instruction sheet (page 7) for details of test administration and scoring of the tests.

Can the patient read aloud (e.g. symptom check-list) and follow instructions without difficulty?	Y	N
Does the patient have a full range of pain-free PASSIVE cervical spine movement?	Y	N
Without moving their head or neck, can the patient look side-to-side and up-and-down without double vision?	Y	N
Can the patient perform the finger nose coordination test normally?	Y	N
Can the patient perform tandem gait normally?	Y	N

BALANCE EXAMINATION

Modified Balance Error Scoring System (mBESS) testing[5]

Which foot was tested (i.e. which is the non-dominant foot) ☐ Left ☐ Right

Testing surface (hard floor, field, etc.) _____

Footwear (shoes, barefoot, braces, tape, etc.) _____

Condition	Errors
Double leg stance	of 10
Single leg stance (non-dominant foot)	of 10
Tandem stance (non-dominant foot at the back)	of 10
Total Errors	of 30

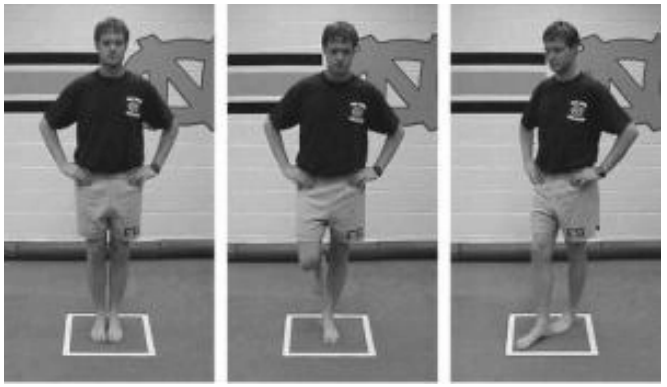

TABLE 1

Balance Error Scoring System (BESS) Scoring Errors

1. Moving the hands off of the hips
2. Opening the eyes
3. Step, stumble, or fall
4. Hip flexion or abduction greater than 30°
5. Lifting the forefoot or heel off of the testing surface
6. Remaining out of testing position for more than 5 seconds

STEP 5: DELAYED RECALL:

The delayed recall should be performed after 5 minutes have elapsed since the end of the Immediate Recall section. Score 1 pt. for each correct response.

Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order.

Time Started _____

Please record each word correctly recalled. Total score equals number of words recalled.

_____

_____

_____

Total number of words recalled accurately: _____ of 5 or _____ of 10

VOMS Screening

Vestibular/Ocular-Motor Screening (VOMS) for Concussion

Vestibular/Ocular Motor Test:	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
BASELINE SYMPTOMS:	N/A					
Smooth Pursuits						
Saccades – Horizontal						
Saccades – Vertical						
Convergence (Near Point)						(Near Point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR – Horizontal						
VOR – Vertical						
Visual Motion Sensitivity Test						

Instructions:

Interpretation: This test is designed for use with subjects ages 9-40. When used with patients outside this age range, interpretation may vary. Abnormal findings or provocation of symptoms with any test may indicate dysfunction – and should trigger a referral to the appropriate health

Provocation or exacerbation of vestibular symptoms
Nystagmus – jerky movements – undershooting on target

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KEEPING THINGS SIMPLE

6 R's

RECOGNISE

REMOVE

REFER

REST

RECOVER

RETURN

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INITIAL ACUTE MANAGEMENT

- Not to be left alone
- Be in supervised care of responsible person with a clear set of instructions on Red Flags
- Not to drive
- No alcohol
- Not to use recreational or prescription medications (Paracetamol OKAY)

