Best Practice Guidelines in the Treatment of BPPV: An Evidence Based Review

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Introduction – The Problem

- “Benign Paroxysmal Positional Vertigo (BPPV) is a mechanical disorder of the inner ear characterized by brief periods of vertigo experienced when the position of a patient’s head is changed relative to gravity” – Helminski et al.
- The problem: The incidence of Benign Paroxysmal Positional Vertigo (BPPV) is 64 /100,000.
  - Those with BPPV also present with postural instability and are at an increased risk of falling.

Significance of BPPV

- BPPV can be disabling
- BPPV is a disorder of the vestibular system
  - Intense, temporary sensation of vertigo or spinning with changes in head position
  - Typically occurs during functional transfers
  - Dizziness occurs within 40 seconds and dissipates in under one minute.
  - Torsional nystagmus also present
    - Eyes beating toward effected side

Significance of BPPV

- Affects women more than men
- Can affect adults aged 18-89
  - Typically affects middle age to older adults
- Causes can be post-traumatic, post-viral or idiopathic

Relevance to Physical Therapy

- Patients with BPPV can be treated by physical therapists
  - Canalith repositioning therapy
  - Exercises to retrain gaze stability
  - Exercises to improve postural righting and orientation to gravity (the vestibular system)

Primary Question

- What are the most affective treatment strategies in the treatment of BPPV?
  - CRT alone
  - CRT and upright prescription
  - CRT and active exercise
- This is a foreground question (PICO)
  - Patients: Adults aged 18-89 with a diagnosis of idiopathic BPPV
  - Intervention: CRT, upright prescription, exercise
  - Comparison or control group: receiving either a sham maneuver or no intervention
  - Outcomes: Dix- Hallpike, subjective assessment of symptoms

Hypothesis

- Ho: There is no significant difference in treatment strategies, and therefore; no particular best practice guidelines.
- H1: There is a significant difference in effectiveness when applying different treatment strategies.

Expected Findings

- CRT will be effective in the treatment of BPPV
- Upright prescription will make no difference in the efficacy of treatment of BPPV
- Active exercise, with CRT will augment treatment of BPPV

