



The Prince Charles Hospital
Metro North Hospital
and Health Service



Clinical Effectiveness of Physiotherapy-led Vestibular Service in tertiary hospital

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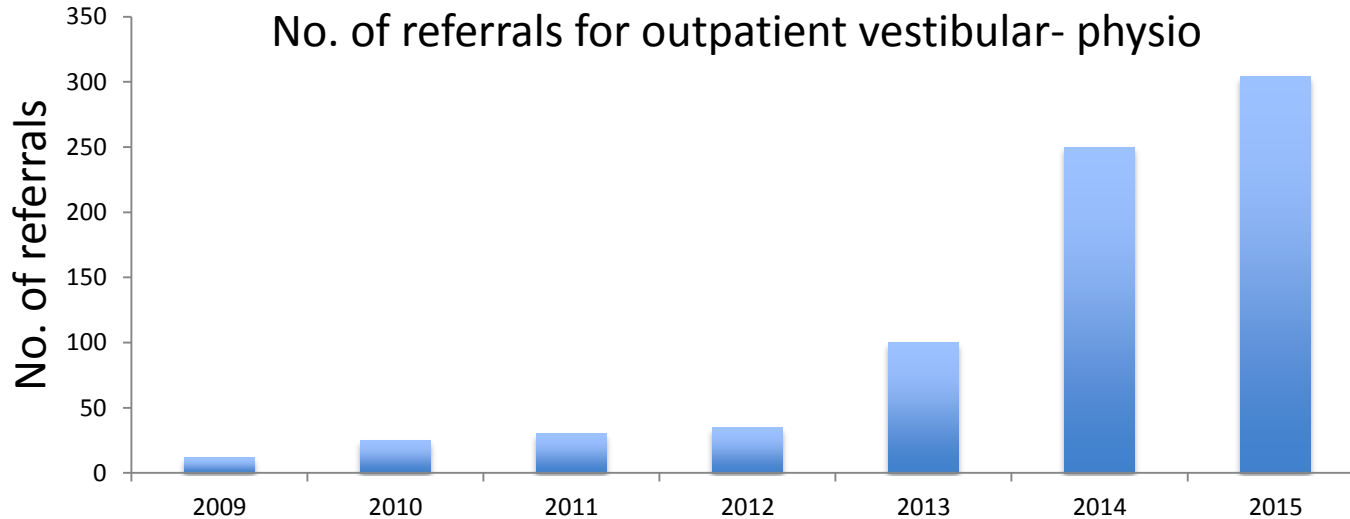


Why look at clinical effectiveness?

- Dizziness/ Vertigo are common reasons for ED presentations
(Kroenke & Hoffman, 2000)
- Vestibular Disorders in Emergency Department (ED):
not optimally managed *(Newman-Toker, 2009)*
- Referral to Physiotherapy Vestibular Rehab from ED: not routine
practice (to assess and manage vestibular disorders) *(Polsenek, 2008)*
- Vestibular disorders not managed optimally may cause:
 - Ongoing symptoms of dizziness/ vertigo *(Herdman, 2000)*
 - Medical consultations/ referrals, re-presentation to hospital
 - Medication use *(Buchman, 2010)*
 - Interference with daily activities *(Whitney, 2000)*
 - Loss of balance, falls and fall related injuries *(Hall, 2004)*
 - increased healthcare costs *(Lo & Harada, 2013)*



Current Vestibular Service



1 FTE Vestibular Physiotherapist

- 0.4 FTE permanent since Jan 2014
- 0.6 temporary since Jan 2015 (Awaiting business case)

Receive referrals from MOs in ED / wards (630 bed hospital)

- Assess patients whilst in ED/ wards
- Run daily out-patient Vestibular Rehab Physiotherapy Clinics



Vestibular Rehabilitation (VR)

VR incorporates:

- Physical manoeuvres to remove particles from the canals (BPPV) *(Bhattachayya, 2008)*
- Education of the patient *(Herdman, 2000)*
- Exercise regimes that aim to maximise vestibular adaptation, thus reducing vertigo, dizziness and nausea *(McDonnell, 2015)*
- Habituate patients to motion sensitivity *(Clendaniel, 2010)*
- Improve balance and gait *(Hillier & McDonnell, 2011)*
- Introduce substitution strategies as required *(Herdman, 2000)*



Aims of the Study

- To investigate clinical effectiveness of a physiotherapy-led, hospital-based vestibular service by:
 1. Determining initial and longer-term outcomes
 2. Comparing immediate & delayed intervention pathways.



Methods of study

Design:

Prospective, observational study, reporting baseline, discharge and follow-up outcomes

Settings:

Emergency/ acute hospital setting/ hospital-based vestibular clinic

Participants:

Adults presenting to hospital with non-emergent dizziness

Exclusion criteria:

- Known cardiac/ stroke diagnosed;
- Unable to provide informed consent (intoxication, mental disability, language barrier);
- Fracture/ injury limiting assessment



Methods

Patients presenting to hospital with non-emergent dizziness, screened (VST) & referred to Physio Vestibular Service

Aim 1:
Determine clinical effectiveness
of Physio-led, hospital based
vestibular service

Physiotherapy Assessment & VR Treatment

Discharge Assessment completed – Short term effectiveness?

3/12 Follow-up Assessment completed – Longer term effectiveness?



