The Nature & Management of Post-Acute Aggression After TBI

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Aggressive Behaviour:
a frequent legacy of TBI.

- Estimated range: 35% (Levin & Grossman 1978)
  96% (Rao et al 1985)
- Depends upon how aggression is defined:-
  - Agitation: 10% Brooke et al (1992)
  - Irritability: 70%; 20% violent McKinley et al.(1981)
- Irritability gradually evolves into impulsive aggression Brooks et al (1987).
- Verbal Abuse/Physical assault: 33.7% at 6 months post-injury. Tatano et al (2003).
- Long Term Problem: 25% exhibit aggression at 6, 24, and 60 months post- injury Baguley et al (2006).

Psychosocial Impact

- Domestic Violence:
  - Thomsen IV. *JNNP .* 1984;47:260-8.
  - Livingston MG, et al. *JNNP.* 1985;48:876-81.
  - Brooks N, et al. *JHTR.* 1987;2:1-13.
- Relationship failure
  - Wood RL, & Yurdakul LK.. *Brain Inj*. 1997;11:491-501.
- Unemployment:
  - Schönberger, et al. *J NNP.* 2011;82:936-941
- Criminality:
  - Miller. *Journal of Forensic Psychiatry.* 1999;10:157-66.
  - Grafman, et al *Neurology.* 1996;46:1231-8.
  - Williams, et al. 2015 *J Head Trauma Rehabilitation*: 30 - Issue 2 - 69–74

No attempt to distinguish or classify different aggressive disorders in either ICD -10; DSM IV, or DSM V

Fleminger S, Greenwood RJ, Oliver DL.

Pharmacological management for agitation and aggression in people with acquired brain injury. *Cochrane Database Syst Rev.* 2006

Given the intrusive nature of aggression after TBI it is surprising that little attempt has been made to distinguish characteristics of aggressive behaviour that might suggest differences in aetiology and offer alternative approaches to treatment.

Classifying Aggressive Behaviour After TBI

Lishman (1978)

Two processes mainly responsible for aggression after head injury.

1. Loss of inhibitory functions or modulatory controls.
   - Impulsive aggression
2. Aggressive behaviour associated with sudden spontaneous, discrete electrical disturbances.
   - Episodic aggression

1. Loss Of Inhibitory Control

Impulsive Aggression

Characteristics of Impulsive Aggression After TBI

- Present from an early stage of recovery.
  - Irritability evolves into impulsive aggression
- Low frustration tolerance
  - Quick temper/Short fuse.
- Disproportionate reaction.
  - Anger escalates out of control
- Mainly verbal outbursts.
  - Abusive, threatening; tirades
- Relentless
  - Family in constant state of tension "Walking on eggshells"
- Altered Personality
  - Or extension of pre-accident personality

Impulsive Aggression

'Altered Personality'

Angry disposition

Attribution of blame

Little or no remorse

Sociopathic Features

Often Subtle

(based on observations from relatives)

Impulsive aggression in general population associated with certain risk factors

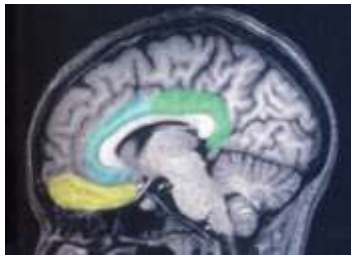
- Male gender.
- Younger age group,
- Low premorbid IQ, (poor verbal skills)
- Low socioeconomic status
- Poor social functioning,
- Alcohol and substance abuse.

Many people in the TBI population conform to these risk factors

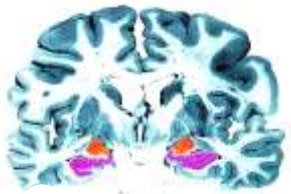
Impulsive Aggression

Cerebral Control Mechanisms and Structures

The Affect Regulatory System



- The anterior cingulate cortex evaluates affective stimuli.
- The amygdala responds to threat and provocative stimuli.
- The orbital and ventro-medial prefrontal cortex inhibit limbic activity that triggers aggression.