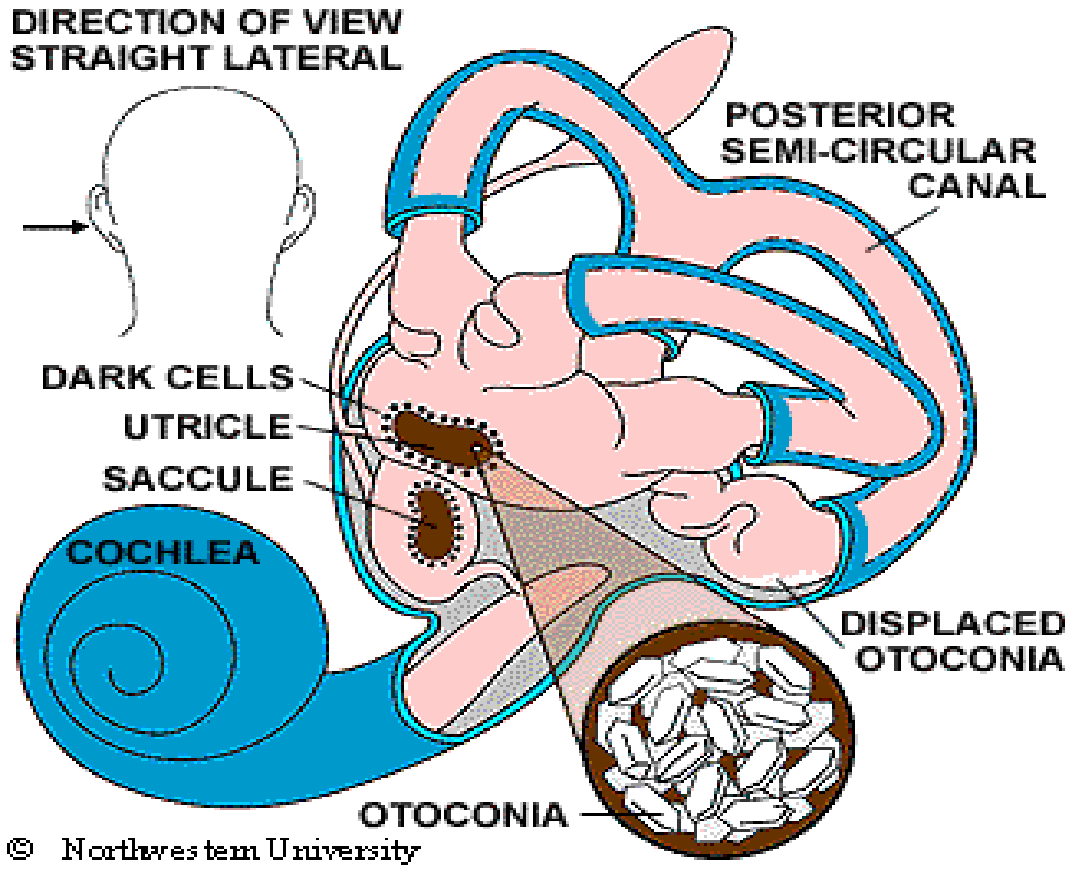
Theoretical Construct

- Cupulolithiasis:
  - Degenerated fragments of otoconia become lodged in the cupula of the semicircular canal
  - Ampulla becomes more gravity sensitive
- Canalithiasis:
  - Degenerated debris floats in the endolymph of the semicircular canal.
  - When the head moves into the symptomatic position, the floating otoconia move the endolymph and cause an increased excitation of the neurons by pulling on the cupula.

Theoretical Construct

- In BPPV, when an individual's head moves, the endolymph and otoconia move against the hair cells
- Hypersensitivity of the hair cells and the increased force of the otoconia lead to symptoms of dizziness/ vertigo
- Treatment involves repositioning the otoconia in the basement membrane of the hair cells and increasing the ability of the nervous system to tolerate the movement and sensory induced stimuli