Methods

Patient presenting to hospital with non-emergent dizziness, screened (VST) & referred to Physio Vestibular Service

Determined by availability and timing of the referral

Immediate Intervention pathway

- Treatment commenced whilst in hospital / immediate post-discharge period (48 hours)

Delayed Intervention Pathway

- Discharged home from hospital
- Placed on wait-list for vestibular assessment & management

Follow-up Physiotherapy Treatment

Discharged: assessment completed

3/12 Follow-up assessment completed

Aim 2: Determine clinical outcomes for immediate & delayed referral pathways



Clinical diagnostic tests on Initial Assessment

Video Frenzel and Video HIT utilized for assessment

- Comprehensive subjective examination
- Nystagmus: Spontaneous, Gaze-evoked
- Smooth Pursuit and Saccadic Eye Movement
- Test of Skew Deviation
- VOR Cancellation Test
- Head Impulse Test (HIT)
- Head-Shaking Nystagmus (HSN)
- Positional Tests including Hallpike-Dix and Head Roll Test
- Pressure/ Fistula testing when indicated
- DVA static vs. dynamic



Vestibular diagnostic clinical tests used to categorise patients:

- Vestibular impairment
- Non-vestibular impairment

Vestibular Disorder Diagnosis

Test	Diagnosis
Positive Hallpike Dix, Head Roll Test (<i>Bhattachayya, 2008</i>)	BPPV
Positive head impulse test / video head impulse test + Acute vestibular crisis history (nil central features) (<i>Luxon, 2007</i>)	Acute vestibular neuritis, unilateral/ bilateral vestibular hypofunction
Episodic symptoms of fluctuant hearing loss, vertigo, tinnitus or ear blockage confirmed by a specialist (<i>Luxon, 2007</i>)	Meniere's Disease
Migraine headaches as per international headache criteria and vestibular symptoms of imbalance, vertigo/ dizziness/ unsteadiness (<i>Lempert, 2013</i>)	Migraine Vertigo
Direction-changing gaze-evoked nystagmus or pure down-beating/ up-beating/ torsional nystagmus (<i>Herdman, 2000</i>)	Indicative of central pathology

If unclear and symptoms of vestibular dysfunction presented, the patient was categorised as 'other vestibular' and referred for further specialist assessment

Outcome Measures

Initial/ Discharge/ Follow-up assessment

- Subjective improvement in dizziness (McDonnell, 2015)
 - Patient report improved/ same/ worse
- Vestibular Screening Tool (VST) (Stewart, 2015)
 - Scores of $\geq 4/8$ indicate vestibular disorder
 - Demonstrates concurrent validity with DHI
 - 2 point change demonstrates clinically meaningful change
- Dizziness Handicap Inventory (DHI) (Jacobson, 1990)
 - Scores >60 = severe vestibular dysfunction, greater functional impairment (Whitney, 2004)
- Functional Gait Assessment (FGA) (Wrisley, 2004; Wrisley, 2010)
 - $\leq 22/30$ predict prospective older fallers
- Activities Balance Confidence Scale – Short form (Schepens, 2010)
 - Balance confidence measure 0-100%.



Results - Demographics

Characteristics	Total Group (n=193)	Immediate Intervention (n=112)	Delayed Intervention (n=81)
Mean age \pm SD (y)	64 \pm 15 (19–94)	63 \pm 16 (30–94)	65 \pm 14 (19–91)
Female, n (%)	115 (59.6)	63 (56.3)	52 (64.2)
Falls past 12-months, n (%)	57 (29.5)	28 (25.5)	29 (36.7)
Independent Gait, n (%)	152 (78.8)	77 (77.8)	75 (93.8)
Non-vestibular, n (%)	37 (19.2)	22 (19.6)	15 (18.5)
Vestibular, n (%)	156 (80.8)	90 (80.4)	66 (81.5)



Clinical Vestibular Diagnosis



BPPV (42.5%)

Vestibular neuritis (14.5%)

Unilateral hypofunction (6.7%)

Unspecified vestibular (6.7%)

Migraine vertigo (3.6%)

Central (2.1%)

