Return to Work after a Concussion or TBI:
Ned Crane, DPT, DAC
Traumatic brain injury (TBI) is a leading cause of worldwide disability, with one estimate showing a loss of 56 billion dollars in economic productivity.

Vocational return is regarded as the most durable sign of successful community return.

- Employment becomes a challenging, if not unlikely, feat to attain because of a myriad of cognitive, physical, and psychosocial problems.
- Meaningful productive employment enhances self-esteem, financial status, and one's overall quality of life,
Furthermore, vocational return is increasingly viewed as a means of enhancing cognitive, behavioral, and physical recovery after the acute rehabilitation phase.

- Because of this and other factors, vocational rehabilitation strategies to assist survivors of TBI are of utmost importance.
Dealing with Dizziness

• Posttraumatic dizziness affects 20 to 65 percent of patients with TBI [and remains disabling for many months]
  – Dizziness is among the top five postconcussive symptoms distinguishing patients with mild TBI from healthy controls
  – One study showed a 46 percent failure of RTW 5 years after mild to moderate TBI for patients with posttraumatic dizziness.
  – A more recent study on RTW at 6 months post-injury (mild and moderate) showed 34 percent of individuals with dizziness were gainfully employed compared with nearly 75 percent of subjects without dizziness.

• Importantly, dizziness was also associated with increased psychological distress (including anxiety and depression), which may further hinder RTW efforts
• Studies of patients with dizziness after mild to moderate TBI show a rate of vestibular abnormalities between 32 and 65 percent.

• The large number of patients with dizziness who do not have objective findings of neural damage reinforces the connection with psychological factors.
  – Medication-based treatments, such as the anxiolytic agents buspirone or trazodone, may be aimed at these psychological factors and can have positive effects on symptoms.
  – Commonly prescribed "sedating" medications, such as meclizine, are controversial in that their mechanism of decreasing the sensation of causative stimuli can theoretically slow recovery.
  – Focused vestibular rehabilitation programs with purposeful exposure, habituation, and coping strategies have proven efficacy.
Benign paroxysmal positional vertigo is a condition that is caused by movement of otolithic debris or granules within the semicircular canals.

– Trauma can lead to the release of such debris.
– Specific therapies (Dix-Hallpike maneuver and Liberatory technique) can be used for both diagnosis and therapy.
• Even in the face of disabling dizziness, progressive return to activity, including driving and work, is key
  – Reducing symptoms preventing habituation to abnormal movement patterns (e.g., remaining lying down for activities)
  – This "forced" activity is a necessary component of the rehabilitation efforts for vertigo.
  – Intensive vocational rehabilitation services are indicated and invaluable in the early rehabilitation course.
• Work site modifications and job accommodations are initially an integral aspect of vocational rehabilitation
  – can usually be tapered away as the symptoms and tolerance improve.
  – Gradated exposure to the necessary aspects of the job (e.g., repeated movements, visual distractions) is both therapeutic and facilitates RTW efforts.
  – Medications, while occasionally helpful early in the treatment program, are limited in the work setting because of cognitive depression.
Dealing with Vision

• Reports of visual changes (usually worsened visual acuity) occur in up to 20 to 40 percent of individuals with TBI
  – True deficits in vision are difficult to differentiate from visual perceptual deficits (the brain's interpretation of what the eyes see)
  – True field cuts (e.g., homonymous hemianopsia, quadrantanopsia, tunnel vision) are more common in ischemic damage to the brain but may also be seen with traumatic injuries

• Cortical blindness (Anton's syndrome) may be seen following occipital lobe injury but is uncommon

• The Useful Field of View (UFOV) test is a measure of the functional or useful range of peripheral vision under cognitive load conditions
As cognitive load is increased by elevating task complexity, the functional range of peripheral vision (i.e., the degree of peripheral vision from which information is processed) becomes restricted.

Thus, the functional extent of peripheral vision under complex real-world conditions, such as detecting stimuli in cluttered backgrounds, is not always equivalent to the maximum extent of peripheral vision that can be measured with clinical perimetry techniques.

Individuals with TBI, strokes and older adults often have impaired UFOV.
Survivors with TBI exhibited decreased information processing time and mild impairment at all eccentricities, with the greatest impairment on the selective attention subtest of the UFOV.

- These findings suggest that survivors with TBI may need more time to locate stimuli in cluttered backgrounds and are less accurate than people without brain impairment.