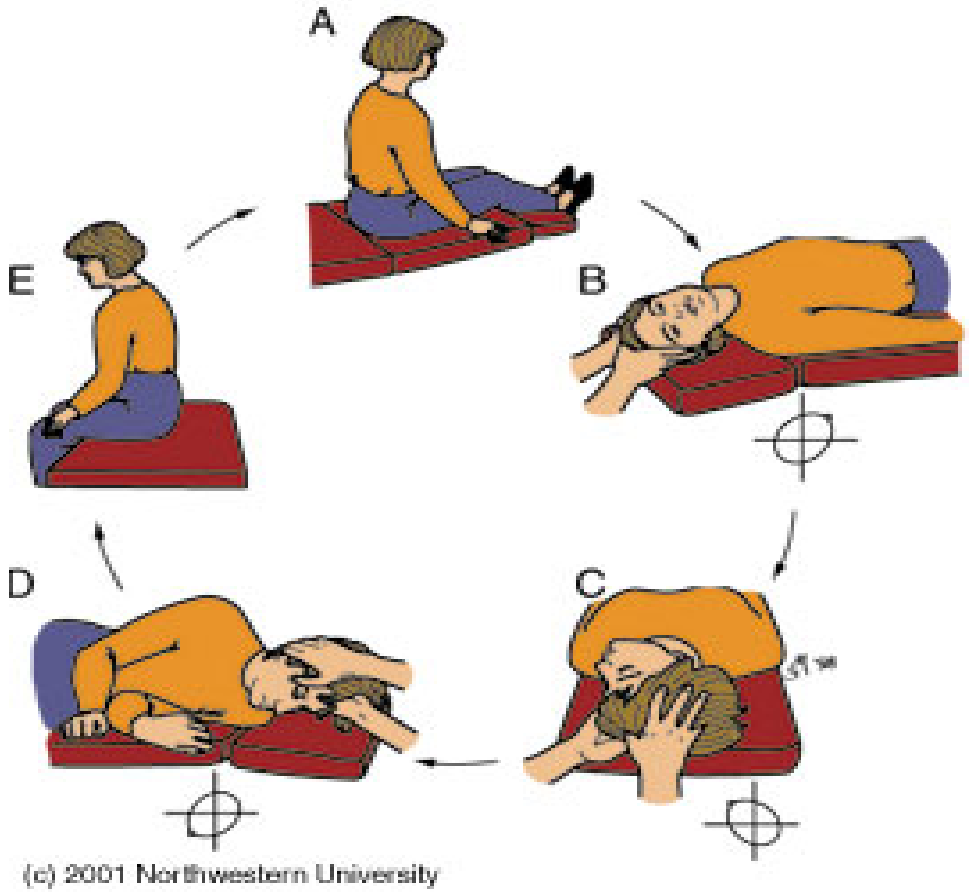
Background:
Anatomy: Vestibular Organ



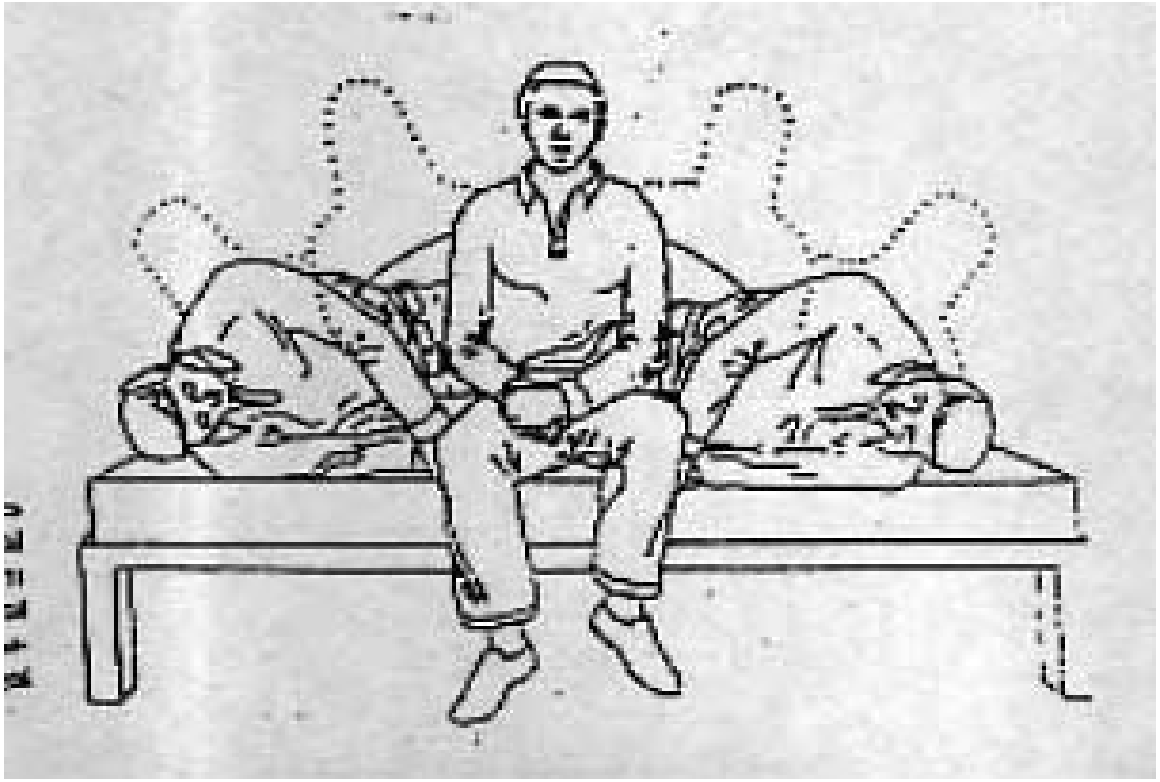
Background:
Canalith Repositioning Therapy

- Physical therapist guides the patient through a series of positions designed to reposition the lodged particles.
- Several maneuvers of canalith repositioning therapy (CRT) exist

Background:
Canalith Repositioning Therapy



Background:
Brandt- Daroff Exercises



Background
How is BPPV Diagnosed?

- Diagnosis is clinical
  - Subjective assessment
  - Positive Dix-Hallpike test:
    - Test elicits symptoms
    - Torsional nystagmus.