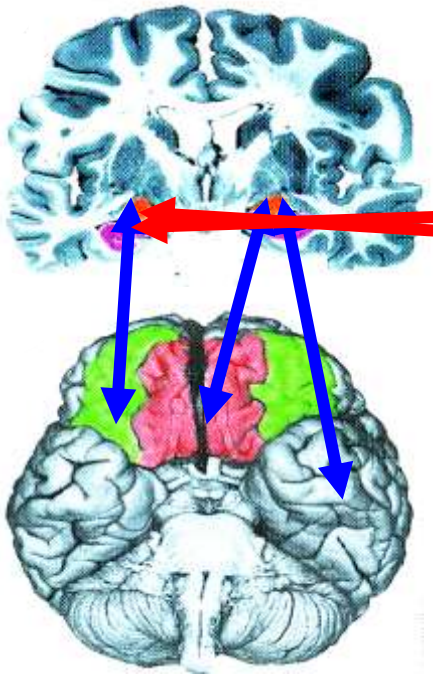
- Hypothalamus: which modulates hormonal balance
- Motor Cortex & Cerebellum: to initiate motor action.

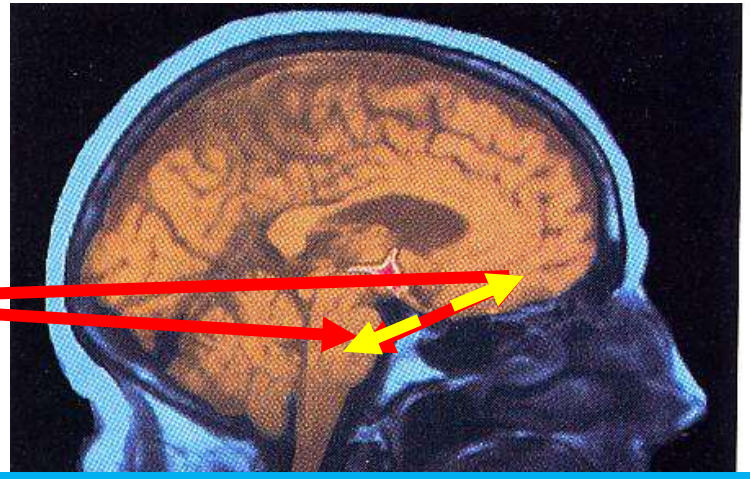
Mechanism of Impulsive Aggression

Amygdala-Prefrontal Cortex-Brain Stem

Reciprocal pathways from amygdala to VPFC & brain stem.

Determine response magnitude during fear & anger.





Amygdala activates brain stem startle reaction

Orbito-frontal modulatory control mechanisms activated.

Damage to this circuit can diminish or abolish inhibitory mechanisms.

2. Behaviour associated with sudden, discrete, spontaneous electrical impulses

Episodic Aggression

Behaviour Characteristics

- "Mood swings"
  - Transient alteration in mood and behaviour
- Apparent loss of control
- Explosive outbursts/rage
- Outburst preceded by:-
  - Period of tense, restless behaviour
  - Argumentative, unreasonable disposition.
  - Socially withdrawn; Suspicious or paranoid state
- Outburst Followed by
  - A sense of relief (often remorse)

"Explosive Diathesis" (Kaplan 1899)

"The role of head injury in the genesis of mental disease".

"Rage which follows the most trivial cause….
….explosiveness of speech, cursing and outbreaks of violence, often directed at things; there may or may not be amnesia afterwards".

Explosive Rage Following Head Injury

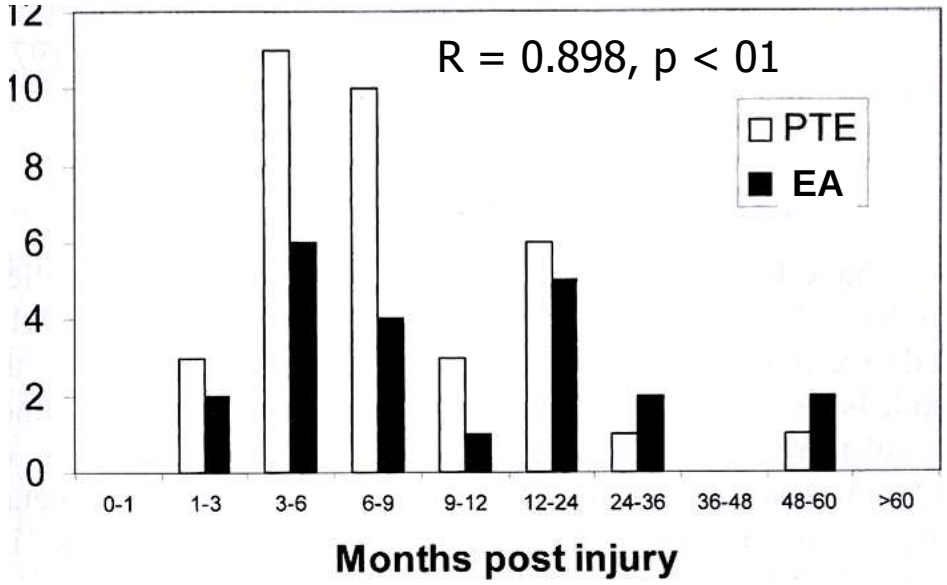
(Hooper et al 1945)

"Aggressive rage … which occurs after head injury…..is different from irritability. It has an explosive element which lifts it out of a background of normal mood or depression"

10 cases in 2000

Epileptiform?