- These results are consistent with previous reports of higher errors and task completion times on cancellation tests involving visual search.
• Rehabilitation efforts for visual deficits focus on enriching the environments to increase appropriate stimuli to the areas of visual decline.
  – This strategy should be applied both in the structured therapy setting and in the general treatment milieu.

• In addition to enhancing visual stimuli and specialized interventions, rehabilitation efforts must also focus on enhancing the cognitive functioning.
  – The use of these strategies and devices allows for greater adaptation to deficits and greater use of other senses.
  – Many of the tactics used for newly blind individuals (from any cause) are used in a modified way for individuals with TBI.
Studies have demonstrated poorer overall functional outcomes with persistent visual deficits and poorer RTW with visual perceptual deficits after TBI.

- Vocational efforts for individuals who have visual deficits that are of clinical significance are typically introduced once an individual has returned to the community.
- Transportation to the work site may present significant challenges and must be addressed early in the course.

• Unique aspects of "blind rehabilitation" that are relevant to the individual with TBI are the overlying cognitive, behavioral, and physical impairments commonly seen.

• Safety concerns must be emphasized in individuals with TBI and impaired sight because of the decreased sensory feedback and, not uncommonly, decreased safety judgment.
Dealing with Headaches

• Pain is commonplace after TBI of all severity levels.
  – In a study of hospitalized patients with TBI, 71 percent required narcotic pain medication prescription upon discharge
  – In an adult tertiary care pain clinic investigation, 58 percent of persons with mild and 52 percent with moderate to severe TBI reported chronic pain.
  – Chronic pain is usually defined as 6 contiguous months of pain and is often intertwined with psychopathology and environmental factors
  – In its persistent form, chronic pain typically imposes severe emotional, physical, economic, and social stresses on the patient and family.
• After major trauma, potential etiologies of pain are numerous. The anatomical source of pain in individuals after TBI may be intracranial or extracranial, depending on the pattern of trauma.
  – Proper detection and diagnosis of pain is paramount for achieving optimal rehabilitation potential after TBI.

• With proper evaluation, pain can often be classified into one of the following clinical types:
  – Musculoskeletal
  – Vascular
  – Visceral
  – Neural tissue origin
• Headache (HA) is the most frequent pain reported after TBI, with a prevalence range from 18 to 93 percent depending on study methodologies.
  – HA that commences within 14 days of consciousness following TBI is termed posttraumatic HA (PTHA).
  – PTHA is usually self-limited but may become chronic.
• A longitudinal study of patients with moderate and severe TBI showed daily PTHA in 30 percent during inpatient rehabilitation, declining to 10 percent 6 months later.
  – Similar to chronic pain in the general population, the evolution from acute to chronic PTHA is linked to emotional distress.

• Chronic PTHA that persists beyond 6 months after injury will usually become permanent and disabling.
Clinicians should, after excluding serious intracranial pathology, attempt to classify PTHA and use medical treatment accordingly.

- Migraine HA type, diagnosed in 26 percent of one PTHA sample, appears to be overrepresented compared with its distribution in the general population.
- Cervicogenic HA, originating from cervical spine or surrounding soft tissues, is common after TBI.
- THA with neuropathic quality may respond to neuropathic pain medications or peripheral nerve blocks.
- Narcotic medications and other medications with central effects such as muscle relaxants should be avoided if possible.
- Tension and cervicogenic HA may respond to NSAIDs and/or acetaminophen.
- Concomitant emotional disorders such as depression and anxiety should be treated with appropriate pharmacological and behavioral treatments.
- Even absent emotional disorders, psychological evaluation and behavior therapy, including relaxation training or biofeedback, may be beneficial.
• Contributing factors should also be sought out, including sleep disturbances, excessive caffeine intake, and sources of emotional distress.

• From a vocational rehabilitation standpoint, the role of emotional stress in PTHA is paramount.
  • Patients should be monitored for the onset of delayed PTHA or exacerbation of preexisting PTHA during work reentry or after changes in work routine.
  • Whenever PTHA or other chronic pain syndromes worsen in employed patients with TBI, they should be medically examined.
  • Their work schedule and duties should as well be reevaluated.

• Some PTHA syndromes (migraine) may be episodically disabling and necessitate intermittent work absence.