Background

- Is BPPV a chronic problem?
  - BPPV can be managed with conservative PT treatment, however recurrence of BPPV has been suggested to be 80% at 1 year and 94% at 5 years

Background: Difference Between BPPV and Central Disorders

- BPPV
  - Latency: 1-40 seconds
  - Duration: less than 1 minute
  - Fatigues: yes
  - Nystagmus: torsional (posterior), vertical (horizontal)
- Central Disorders
  - Latency: None
  - Duration: Over 1 minute
  - Fatigues: no
  - Nystagmus: Not always present

Search Methods

- Sources:
  - PubMed
  - PEDro
  - CINAHL
  - Cochrane

Search Methods

- Keywords:
  - Benign paroxysmal positional vertigo (BPPV)
  - Vertigo
  - Canalith repositioning therapy (CRT)
  - CRT AND upright prescription
  - CRT AND exercise
  - BPPV and physical therapy
  - BPPV and rehabilitation
  - CRT and physical therapy

Search Methods: Criteria for Study Inclusion

- Level of Evidence:
  - Intervention studies that range from level I-III
- Type of study:
  - Intervention or management of BPPV
    - Intervention must be conservative
    - Therapy focused on rehabilitation or physical therapy

Criteria for Study Inclusion

- Inclusion Criteria
  - Adults (18 years or older)
  - Spontaneous BPPV
- Exclusion Criteria
  - Posttraumatic or postviral BPPV
  - Labyrinth disease
  - Central vestibular disorders

Measured Outcomes

- Presence or absence of vertigo
  - Determined by
    - Dix-Hallpike test
    - Subjective measures

Secondary Review

- All studies were reviewed and approved by a second physical therapist to be certain that all studies meet the criteria

Data Analysis

- Total number of studies located in search: 18
  - CRT: 9
  - CRT and upright prescription: 4
  - CRT and active exercise: 5
- Number meeting criteria: 5
  - CRT: 4
  - CRT and upright prescription: 0
  - CRT and active exercise: 2
  - One study examined both CRT and exercise as compared to sham

CRT vs. Control or Sham

Study	Type of Study	Level of evidence
Munoz et al. 2007	Double-blind RCT	1b
Froehling et al. 2000	Blinded RCT	1b
Angeli 2003	RCT	1b
Cohen and Kimball 2005	Blinded RCT	1b

Exercise

Study	Type of Study	Level of evidence
Cohen and Kimball 2005	Blinded RCT	1b
Helminski 2005	Random sample of convenience and retrospective review	2c