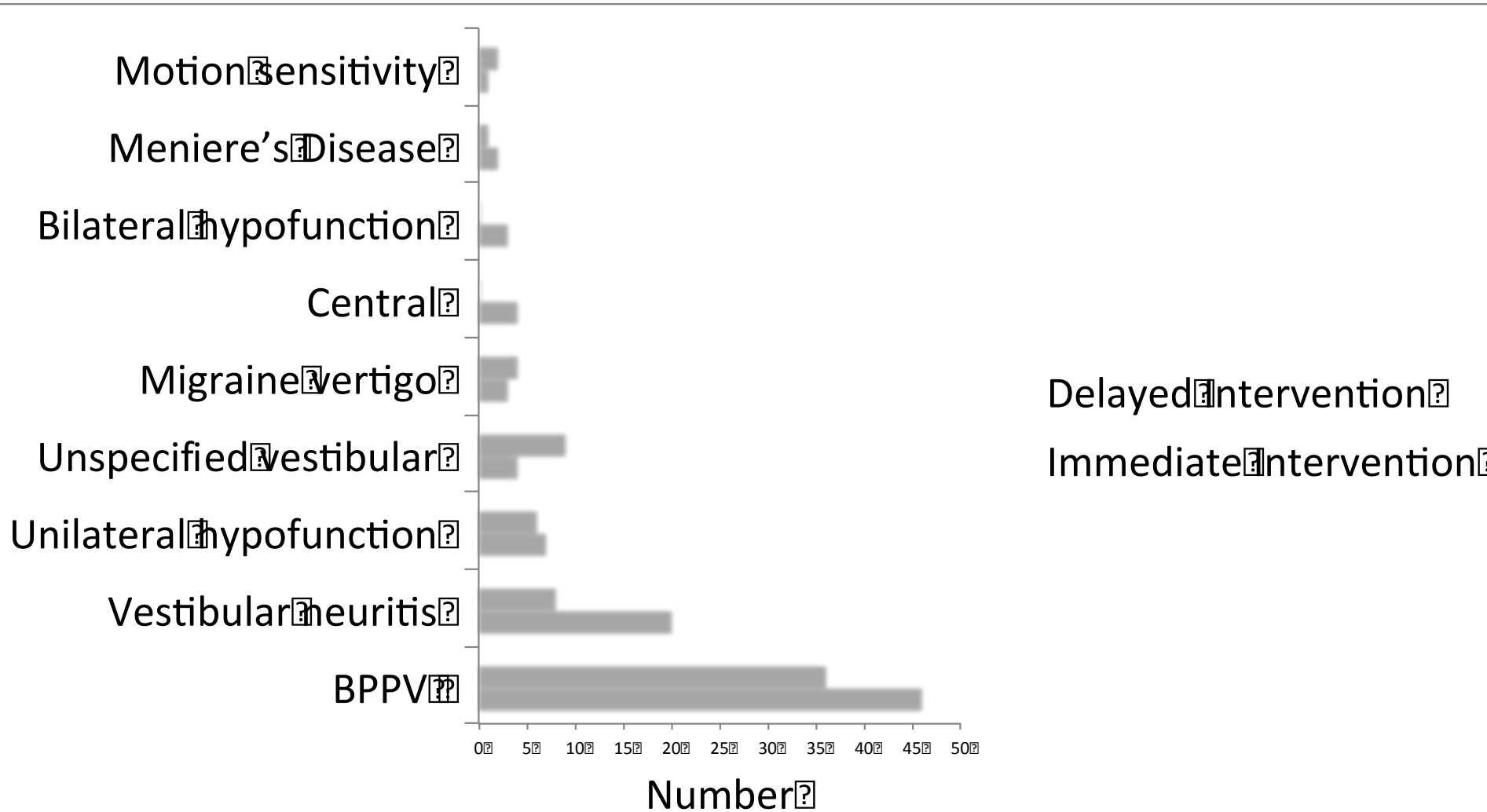
Bilateral hypofunction (1.6%)

Meniere's Disease (1.6%)

Motion sensitivity (1.6%)

Intervention Groups

Clinical Vestibular Diagnosis



Results

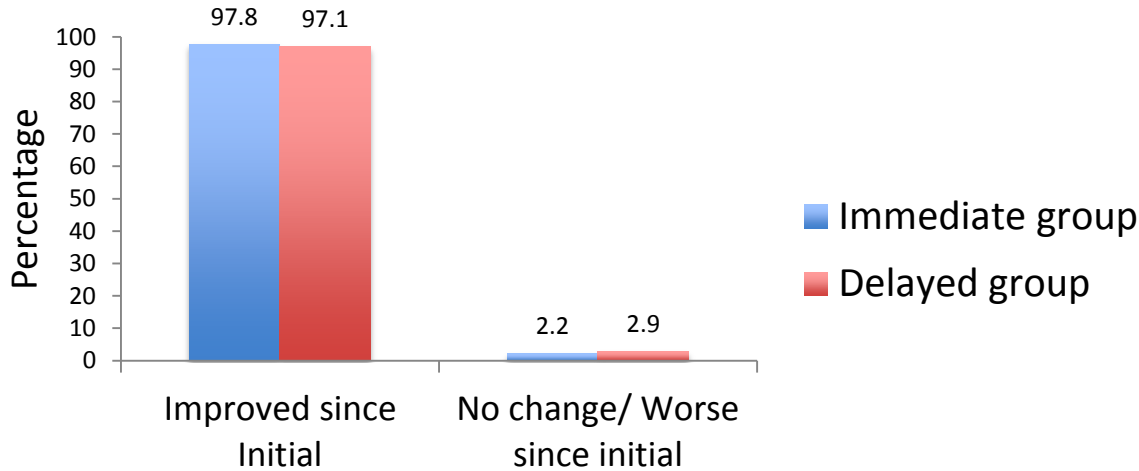
	Total Group (n=193)	Immediate (n=112)	Delayed (n=81)
Diagnosed as vestibular	156 (80.8%)	90 (80.3%)	66 (81.5%)
Completed discharge Ax	105 (67.3%)	67 (74.4%)	38 (57.6%)
Completed Follow-up Ax	73 (69.5%)	44 (65.7%)	29 (76.3%)

- Immediate and delayed groups completed similar No. of Physiotherapy sessions: 3.24 – 3.28
- Immediate group assessed within 48hrs of presenting to hospital
- Delayed group waited an average 22 days (3-77 days) for initial Ax