• Others may be chronically disabling (chronic daily HA), causing total work disability if refractory to treatment.
Dealing with Fatigue

• Fatigue is commonly observed and reported after TBI, regardless of severity.
• Following HAs and dizziness, it is the third most prevalent symptom of postconcussive syndrome.
• Studies on fatigue in the general population have documented prevalence rates ranging from 7 to 45 percent.
  – The wide range of prevalence rates is likely attributable to differences in operationalizing a working definition of fatigue, as well as the variability of fatigue across different medical conditions and interventions.

• Typically, an assessment of fatigue is obtained via a detailed history, a structured interview, or questionnaires designed to measure broader conditions (e.g., Beck Depression Inventory).
• The most commonly recognized questionnaires in the literature are the
  – Fatigue Impact Scale
  – Fatigue Severity Scale
  – Barrow Neurologic Institute Fatigue Scale
• Fatigue has been shown to be a clinically relevant symptom up to **10 years post-injury**
  – negatively affect functional performance
  – return to vocational efforts

• Treatments focus on managing underlying physical (endocrine, infectious, cardiovascular) and psychological (depression, stress) factors and use of neurostimulant agents (e.g., methylphenidate).
Vocational interventions need to address physical and cognitive conditioning to allow for successful employment.

- **Work accommodations** should be made to account for decrease in functional abilities.
- A **progressive program** of reactivation of the body and the mind is both a specific treatment of the underlying symptom and a necessary vocational rehabilitation intervention.
- While **scheduled rest breaks**, adjusted work schedules, and job modifications may be needed initially to maintain the client in a vocational situation,
  - the long-term goal is one of gradual weaning away of these adjustments.
• The partnership between the medical and rehabilitation team and the vocational specialist is vital to facilitate rapid feedback of the successes of interventions and the potential exacerbation of symptoms related to work.
CONCLUSIONS

- The sequelae described in this article represent challenges to successful RTW.
  - These problems are recurrent and long-term and clearly affect job procurement, nature of job, level of required support, and likelihood of job retention.
  - Conversely, these challenges should not be viewed as impenetrable obstacles.
- With appropriate supports, such as compensatory strategies, job coaching, assistive technology, medical management, and job restructuring, successful RTW is a viable option.
- Most of the sequelae described have solutions, not the least of which is searching for a more appropriate job.
- The astute medical professional will focus repeatedly on two questions:
  - When will my patient be employed?
  - What supports are needed for my patient to become employed?
• The limitations faced by many patients with TBI can best be overcome through clever job search, job redesign, and community linkages with business and industry that are willing to partner in helping the patient with TBI regain employment.

  – For example, the person who has periodic HAs may fair poorly in a stimulus-rich environment and flourish in a more controlled environment.

  – The physician plays a key role in communicating suggestions to the vocational specialist.
• Community rehabilitation programs (CRPs) provide supported employment services, frequently through agreements with state vocational rehabilitation agencies.
  – The CRP staff members that provide employment services are called employment specialists.
  – Well-trained employment specialists are skilled in a variety of activities necessary to identify, develop, implement, and monitor individualized employment supports.

• Physicians must focus on employment outcomes in real jobs and not settle for volunteer work, sheltered work, or assessment and planning.
  – Individuals should be placed in real work for real pay.
Through close collaboration between the survivor of TBI, physician, vocational specialist, and community resources, successful employment for survivors with TBI is possible and must be assigned a high value.

- Significant relationships were found between RTW and type of occupation, discharge disposition, and social interaction.
- Social support intervention, discharge disposition, and the type of job to which a client with MTBI is hoping to return are areas worth further consideration.
• Assessment of cognitive functioning at 6 to 9 months post-injury may also prove useful for those who have not resumed employment.

• Return to work is a particularly important outcome for survivors.
  
  – The inability to work has serious social and economic consequences for both the individual and society

• The best available evidence suggests that most people RTW within 3 to 6 months after MTBI.
• However, 5% to 20% still experience persisting problems in the longer term.
• Predictors of delayed RTW or unemployment include
  – a lower level of education
  – nausea or vomiting on hospital admission
  – extracranial injuries
  – a high level of pain early after injury
  – limited job independence and decision-making latitude.
• Further high-quality research is needed to determine long-term RTW prognosis and determinants for individuals with MTBI across different occupational categories.

• MTBI definitions need to be more specific and uniform to compare participants across studies.
• RETURN TO WORK (RTW) is a significant outcome milestone for survivors of severe traumatic brain injury (TBI), who often face persisting cognitive and physical impairments.

• Within our culture employment contributes to self-esteem and symbolizes full reintegration and membership in the community at large.