4-6 hrs generally critical period

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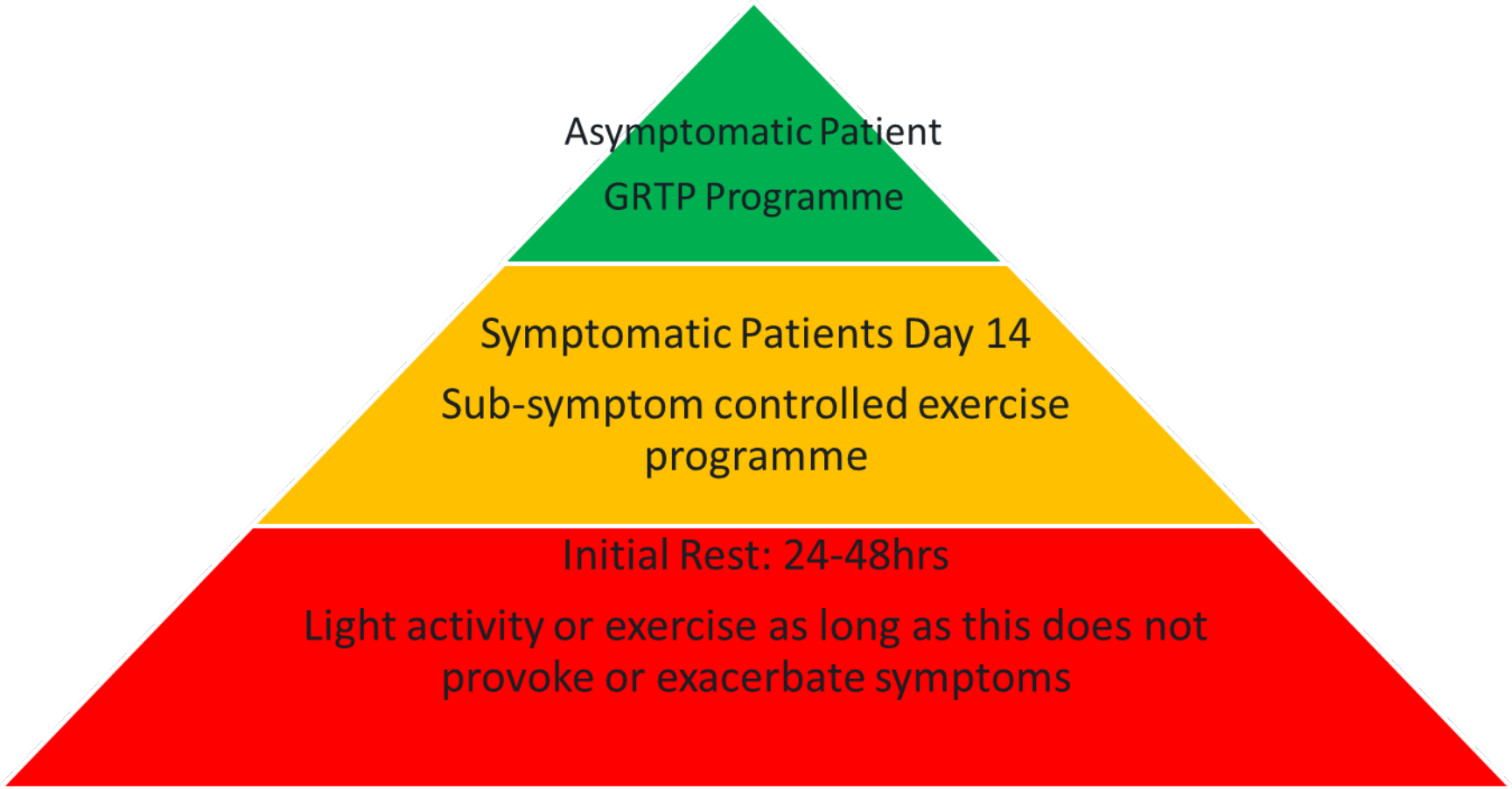
Where Do I Fit?