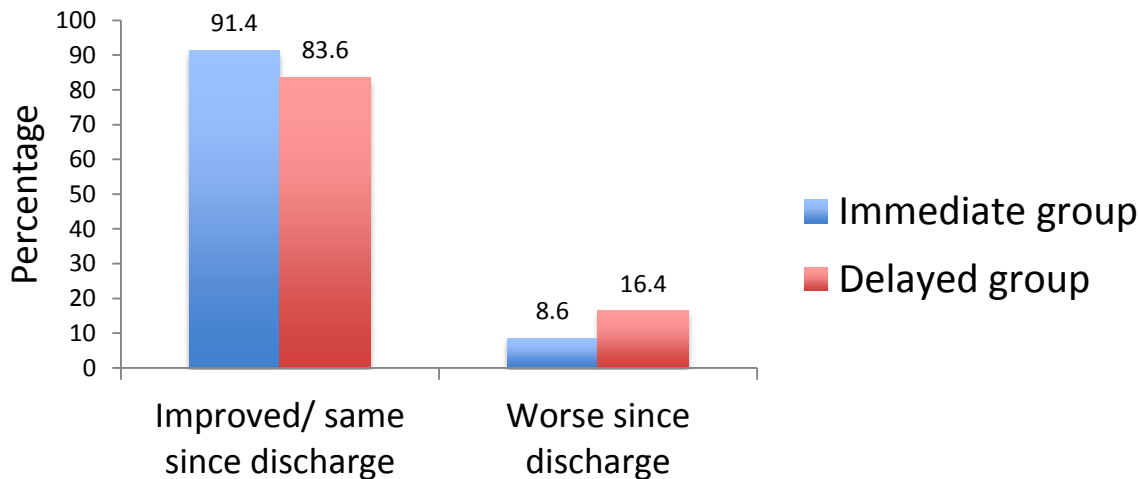


Subjective Improvement

Discharge



3/12 Follow-up



No significant difference in subjective rating scale between immediate and delayed groups ($p > .05$)

Vestibular Screening Tool (VST)



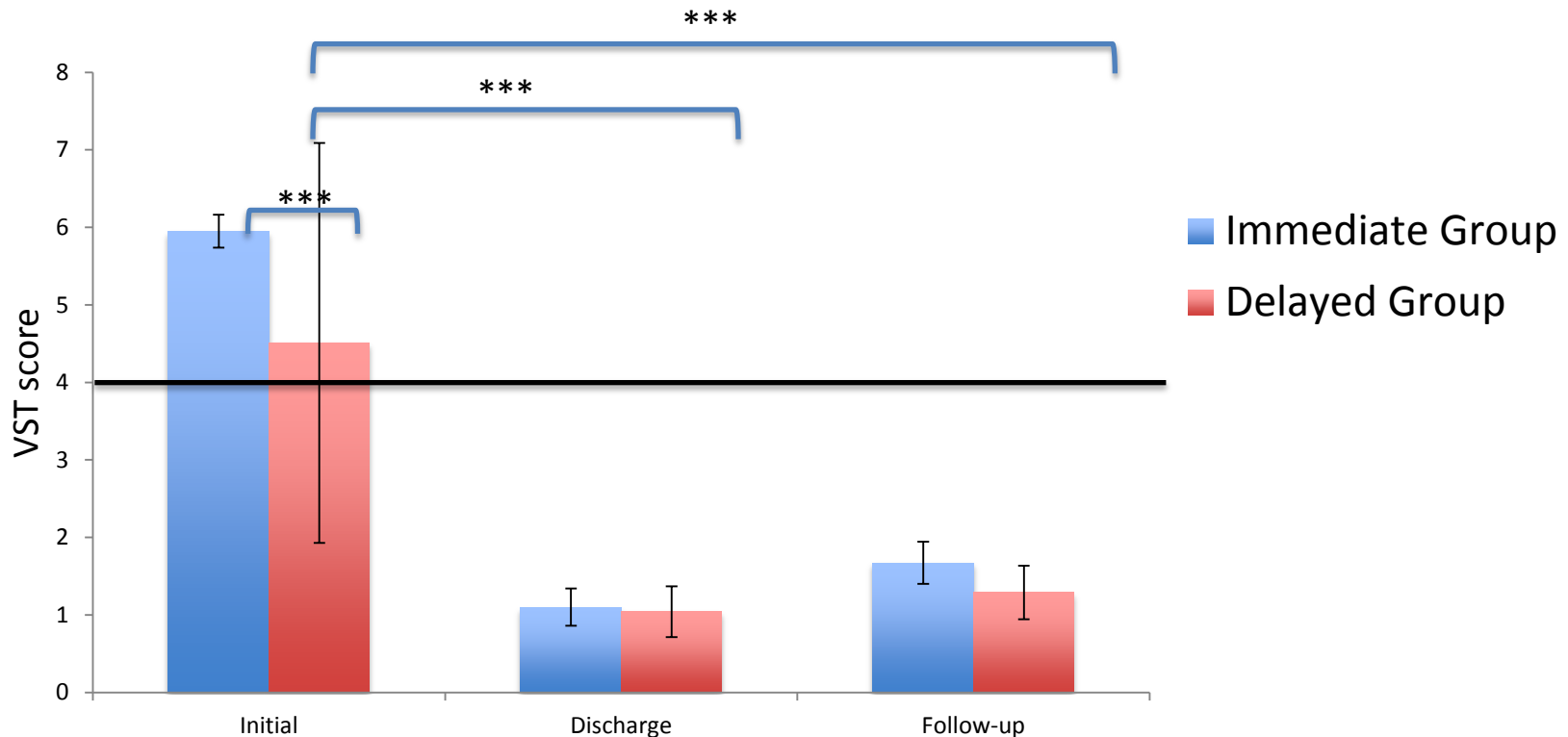
- Significant difference between immediate and delayed group on initial Ax

Vestibular Screening Tool (VST)



- Significant difference between immediate and delayed group on initial Ax
- Both groups' scores were abnormal (ie. $\geq 4/8$) on initial Ax

Vestibular Screening Tool (VST)