• Families typically desire early prognostic information about RTW and other long-term implications of TBI.

• Rehabilitation professionals use such prognostic information in program planning and goal setting.
  – However, the present ability to predict RTW for a person after TBI is limited at best.
• Premorbid occupational factors have emerged as a domain of demographic predictor variables that may warrant special attention.

• Occupational factors not only directly influence employment opportunities but may also serve as markers for “employable” characteristics.

• Education level and whether the person was employed or unemployed before the injury have already been shown to have a strong relation to RTW in the TBI population.
• Among patients employed at the time of injury, those in manual labor jobs had the lowest rate of RTW – implying that this group may have a greater need for early vocational rehabilitation services.

• Patients in professional/managerial jobs had the highest rate of RTW at 1 year.

• Pre-morbid occupation category should be considered in clinical prognostication for RTW and vocational rehabilitation planning and controlled for in clinical trials that use RTW as an outcome measure.
Exercise assessment and aerobic exercise training for postconcussion syndrome (PCS) may reduce concussion-related physiological dysfunction and symptoms
  — by restoring autonomic balance and improving cerebral blood flow autoregulation.

In a descriptive pilot study of 91 patients referred to a university clinic for treatment of PCS, a subset of 63 patients were contacted by telephone for assessment of symptoms and return to full daily functioning.

Those who experienced symptoms during a graded exercise treadmill test (physiologic PCS, n = 40) were compared to those who could exercise to capacity (PCS, n = 23).
  — Both groups had been offered progressive exercise rehabilitation.
• Overall 41 of 57 (72%) who participated in the exercise rehabilitation program returned to full daily functioning.
  – This included 27 of 35 (77%) from the physiologic PCS group, and 14 of 22 (64%) from the PCS group.
  – Only 1 of the 6 patients (17%) who declined exercise rehabilitation returned to full functioning.

- VOCATIONAL PROGRAMS TO ENHANCE RTW
- THE EFFICACY OF SUPPORTED EMPLOYMENT
- GET TO KNOW THE PERSON
- IDENTIFY GOOD WORK OPPORTUNITIES
- PROVIDE ON-THE-JOB SUPPORTS
- UNDERSTAND AND MANAGE UNACCEPTABLE BEHAVIOR
- PROVIDE ONGOING AND LONG-TERM SUPPORT
Rehabilitation after TBI and Concussion
Physical Therapist role in return to Work: Post Concussion Syndrome

Establish a patient specific, progressive exercise plan

• A graded regimen for the clinic and home
  • Physical and mental activity without symptoms or increase in symptoms
  • Improve aerobic capacity, balance, gaze stability, gait and mood
• Teach coping strategies and how to work within the limitations of the symptom provoking activities
  • Habituation to dizziness, headaches and vertigo
• Foster a team approach.
  • Patient, Family, MD, Case Manager, Employer
Every Rehabilitation Program Should Be **Unique**

- Patient Specific
- Challenging but not training into dysfunction
- Building from simple to complex tasks
- Recover the ability of the brain to integrate
  - Vision
  - Proprioception
  - Vestibular System
- Restore the ability of the brain to meet metabolic demand
- Ergonomic and postural strategies for work
- Accommodations for completing work tasks
Management of dizziness and balance dysfunction is a major challenge after concussion.

The purpose of this study was to examine the effect of vestibular rehabilitation in reducing dizziness and to improve gait and balance function in people after concussion.
Methods:

• A retrospective chart review of 114 patients (67 children aged 18 years and younger [mean, 16 years; range, 8–18 years]; 47 adults older than 18 years [mean, 41 years; range, 19–73 years]) referred for vestibular rehabilitation after concussion was performed.

• At the time of initial evaluation and discharge, recordings were made of outcome measures of self-report (eg, dizziness severity, Activities-specific Balance Confidence Scale, and Dizziness Handicap Inventory) and gait and balance performance (eg, Dynamic Gait Index, gait speed, and the Sensory Organization Test).

• A mixed-factor repeated-measures analysis of variance was used to test whether there was an effect of vestibular rehabilitation therapy and age on the outcome measures.
Results:

• The median length of time between concussion and initial evaluation was 61 days. Of the 114 patient who were referred, 84 returned for at least 1 visit. In these patients, improvements were observed in all self-report, gait, and balance performance measures at the time of discharge ($P < .05$).

• Children improved by a greater amount in dizziness severity ($P < .005$) and conditions 1 (eyes open, fixed support) and 2 (eyes closed, fixed support) of the Sensory Organization Test ($P < .025$).