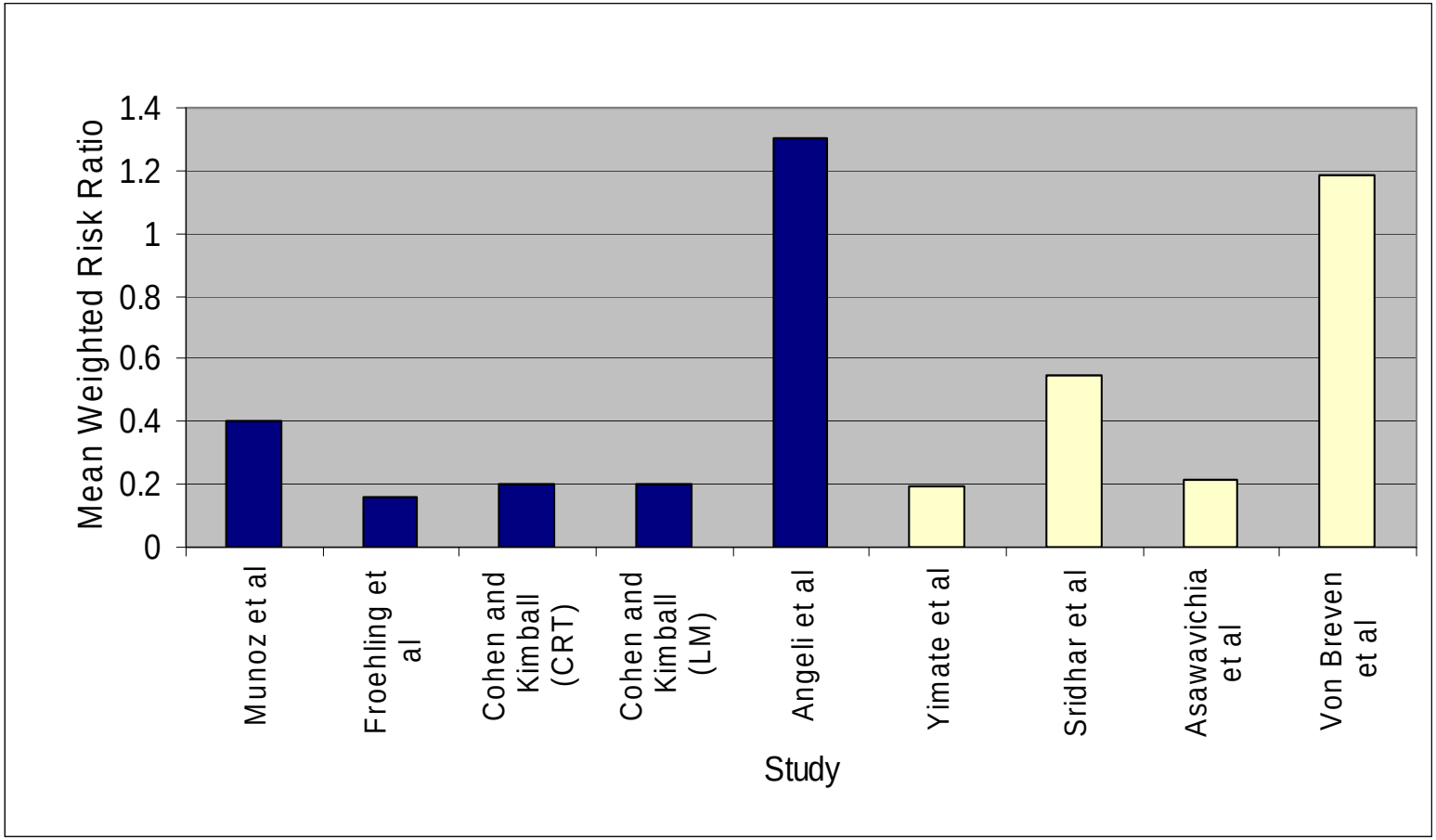
Data Analysis

- Statistics calculated
  - EER
  - CER
  - ARR
  - NNT
  - RR
- Calculated for outcomes at first follow-up

Results: CRT vs. Control or Sham

- Results for studies comparing CRT to a control group or sham maneuver are varied but generally favor CRT
  - EER:0.32-0.67
  - CER: 0.05-0.38