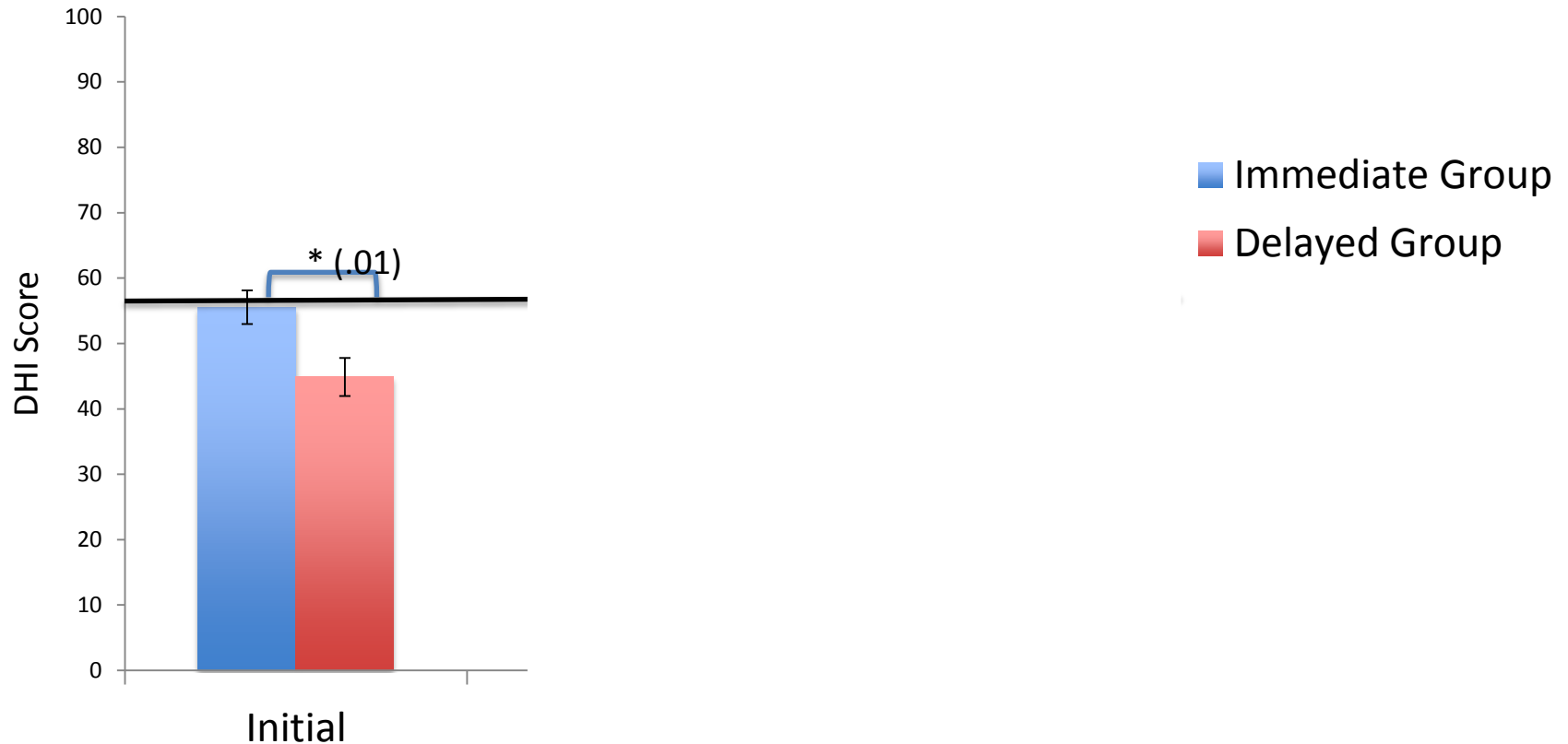
- Significant difference between immediate and delayed group on initial Ax
- Both groups' scores were abnormal (ie. $\geq 4/8$) on initial Ax
- Significant improvements between initial–discharge, initial–follow-up, for both groups

Dizziness Handicap Inventory (DHI)



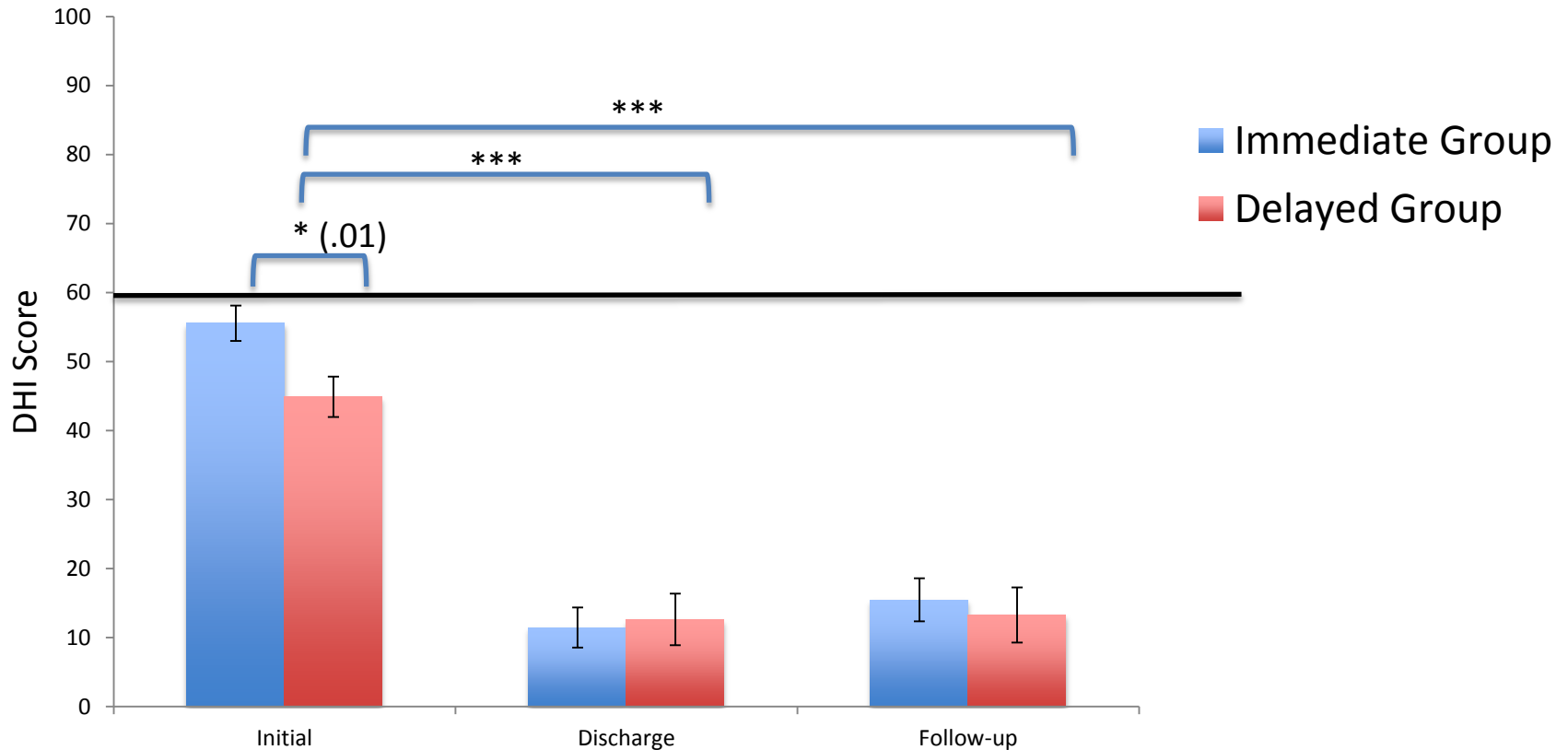
- Mild significant difference between immediate and delayed groups on initial assessment