Delayed On-set
~ 4-6 months post injury



Onset of episodic aggression (EA)

and post traumatic epilepsy (PTE)

743 admissions to DGH

Eames & Wood 2003; *Episodic disorders of behaviour and affect after acquired brain injury;* Neuropsychological Rehabilitation, 13, 2, 241-258

Personality

No evidence of generalised personality disorder.

Normal self between episodes.

"It's like living with Jekyll & Hyde"

Episodic Dyscontrol Syndrome

Mark & Ervin 1970; Violence And The Brain;
Elliot 1982; J Nervous & Mental Disease, 170, 680-687

- *Explosive rage*:
  - Verbal or physical.
- *Onset:*
  - Often sudden, with little or no warning.
  - Increasing dysphoria or 'pressure in head'.
- *Duration:*
  - Minutes (for aggressive outburst/tirade).
  - Hours (irrational and unreachable).
- *Control:*
  - Usually absent in respect of outburst
  - Present in the direction of aggression
- *Sequelae:*
  - Fatigue; relief; remorse;
  - Imperfect memory
- *Pattern:*
  - Irregular and unpredictable,

Episodic Dyscontrol Syndrome Not Classified in DSM V

Intermittent Explosive Disorder

Classified as an impulse - control disorder

- Fails to resist aggressive impulse
- Disproportionate aggression.
- Serious assault or destruction of property.

Includes characteristics of episodic aggression !!

- Discrete episodes
- Prodromal sense of tension
- Subsequent feeling of relief.

Exclusion Clause

Must not be due to a general medical condition; e.g., head injury.

National Co-morbidity Survey for IED

Kessler et al (2006, Am J Psychiatry. 63, 669-678)

Narrow Definition

- Serious physical assault or destruction of property.

Broad Definition

- Verbal outbursts of aggression.
  - Abusive tirade
  - A sense of threat
- Physical damage to property

Both definitions assume

- Discrete episodes
- Explosive character
- A 'lack' of control

Kessler et al 2006

Survey of 9,282 adults (2001-2003).

Impulsive Explosive Disorder

- Narrowly defined = 7.3%
- Broadly defined = 5.4%

Swansea Study

Survey of 123 brain injured adults 2010-2013.

Episodic Aggression

- Narrow definition = 13.0%
- Broad definition = 18.5%

Treatment

Pharmacology

Carbamazepine

Case Study: W R.

