Physiotherapy in the management of imbalance

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Consequences....

- FAINTS
- FITS
- FUNNY TURNS

‘ IMBALANCE ’
Consequences....

- FAINTS
- FITS
- FUNNY TURNS

FALLS
Consequences

Imbalance

Falling

Fear

Impact Quality of Life

- Decreased Confidence
- Avoidance Behaviours
Physiotherapy Management of Imbalance

- Exercises
- Education
Physiotherapy Management of Imbalance

Exercises

- Individual
- Groups
- Classes
- Home
- Community
- Gym
Exercise (Rehabilitation)

- Strengthening
- Stretching
- Balance (*Proprioception or Vestibular*)
- Functional
- Fitness
- Stamina
- Cardiovascular / Aerobic
- Biofeedback
Exercise Classes
Exercise software programmes

Exercises & Stretches
Biofeedback (Smart Equitest)

Long Forceplate

Biofeedback built into Computerized Dynamic Postuography unit
Biofeedback

COG Control: Limits of stability
COG Control: Path
Improve Postural Control

Combined Tasks: Move & Maintain
Improve Performance

Increase:  *Strength, ROM, Endurance*
Use what you have available.... Exercise Ball....wobble board etc.
Possibilities: Home balance exercises

- Nintendo Wii (Balance Board)
Balance Activities

- Balancing on one leg
- Leaning your body
- Rotating your hips
- Moving your body to a rhythm
Physiotherapy Management of Imbalance

- **Education**
  - Patient
  - Carers
  - Family
  - Health professionals
  - Government agencies
Reduced confidence / coping strategies

- Group exercise programmes
- Coping strategies (avoidance strategies)
- Teach technique & practice getting up off floor
Getting up from the floor
Physiotherapy Management of Imbalance

- Need to understand ‘Normal’
- Need to understand ‘Pathologies’
  - And how they impact balance
WHAT IS “BALANCE”?  

The ability to control our Centre-of-Gravity over the Base of Support in a given Sensory Environment
Simplified Balance Overview

You need:

- Brain (cerebellum)
- Eyes
- Ears (vestibular system)
- Body
Static vs Dynamic Balance

What’s the difference?
Static Balance
Dynamic Balance

This shows us that you can still fall even with very good balance.
Balance should be automatic..... Usually occurs subconsciously.....

We don’t normally think about our balance

We take it for granted.... Only notice it if we have a problem
Can anyone’s balance get better?

YES!
With exercise & practice
Amazing!

So normal balance can be improved with exercise

Principles of physiotherapy / exercise for (im)balance
If you have a balance problem can exercise help?

All balance problems can have some help with exercise

But problems related to the inner ear do respond very well to exercise

The vestibular system can be retuned!

That’s what I do within the Leicester Balance Centre
This will be discussed shortly
Balance problems

- Exercises have to target the problems
- Need to know the site of the problem
  - Eyes / ears / body / brain?
- Exercises may vary depending on medical status
- I use home exercise programmes
Consequences

Imbalance → Falling
Exercises for improving balance in older people (review)

Howe TE, Rochester L, Jackson A, Banks PMH, Blair VA

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NICE Pathway: Falls in older people overview

Latest update: March 2015

CSP ‘Physiotherapy Works’
Evidence based briefing
Causes of Falls

Significant falls are a result of complex interactions between multiple risk factors.

- Intrinsic factors
- Extrinsic factors
- Predisposing factors

Mobility
Balance & Gait
Simple model of falls

Balance

Falls
Simple model of falls

FALLS

Balance

Musculo-skeletal

Vision

Vestibular

Proprioception

Tactile sensation

CNS

Environment

al hazards
Complicated model of falls

Balance

Musculo-skeletal

Vision

Vestibular

Proprioception

Tactile sensation

Environmental hazards

CNS

FALLS
Generally Acknowledged

- High percentage of falls preventable (and predictable !)

- Falls are often the presenting issue of underlying medical condition (s)

- Falls are multi-factorial therefore need a multi-dimensional approach to assessment and management
INJURIES

40-60% falls → injuries
30-50% falls → minor injuries
5% falls → fractures
5-6% falls → major injuries (- fractures)

HOSPITALISATION

INSTITUTIONALISATION

FEAR OF FALLING

DEATH!
Falls Risk Factors

- History of Falls
- Medications
- Balance, transfers and gait
- Musculoskeletal factors
- Continence
- Agitation / confusion
- Loss of consciousness
- Postural hypotension
- Alcohol
Falls Risk Factors

- Nutrition and hydration
- Vision
- Hearing
- Footwear / footcare
- Reduced confidence / coping strategies
- Risk taking behaviours (lack of insight)
- Osteoporosis
- Environmental Hazards
- Functional impairments / ADL issues
Falls Risk Factors

Need to add:

‘Vestibular Dysfunction’
Falls Risk Factor
‘Vestibular Dysfunction’

- Previous sub-clinical vestibular dysfunction may become unmasked….