Dizziness Handicap Inventory (DHI)



- Mild significant difference between immediate and delayed groups on initial assessment
- Immediate and Delayed groups were approaching the 'severe' DHI level

Dizziness Handicap Inventory (DHI)



- No significant difference between immediate and delayed groups on initial assessment
- Immediate and Delayed groups were approaching the 'severe' DHI level
- Significant improvements between initial and discharge, initial and follow-up, for both groups

Functional Gait Assessment (FGA)



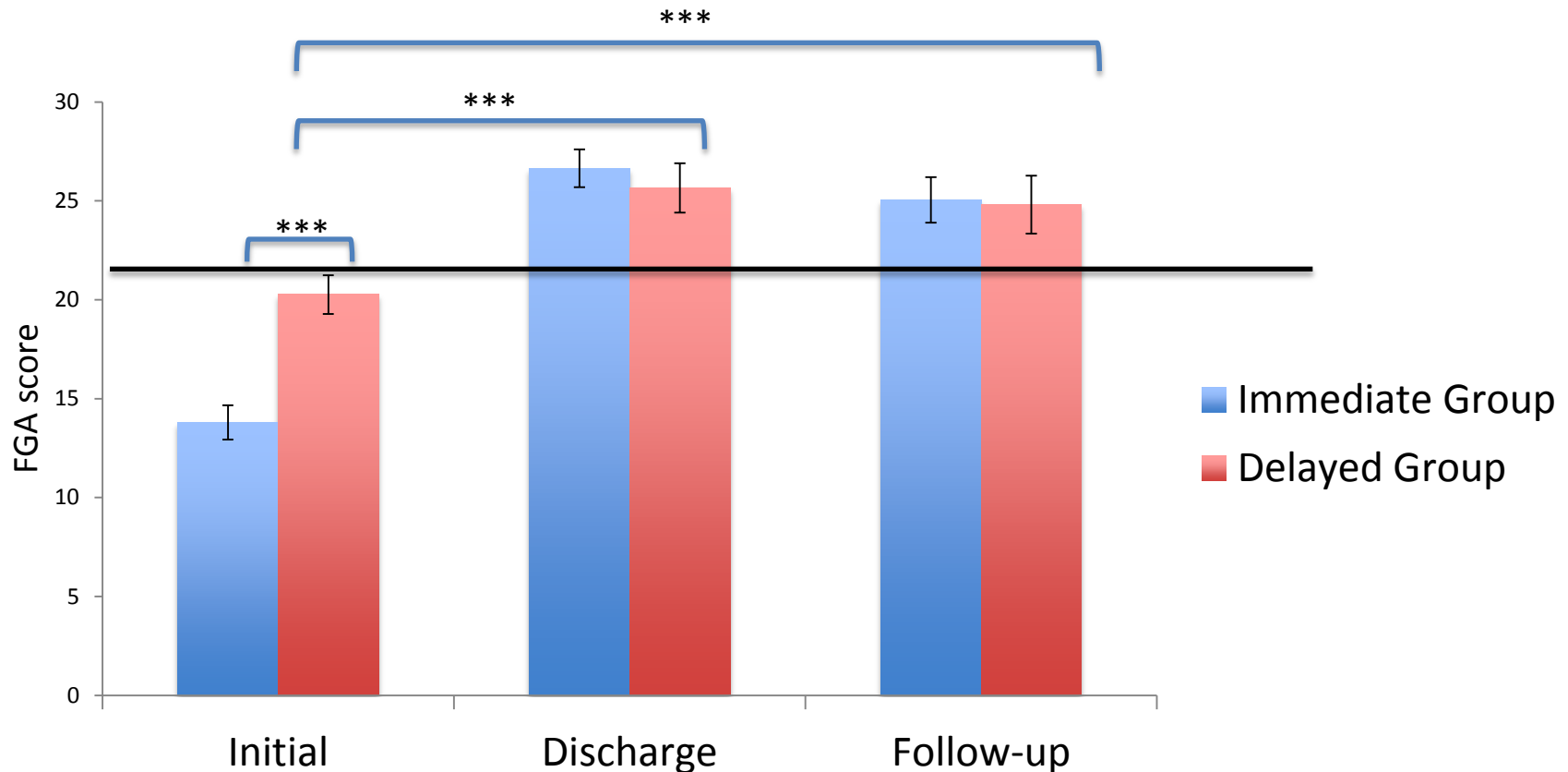
- Significant difference between immediate and delayed groups on initial assessment