  - NNT: 4-29
- More significant results seen by Angeli et al where CRT was compared to a control group who received no intervention
  - Suggests possible placebo effect in other studies that used a sham maneuver

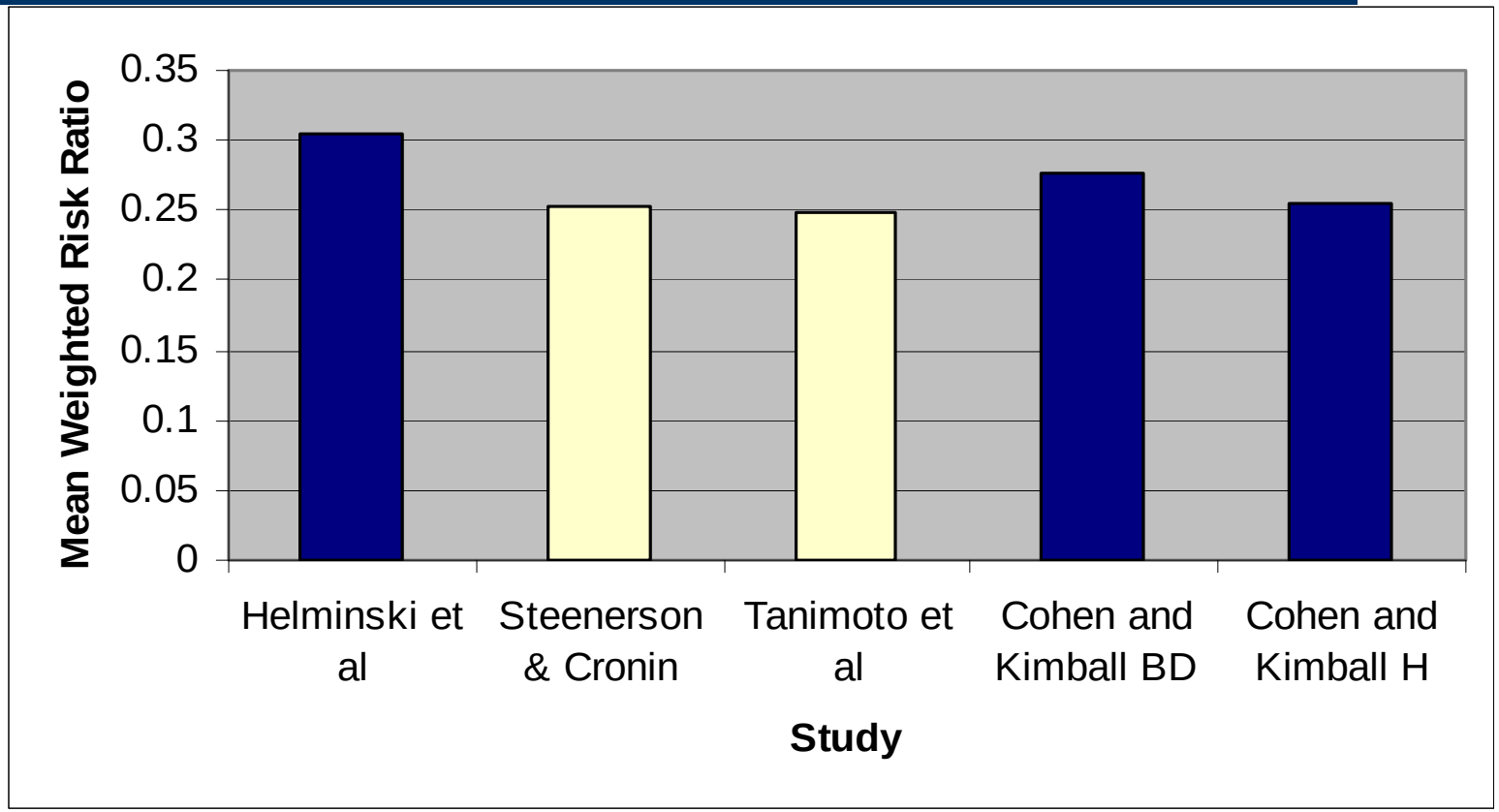
Mean Weighted Risk Ratio for a Negative Dix Hallpike Test :Examining Repositioning Maneuvers