ASYMPTOMATIC

RETURN TO SCHOOL / WORK

AEROBIC BASED EXERCISE

RETURN TO SPORT in accordance with sporting organisation guidelines

SYMPTOMATIC

<14 Days → Relative Mental Rest / Light Aerobic Exercise

Reassess Day 14

70%

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ASYMPTOMATIC MANAGEMENT

CONCUSSION*	
Rest / No Activity Complete mental and physical rest. No screens	1-2 Days
Light Aerobic Exercise Symptom guided low-moderate intensity exercise (walking / stationary bike riding)	2 – 14 Days
Graduated Return to Riding Equine specific drills	Day 15+ providing asymptomatic Progress each stage 1-2 days

*Exception – Professional Rider

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Equestrian Sports NZ
Concussion Awareness Policy

Appendix Five

Return to Riding Stage	Functional Exercise at each stage of rehabilitation	Objective
No activity	Physical and cognitive rest	Recovery
Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity 70% of maximum predicted heart rate. No resistance (weights) training. Consider grooming and feeding your horse as part of this light exercise. Progress to barn and stall cleaning duties.	Increase heart rate
Equine specific exercise	Running, jumping or bounding type aerobic exercise that replicates the rhythmical movement of horse riding	Add movement
Low impact training drills	Low risk horse riding, preferably under parental or coach supervision, using the gaits of walking, trotting or hacking. Helmet use compulsory. Preferable to commence riding on safe, calm quiet mount initially.	Heart rate, movement, co-ordinaton and cognitive load
Higher impact training drills	Higher risk horse riding, preferably under parental of coach supervision, using the techniques of cantering as well as return to horse jumping. Increase duration & intensity of riding slowly during this period. Helmet use compulsory. Movement, coordination and cognitive load with more difficult tasks.	Restore rider confidence.

SYMPTOMATIC - MANAGEMENT

Initial Rest 24 – 48 hours

Light exercise after this time period providing does not worsen symptoms

Relative mental rest

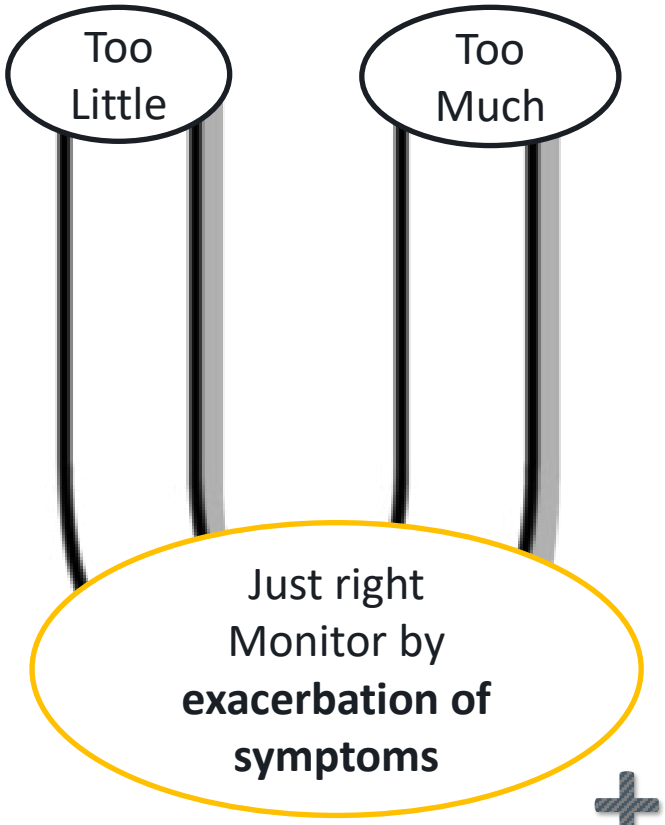
Avoid alcohol

Simple analgesia only

Impact on work / school

For 10 – 14 Days

What can we learn from Goldilocks?