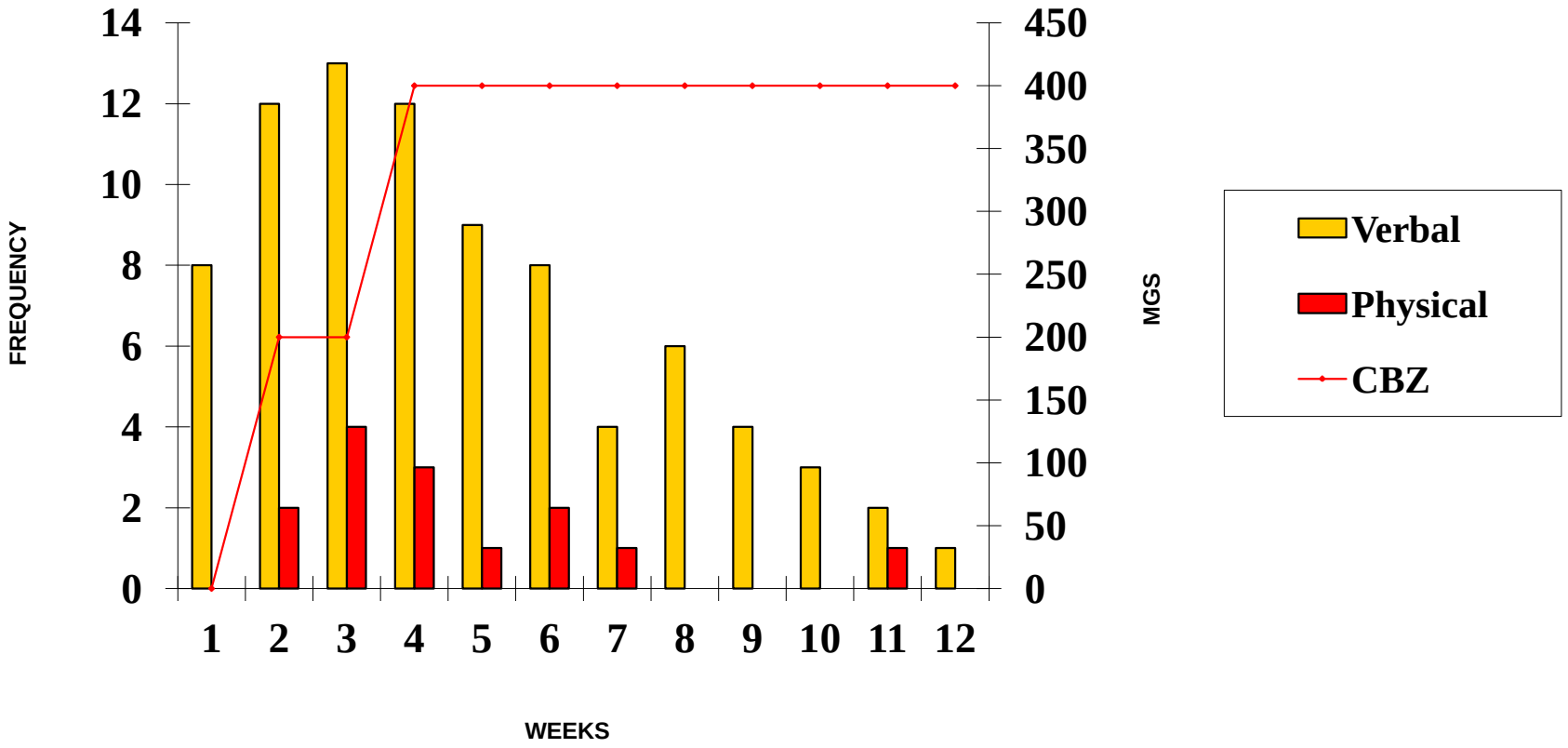
- Personal
  - Age 35; Married x 12 years; 2 children;
  - In regular employment as a store man.
  - Good social adjustment/No behaviour problems
- Injury Details
  - RTA 2012 (referred for treatment 2014)
  - GCS 8/15. PTA 2 days
  - Small right frontal contusion
- Neurology & Neuropsychology
  - Anosmia; Minor executive weaknesses