Functional Gait Assessment (FGA)



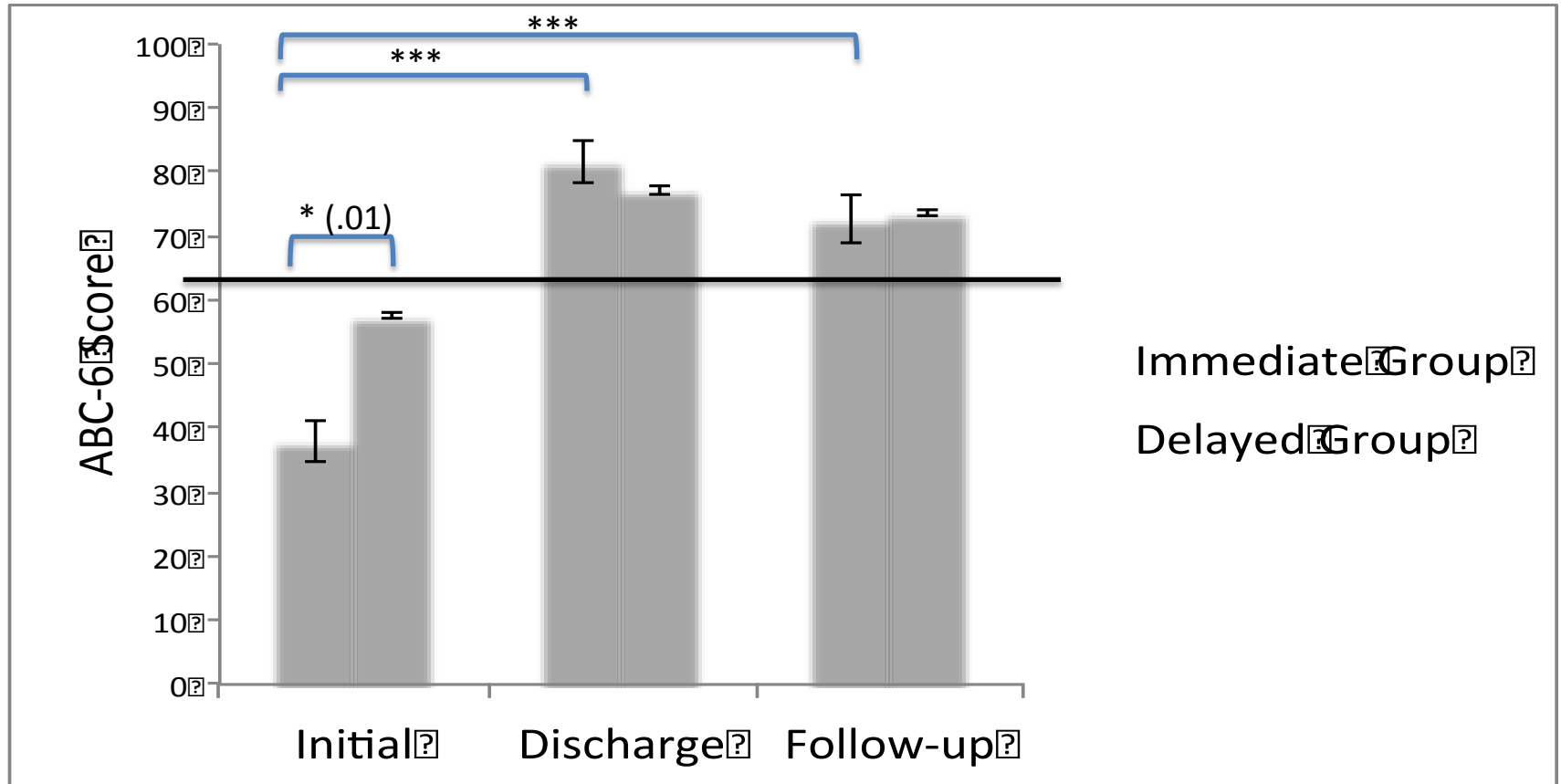
- Significant difference between immediate and delayed groups on initial assessment
- Both groups scored below 22/30 on initial Ax = predictive of falls

Functional Gait Assessment (FGA)



- Significant difference between immediate and delayed groups on initial assessment
- Both groups scored below 22/30 on initial Ax = predictive of falls
- Significant improvements between initial and discharge, initial and follow-up, for both groups

Activities Balance Confidence: Short Form 6



- Significant difference between groups at initial assessment
- Both groups scored below 60/100 on initial – low balance confidence
- Significant improvements by discharge and follow-up assessment

Summary

- People who present to hospital with a vestibular dysfunction have:
 - Moderate - severe dizziness impairment
 - Significant functional limitations
 - Increased risk of falling
 - Poor community ambulation
 - Low balance confidence
- Resultant symptoms and functional impact of a vestibular disorder do not always spontaneously resolve, even 3 weeks after hospital.
- Physio VR intervention produced significant improvements in:
 - Dizziness impairment
 - Balance confidence
 - Functional gait
- Results were maintained 3 months post discharge

Summary

- Delayed group had persistent symptoms until management commenced (> 3weeks after ED presentation) ie did not spontaneously improve
- Both immediate and delayed physiotherapy intervention groups responded to VR & achieved similar results by D/C
- Significant improvements maintained three-months after discharge
- A physiotherapy-led vestibular service demonstrated clinical effectiveness in Mx of dizzy patients presenting to hospital
- Patients presenting to hospital with a suspected vestibular disorder should be considered for referral to a physiotherapy-led vestibular service in the hospital setting.