+3 FACTOR

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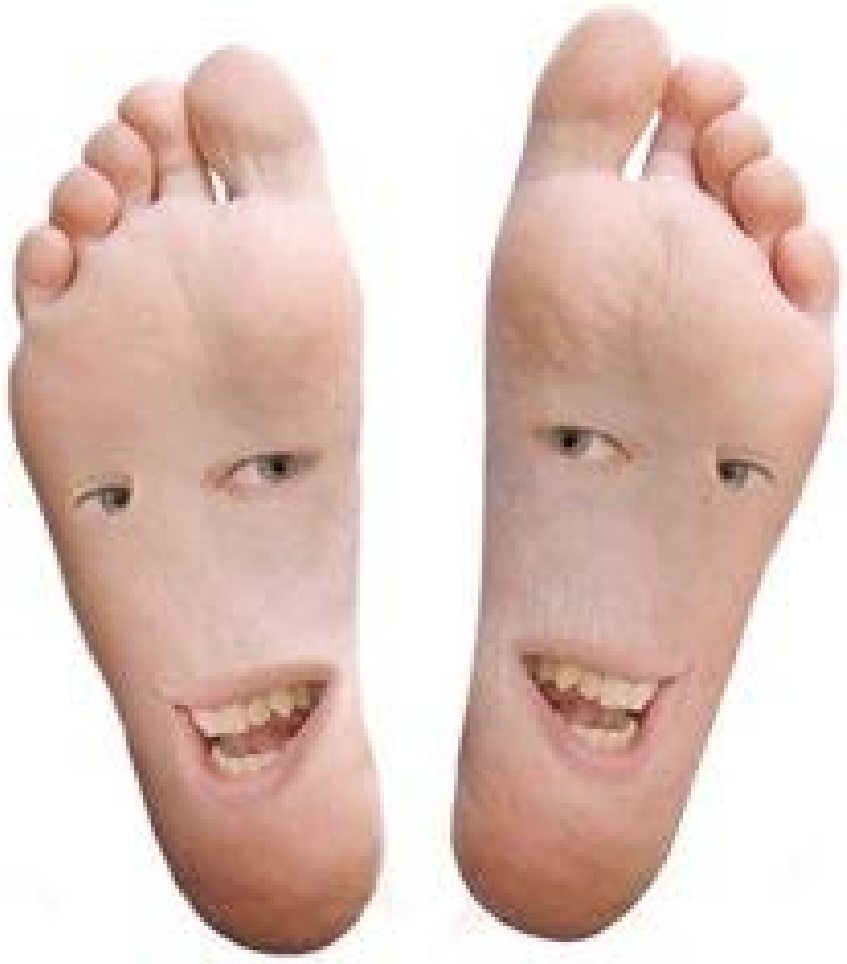
RELATIVE MENTAL REST?

Table 2 Graduated return-to-school strategy

Stage	Activity	Goal of each step
1	not gi	ong as screen d up
2		outside
3		o start ring th
4	Return to school full time	Gradually progress school activities until a full day can be tolerated	Return to full academic activities and catch up on missed work

LIGHT AEROBIC EXERCISE



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SYMPTOMATIC DAY 10?

REFER → Sports Concussion Clinic

Dedicated Concussion Service

Specialist

POOR PROGNOSTIC INDICATORS REFER EARLY

- Age
- Gender
- PHx of concussion with prolonged recovery <12m
- Mental health issues esp. depression, anxiety / ADHD
- High initial symptom and severity scores
- Non-sporting environment