Behaviour and Personality

Episodic changes of mood & behaviour

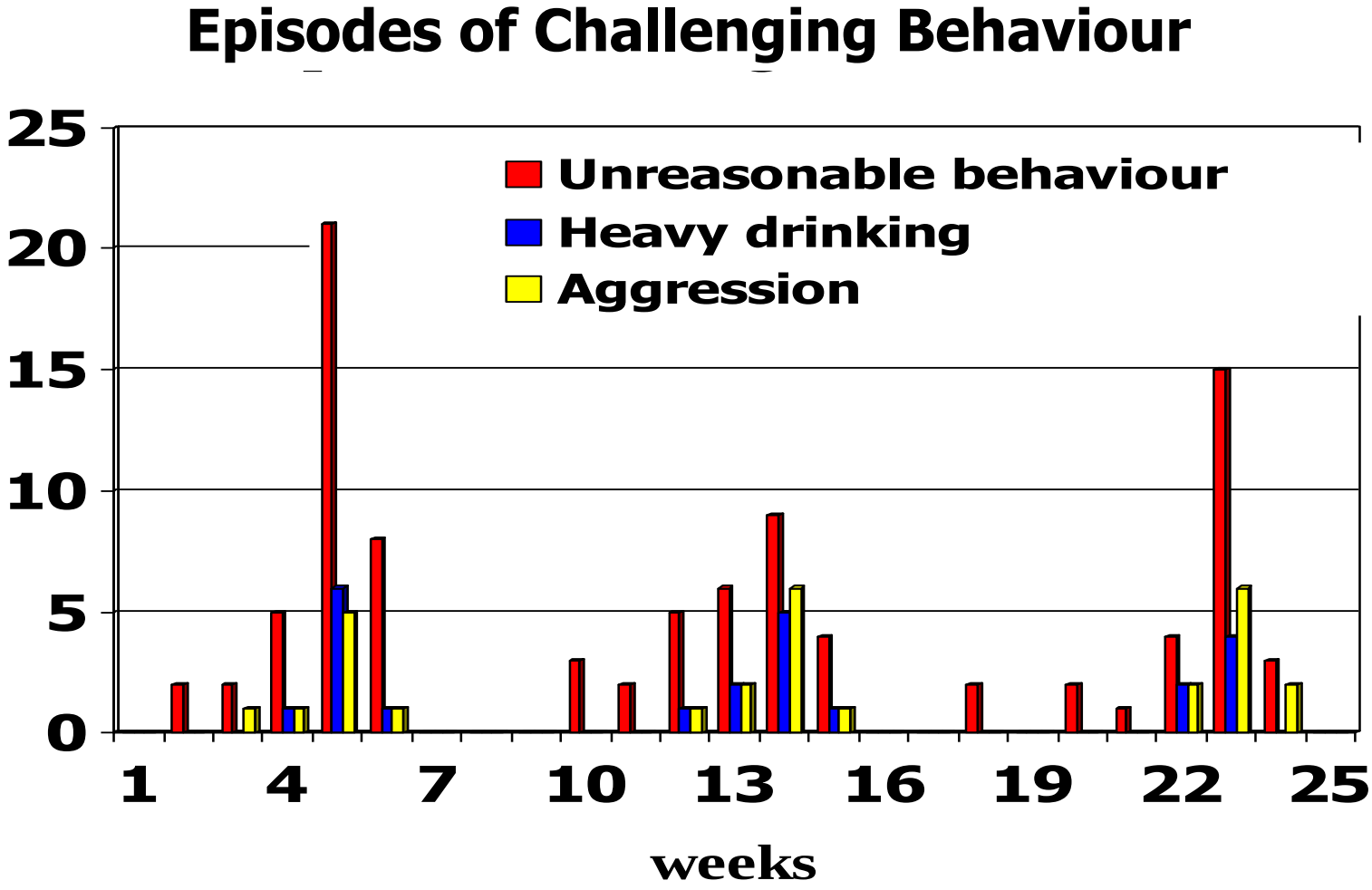
- Negative and 'depressed'
- Unreasonable, fault finding, accusing & suspicious manner.
- Altered facial features ("the long stare")
- Altered tone of voice (terse, clipped comments)
- Socially withdrawn (avoided family contact)
- Abusive outbursts (threatening "*nasty, really in your face*")
- Physical aggression
  - pushed wife; punched her on shoulder;
  - smashed objects – even his garden shed!

Response to Carbemazepine (Tegretol Retard)