- Or patient may de-compensate for a pre-existing vestibular problem…

- Increased risk of falling
Vestibular Dysfunction

- Balance Problems
  - Multi-factorial
  - Overlap of Systems
  - Combinations of symptoms

So what does a problem here cause?

And how do we treat it?
Treatment Concepts

My clinic assesses and treats patients from around the UK with balance problems related to the vestibular system....

Physiotherapy : Vestibular Rehabilitation
VESTIBULAR REHABILITATION

Facilitates CNS compensation of vestibular disorders through EXERCISE
Vestibular Compensation

Process of Recovery from the Neurological Effects of Vestibular Loss.
Vestibular Compensation

- It is a response to a vestibular lesion
- It does not occur *(or occur properly)* with fluctuating deficits....

*E.g. Meniere’s Disease, Migraine, BPPV*
So what happens when ‘something’ damages the vestibular mechanism?

And causes **Vestibular Dysfunction**
For over 100 years....it's been known...

Following a total loss of a previously intact Labyrinth (unilateral vestibular loss UVL)

There is a stereotyped pattern of disruption of equilibrium across species...
Fortunately, much disease process of the vestibular labyrinth is self limited and spontaneous recovery is expected

“It’ll get better over the next few weeks...”
Vestibular Rehabilitation has a role to play if the normal compensatory process doesn’t occur completely or properly…

It retunes the VOR
The VOR
Simple Reflex loop

medial rectus
lateral rectus

head

left
right

vestibular nuc.
Head turns right

Eyes move left
VOR Adaptation

- Adaptive control of vestibular motor behaviour is essential for higher species to maintain optimal visual function.

- Changes caused through aging, disease and other factors demand mechanisms to detect and correct errors in ‘performance’.

Adaptation or recalibration of the VOR is one of these mechanisms, probably the most important.
What error signals drive VOR Adaptation?

- Image motion or Retinal “slip” associated with head movement

The purpose of the VOR is to keep images stable on the retina during head movement.
Treatment Efficacy for simple un-compensated unilateral vestibular problems (in literature)

80 % improvement in symptoms (with functional outcome measures)

in over 80 % of patients
‘Ideal Patient’

Simple uncompensated unilateral vestibular lesion.

Should respond very well to:

Vestibular Rehabilitation
Examination

Symptoms

Tests

Customized Vestibular Rehabilitation Programme
‘Diagnosis’ can help dictate treatment plan

- BPPV ➢ CRM, B-D X’s
- Unilateral Vestibular loss ➢ Adaptation X’s
- Motion Sensitivity ➢ Habituation X’s
- Bilateral Vestibular loss ➢ Habituation, Substitution +/- adaptation X’s
- Central Vestibular problem ➢ Habituation X’s
Development of Exercise Programme

- Results of tests interpreted, explained to patient and related to their symptoms
- Exercise programme designed to target identified functional deficits
- Review organized (support mechanisms)
Explain to patient, so that complex vague symptoms make sense.

And because you understand and empathize with the patient they will do whatever is required to improve...
Rationale of Exercise Programmes

Exercise programmes capitalise on the *Plasticity of the central nervous system*.

They expedite *Vestibular Compensation* by both adaptation and habituation, and also incorporate sensory substitution.
Rationale of Customized Exercise Programmes

- Use exercises that induce errors in
  - Vestibulo-ocular system
  - Vestibulo-spinal system

Concept of using negative feedback
Treatment Progression

- Graded Exercises
- Graded Purposeful Activity
- Activities Daily Living
- Work Hardening
- Psychological Support
Progression of Balance Exercises

Factors to consider

- Safety
- Patient Understanding (cognition)
- Fatigue
Goals of Balance Exercises

- Improve static or dynamic balance
- Improve ability to see clearly with head movement
- Decrease sense of disequilibrium
- Improve overall activity level and physical condition
- Decrease social isolation
Rehabilitation Plan

- Correction of remediable problems eg neck / back
- General fitness
- Consideration of psychological aspects
- Medication
- Realistic goals
  - family, social & occupational
Things I have to consider.....

Current Functional Status

• Self Care Activities \( (level \ of \ independence \ ?) \)
• Effect of Driving \( (as \ driver \ or \ passenger) \)
  – Also…night vs day driving, various road types
• Occupation \( (working \ currently \ or \ off \ work) \)
• Any Medical Disability Allowances
• Specific Situations
  – TV, Reading, Computer use, Shops, Crowds
• Stairs, Ramps, Grass
Age need be no barrier!
• Encourage exercise in any form

• Tai Chi for example

• Build it into lifestyle
Exercise Programmes

As long as you are considering function, quality of life, and safety…

you are only limited by your imagination!