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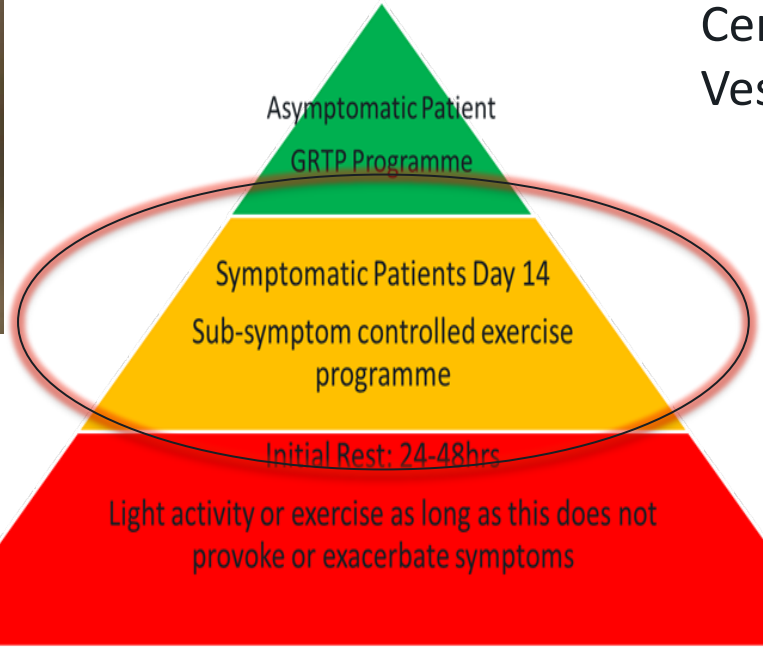
Treadmill Based Testing

→ Sub-symptom controlled exercise programme

Brainstem Autonomic Dysfunction



Cervico-Vestibular Rehab

Cervicogenic origin

Vestibular dysfunction

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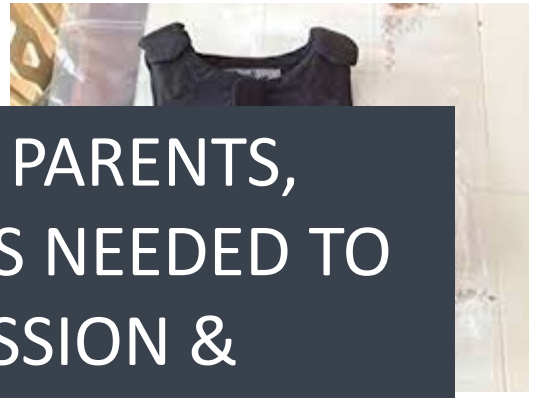
Prevention

10,000 equestrian patients presenting to ED
40% females 10 – 19 yrs. of age
Helme
Protec
Dutch Stu



EDUCATION OF RIDERS, OFFICIALS, PARENTS, ADMINISTRATORS AND TRAINERS IS NEEDED TO RAISE THE AWARENESS OF CONCUSSION & REDUCE THE LIKELIHOOD OF SUBSEQUENT INJURIES

EARLY REMOVAL = EARLIER RECOVERY

s

proven effective
Journal de Traumatologie du Sport 2015

Helmets ↓ TBI by 40-50%
↓ LOS in Hospitals

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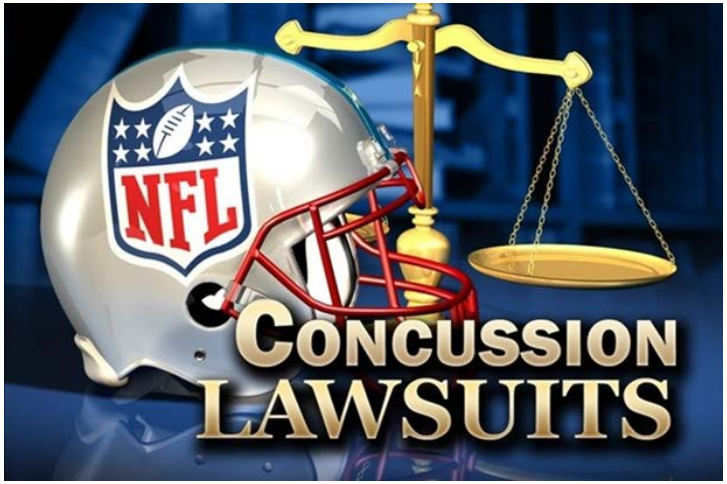
What Are The Long Term Risks?

Plenty of talk about the increased risk of certain conditions esp. in the media

- neuro-degenerative conditions (CTE)
- cognitive abnormalities
- mood disturbances



ASSOCIATION BETWEEN REPETITIVE CONCUSSIONS AND LONG TERM PROBLEMS BUT NO CAUSATION

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