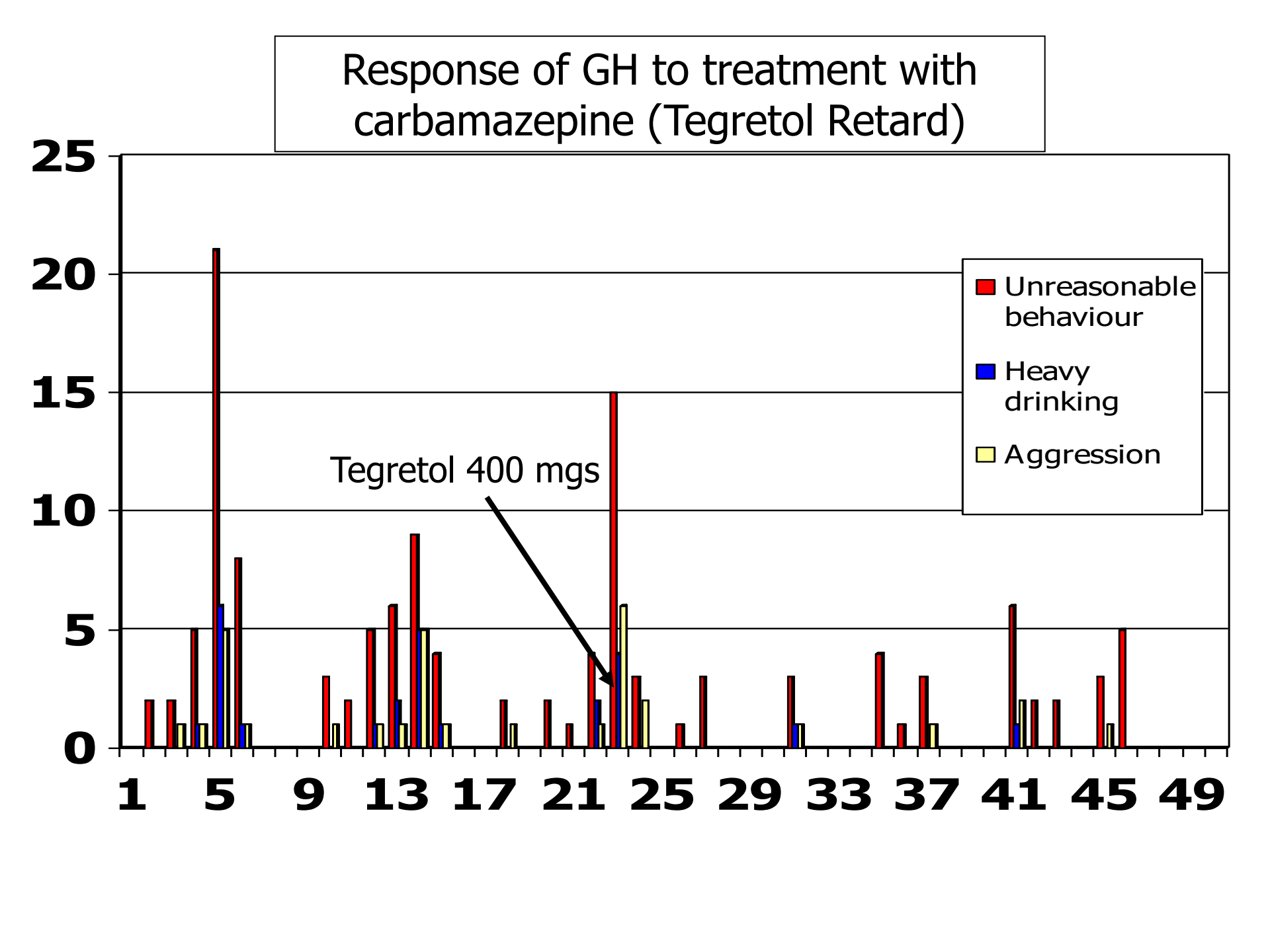
Case Study: GH.

- Premorbid history of dyslexia
- Normal behavioural development
- Age at injury = 16 yrs (RTA)
- Brief LOC; PTA ~ 12 hours
- CT Scan: small right frontal contusion
- 12 months post exhibited
  - Behaviour problems.
  - Executive dysfunction
- Admitted for rehabilitation 2 years post injury
  - (18 years old).



EDS: Episodes are irregular and unpredictable.

Intervals of days, weeks, months.


Response of GH to treatment with carbamazepine (Tegretol Retard)
25
20
15
10
5
0
1
5
9
13
17
21
25
29
33
37
41
45
49
Unreasonable behaviour
Heavy drinking
Aggression
Tegretol 400 mgs

Treatment

Psychological Methods

THERAPY STAGES

- Designate problem
  - How is it perceived by the client?
  - How is it perceived by others?
- Address problems of awareness/judgement
  - Client has to accept that a problem exists
  - And that what exists is a problem !
- Behaviour analysis
  - Define the nature of aggression.
    - Impulsive v's episodic
    - Verbal v's physical
    - Impact on others.
    - Any specific triggers
- Situational analysis
  - Demands of activity
  - Physical/cognitive constraints

Methods to improve self monitoring

- Keep a record of incidents
- Agree on a method of receiving situational feedback or cues
- Discriminatory training
  - Awareness of both external and internal stimuli that signal the probability of a specific response.
- Recognition of social consequences
  - Meta-cognitive review of actions
  - Non-judgemental appraisal

Case Study RW
Impulsive Aggressive Outbursts

- Personal
  - Age 38; Married x 15 years; 2 children
  - Regular employment, motor mechanic.
- Injury Details
  - RTA 2013 (referred 2015)
  - GCS 5/15. PTA 4 days
  - Right frontal and temporal contusions
- Neurology & Neuropsychology
  - Anosmia; minor weaknesses of attention, memory, executive function.