Limitations/ further Research

Limitations:

- Differences in patient profile in the immediate & delayed groups whilst in ED is unknown
- Costs to patients & healthcare service for delayed group not calculated

Further Research:

- Psycho-social impact on patients during wait-list period requires FU
- Rate of falls, representations/ re-admissions to hospital requires FU
- Proportion referred to Audiology/ Neurology/ ENT/ Psychology for FU
- Longer-term (>3/12) follow-up required
- Burden of Care to be established



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Questions?

Thank-you

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Clinical Diagnosis	Total (n = 193)	Immediate (n = 112)	Delayed (n = 81)
- Non-vestibular, n (%)	37 (19.2)	22 (19.6)	15 (18.5)
- Vestibular: n (%)			
BPPV	82 (42.5)	46 (41.1)	36 (44.4)
Vestibular neuritis	28 (14.5)	20 (17.9)	8 (9.9)
Unilateral hypofunction	13 (6.7)	7 (6.3)	6 (7.4)
Bilateral hypofunction	3 (1.6)	3 (2.7)	0 (0.0)
Migraine vertigo	7 (3.6)	3 (2.7)	4 (4.9)
Meniere's Disease	3 (1.6)	2 (1.8)	1 (1.2)
Central	4 (2.1)	4 (3.6)	0 (0.0)
Motion sensitivity	3 (1.6)	1 (0.9)	2 (2.5)
Unspecified vestibular	13 (6.7)	4 (3.6)	9 (11.1)

Results - Demographics

Characteristic	Total group (n = 193)	Immediate Intervention (n = 112)	Delayed Intervention (n = 81)
Mean age \pm SD (y)	64 \pm 15 (19–94)	63 \pm 16 (30–94)	65 \pm 14 (19–91)
Female, n (%)	115 (59.6)	63 (56.3)	52 (64.2)
Falls past 12 months, n (%)	57 (29.5)	28 (25.5)	29 (36.7)
Independent gait, n (%)	152 (78.8)	77 (77.8)	75 (93.8)

VST: Vestibular Screening Tool (Stewart et al, 2015)

- Stewart, V., Mendis, M.D., Rowland, J., Low Choy, N.L. (2015) Construction and Validation of the Vestibular Screening Tool for Use in the Emergency Department and Acute Hospital Setting. Archives of Physical Medicine and Rehabilitation 96 (12): 2153-60
- VST is Valid & Reliable tool for use in hospital setting
- High Sensitivity (83%) & Specificity (84%) for identifying a likely vestibular disorder when patients present to hospital with non-emergent dizziness
- Uni-dimensional internal construct validity

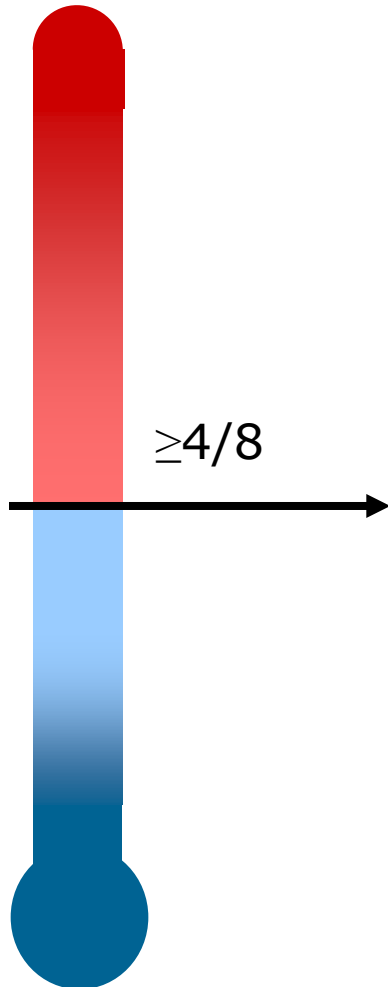
Vestibular Screening Tool (VST)	Yes (2)	Sometimes (1)	No (0)
1. Do you have a feeling that things are spinning or moving around?			
2. Does bending over and/ or looking up at the sky make you feel dizzy?			
3. Does lying down and/ or turning over in bed make you feel dizzy?			
4. Does moving your head quickly from side to side make you feel dizzy?			
TOTAL	/8		

Total score $\geq 4/8$ indicates vestibular disorder, refer to vestibular service

- High inter-rater reliability (0.988 ICC)
- High intra-rater reliability (0.878 ICC)

VST Validation Results Study #1

Vestibular Disorder



VST Scores $\geq 4/8$:

- ▶ Predict vestibular dysfunction as cause to non-emergent dizziness

VST Scores $\leq 3/8$:

- ▶ Non-vestibular cause to dizziness more likely

Non-Vestibular Disorder

VST – Vestibular Screening Tool

	Yes	Sometimes	No
1. Do you have a feeling that things are spinning or moving around?			
2. Does bending over and/ or looking up at the sky make you feel dizzy?			
3. Does lying down and/ or turning over in bed make you feel dizzy?			
4. Does moving your head quickly from side to side make you feel dizzy?			

Yes = 2
Sometimes = 1
No = 0

TOTAL / 8



Statistics

- Means / SD outcome measures determined for initial, discharge & follow-up assessment
- Linear mixed Models
 - Determined significance of the mean difference of measures across continuum of care
 - Compared differences in mean scores between immediate & delayed intervention groups