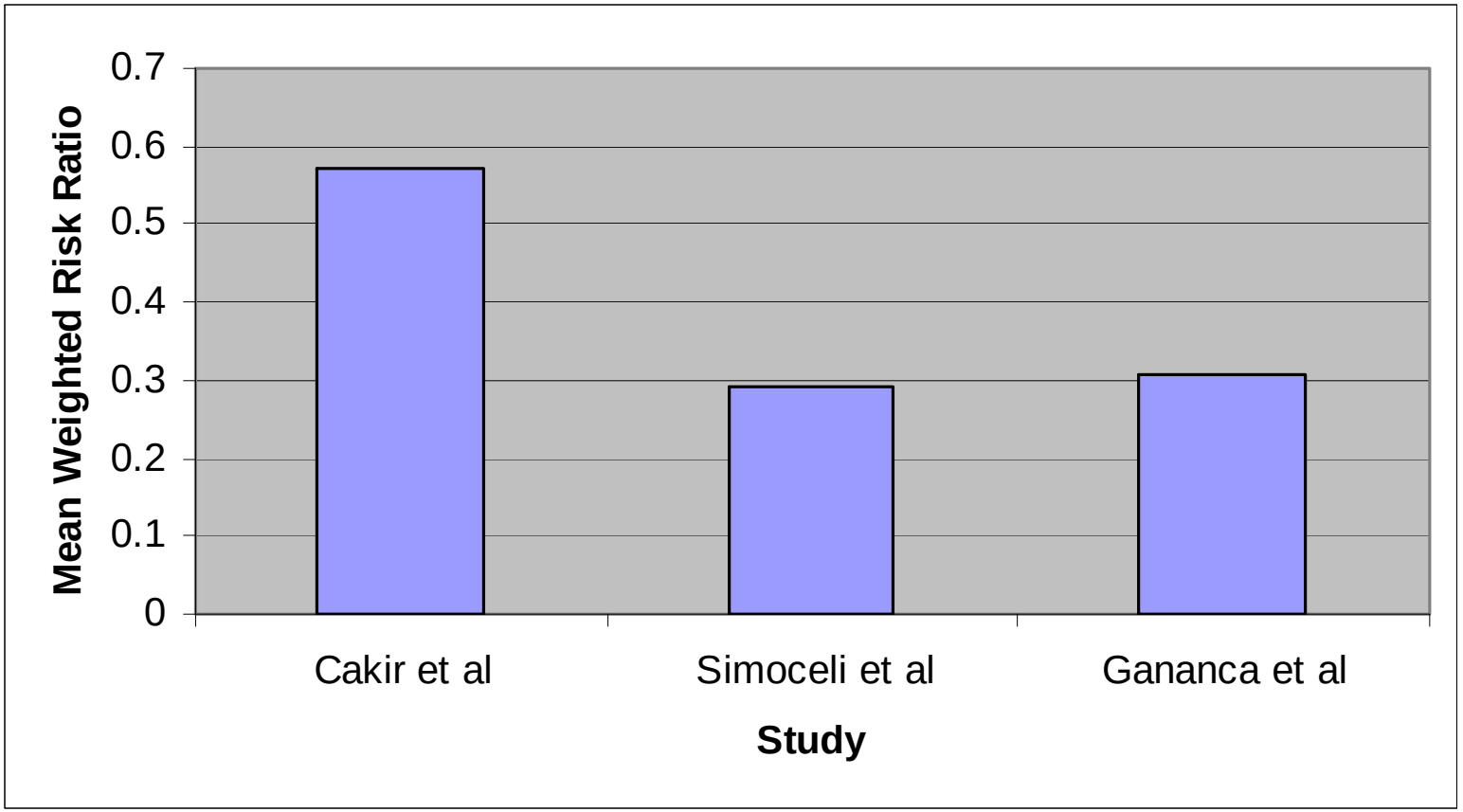
Results: Exercise vs. Control

- Little variation in Cohen and Kimball study but generally supportive of the exercise group
  - EER: 0.38-0.42
  - CER: 0.27-0.30
  - NNT:7-10
- In Helminski study, EER, CER and NNT reported similar outcomes in experimental and control groups
  - All subjects had previously been treated with CRT
    - Follow up at 2 months may have been to soon creating a floor effect

Mean Weighted Risk Ratio of Symptoms with Exercise



Mean Weighted Risk Ratio of Negative Dix-Hallpike or Absence of Symptoms with Upright Prescription



Frequency and Follow-Up

CRT vs. Sham or control

Study	Treatment Frequency	Time to follow up
Munoz et al	2 times in one session	1 week
Froehling et al	Up to 5 times per 1 session, with a median of 3 times	1-2 weeks
Angeli et al	Up to 3 times in 1 session	1 month
Cohen and Kimball	3 times in one session	1 week

Frequency and Follow-Up

- Exercise vs. Control

Study	Exercise Frequency	Time to Follow-Up
Cohen and Kimball	5 trials, 3 times a day (BD) or 4 exercises, 4 times a day (H)	1 week
Helminski	2 trials, once a day (BD)	1 week

Frequency of Treatment

- For those treated with a form of CRT, performing the maneuver 1-3 times in one session may achieve desired results
  - Treat until no nystagmus is observed
- For those treated with Brandt- Daroff exercises 2-5 cycles 1-3 times a day may be effective
- For Habituation exercises performing exercises 4 times a day may be effective

Follow- Up

- Follow up at one week after initial treatment may be beneficial in treating BPPV.
- Additional follow- up time varies as suggested by the studies included
  - 1month-2 years
  - Symptoms tend to recur between 1 and 5 years

Integration of Findings

- The findings of this EMB review suggest that while patients in the experimental groups may have an increased incidence of a favorable outcome, the difference between the event occurring in the experimental group vs. the control group is not greater than chance alone.
- Accept Ho

Discussion

- Treatment of BPPV with CRT and/ or exercises may be more effective than no treatment in the management of this disorder
- Exercises may be especially beneficial for those who cannot tolerate CRT

Discussion

- Difficult to draw conclusions regarding best practice for BPPV given the results of accepted studies
- Further EBM questions may want to include data from studies on patients with post-traumatic or post-viral BPPV
  - Results may be skewed secondary to confounders such as central vestibular lesions arising from other causes of BPPV

Future Research

- Large (over 100 subjects) RCT involving patients with idiopathic BPPV
  - CRT vs. no treatment
  - CRT and no exercise vs. CRT and exercise
  - CRT vs. exercise
  - Upright prescription post CRT vs. no upright prescription post CRT

Recommendations for Practice

- Level of evidence is low to moderate
- Treating patients for BPPV may be more effective than no treatment.
  - CRT is preferred, however exercises may be beneficial for those who cannot tolerate CRT
  - Upright prescription after CRT may not be necessary

The End

Thank You

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Questions? Comments?