Behaviour and Personality

- Unpredictable changes of mood
  - Poor tolerance of frustration
  - Tried to withdraw from family
  - Sudden angry outbursts
  - Threatening & abusive behaviour
- Reduced insight & judgement
  - Refused to accept medication
  - Previously refused psychological therapy

C-B-T

1. Awareness:
   - Recognition of impact of behaviour on wife and two children
   - Calm discussion of recent incidents (therapist as mediator)
2. Acceptance:
   - Wife in distress (on SSRI medication)
   - Children's behaviour affected (bed wetting and school problems)
3. Strategy:
   - Identify thoughts and emotional/physical stimuli that signal mood change

4. Verbal Regulation

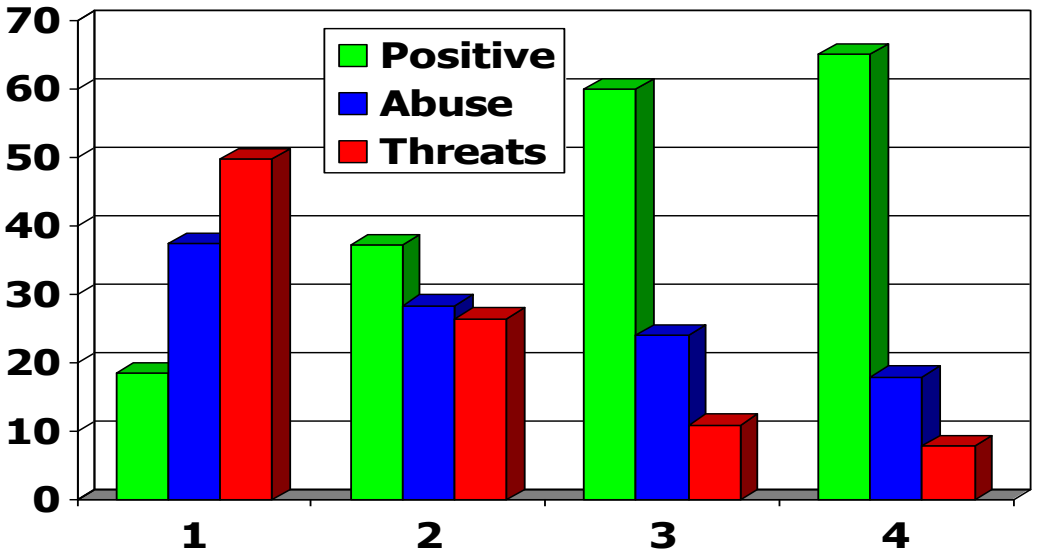
- Overt:-
  - Tell myself - "I am in one of my moods"
  - Tell family – "I'm having one of my bad days"
  - Remorse – "I'm sorry daddy's not feeling very well today" (To explain need to withdraw)
- Covert:-
  - Think Positive – "I must look for the good things"
  - Control tone of speech – "I mustn't sound nasty"

5. Family Acknowledgement and Feedback

- Family have to acknowledge this is an "illness" and that RW needs their support
  - "Is there anything we can do ?"
- Cues
  - "I can see that you look/feel angry"
  - "Would you like to be on your own?"
  - "Can you try and be nicer to the children"
- Emphasise neutral or supportive tone of voice from wife.
- Accept and acknowledge cues from wife

Impact of raised awareness on behaviour control

Ratings by wife in week prior to clinic



Monthly outpatient clinics

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Case Study: Episodic Dyscontrol

- SD: Age 16
- PM history
  - No developmental problems
  - Average student
  - Good behaviour.
- Injury Details:-
  - Kicked in face by horse
  - UC ~ 10 minutes
  - PTA ~ 1-2 hours
  - CT scan - normal

- Resumed school 3 weeks after injury
  - ~ 3 months later started to exhibit behaviour problems.
  - Mixed with ‘bad crowd’ she previously avoided.
- 12 months post:- School exclusion
- 18 months:- Family couldn’t cope.
  - Social services involved.
- 24 months: (18 years old) left home (NFA)
- 30 months: Pregnant.
  - Baby taken into care.

Behaviour Pattern

- Much of the time pleasant and easy going.
- Then every 3 weeks or so she became an "*old witch*" ("Hen gwrach").
- Reported episodic behaviour pattern:-
  - Tense and restless ~ 1 day
  - Hypersexuality ~ 1-2 days
  - High alcohol consumption ~1 day
  - Volatile aggression ~1 day
  - Lethargic and morose ~1-2 days
  - Returned to 'normal' behaviour

Case Example: Personality Change

- School teacher
- Normal developmental history
- Second marriage.
- One step- child, aged 11 years.
- Happy family.
- Good psychosocial skills.
- No sign of abnormal behaviour.

Minor Head Trauma

- No LOC
- PTA ~ 4 hours
- Good short term recovery
- No CT Scan or MRI scan
- Persisting post concussion symptoms
- Attributed to psychological factors.

1 Year later: 40 years of age:-

- Started to take an interest in child pornography.
- Frequently visited child porn web-sites.
- Began to visit ‘massage parlours’.
- Clumsy attempt to concealed these behaviours.
- Marital problems as a result of altered sexual behaviour.

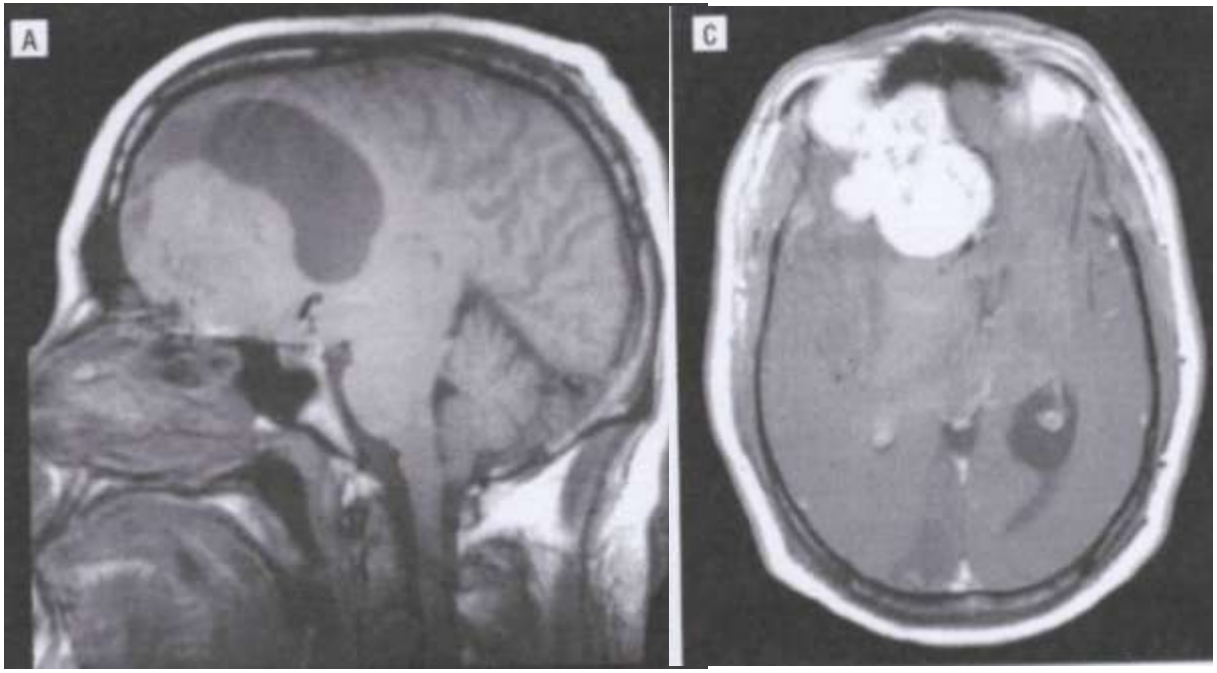
2 years post injury: Age 41

- Started making sexual advances to his step-daughter (13 year old).
- Arrested and removed from family home
- Found guilty of sexual assault.
- Diagnosed as a paedophile & placed on sex offenders register.
- Probation follow-up.
- Lost his job.
- Lived in lodgings – on benefits.
- Depression.

3 Years Post: Age 42

- Started expressing fear he would rape his landlady
- Depression. Expressed suicidal ideas
- Admitted to psychiatric hospital
- Sexually disinhibited to staff
- C/O severe headaches
- Abnormal neurological signs noted
  - Balance & coordination problems
  - Loss of smell & taste
- MRI scan – abnormal

Haemangiopericytoma



Mass in anterior fossa displacing right orbito-frontal lobe distorting DLPFC

Personality Disorders

- borderline personality disorder (BPD)

- a personality disorder marked by impulsive aggression, coupled with highly reactive and unstable affect modulation.
- patients with BPD will respond to disappointment and frustration with intense emotions triggers the generation of impulsive, often aggressive, responses.

Narcissistic Personality Disorder

- Patients with narcissistic personality disorder may also act aggressively in an impulsive manner when feeling humiliated or "narcissistically injured."

Antisocial personality disorder

- Individuals can act aggressively with little apparent remorse about their aggressive antisocial behaviours.

Cognitive Behaviour Therapy

- A problem orientated form of therapy
  - Does not focus on pre-accident personality
- Targets perceptions and misattributions
  - Helps client identify errors or biases in how they perceive specific situations
- Uses language to
  - Reconstruct ideas and assumptions
  - Change beliefs and values
  - Promote self-regulated behaviour.