Discussion:

• Vestibular rehabilitation may reduce dizziness and improve gait and balance function after concussion.

• For most measures, the improvement did not depend on age, indicating that vestibular rehabilitation may equally benefit both children and adults.

Conclusions:

• Vestibular rehabilitation should be considered in the management of individuals post concussion who have dizziness and gait and balance dysfunction that do not resolve with rest.
Objectives:
- To assess balance, dynamic gait, and dynamic visual acuity outcomes after a vestibular and balance rehabilitation program and to determine which variables were significantly associated with improved balance and ambulation.

Design:
- Retrospective case series.

Setting:
- Outpatient setting at a tertiary care facility.

Participants:
- Twenty patients who were seen for vestibular and balance therapy between July 1999 and June 2000.

Interventions:
- A customized exercise program was developed for each patient according to the results of the assessment and included the following interventions, as indicated: gaze stabilization, balance and gait training, and habituation exercises.

Main Outcome Measures:
- The Dynamic Gait Index (DGI), Berg Balance Scale (BBS), Dynamic Visual Acuity Test (DVAT), and computerized posturography (Sensory Organization Test [SOT]).
Subjects received vestibular and balance rehabilitation provided by 1 of 2 physical therapists with specialized training in the assessment and treatment of balance and vestibular disorders.

A customized exercise program was developed for each subject according to the results of the assessment and included the following interventions as indicated:

- gaze stabilization
- balance and gait training
- habituation exercises.
Results:

• The mean change scores for the DGI showed significant improvement for both patients with peripheral vestibular dysfunction and patients with central balance disorders.

• For the central balance disorders group, the BBS score also showed significant improvement.

• No difference was noted for pre-therapy and post-therapy SOT scores between groups.

• The total group appeared to show an average improvement of more than 2 lines on the visual acuity chart on the clinical DVAT.

• Patients who were 66 years or older were 1.5 times more likely to score less than 20 on the DGI, and those whose pre-therapy vertical dynamic visual acuity was 20/80 or worse were 1.3 times more likely to score less than 20 on the DGI.

Conclusions:

• Patients showed functional improvements in balance, visual acuity, and gait stability after balance and vestibular physical therapy.

• Age and pre-therapy vertical dynamic visual acuity score influenced dynamic gait outcome after a balance rehabilitation program.
Return to Work Program

• 1) Early mental and physical rest is paramount
  – After 1 to 2 weeks of no activity or when symptom free at rest.
    • No work
    • Limit activities at home to non-provoking
  – Then begin a **GRADED** exercise program in skilled therapy
2) Complete at least 1 week of therapy and be able to either be symptom free or have no increase in symptoms.

3) Resume light duty, ½ day at work, continue skilled therapy at least 1 week minimum.
   - Rest breaks as needed
   - “Light Duty” definitions vary greatly
     - a light activity like filing papers may be appropriate for a patient with a knee sprain but can actually be overwhelming for a patient with concussion.
   - Should be able to complete without symptoms or without increasing symptoms
• 4) Advance to light duty, full day at work, continue skilled therapy at least 1 week minimum.
  – Start to challenge ability to handle work load
  – Limit rest breaks
  – Should be able to complete symptom free or without increase in symptoms

• 5) Advance to Full duty, full day at work
  – Minimal rest breaks
  – Wean from skilled therapy
The Steps: 1 week (or 3 visits) per step minimum.
Driven by patient symptoms and periodic assessment.

- **Phase 1**
  - No work
  - No exercise
  - 0-2 RPE (Rate of Perceived Effort)

- **Phase 2**
  - No work
  - Graded exercise, 2-4 RPE
  - No symptoms

- **Phase 3**
  - Light Duty 1/2 day
  - Graded exercise, 4-6 RPE
  - No increased symptoms

- **Phase 4**
  - Light Duty for full day
  - Graded exercise, 6-8 RPE
  - Habituate to symptoms

- **Phase 5**
  - Work Full duty
  - Wean from graded exercise or transition to Work Hardening/Conditioning
A few definitions....

• “No Symptoms”
  – This means that the patient should be symptom free at rest or with quiet sitting
  – If symptoms are provoked during exercise/work, a rest break should be taken until they resolve, before continuing activity

• “No Increased Symptoms”
  – This means that the patient can be exercising/working with symptoms to build up tolerance
  – However, they may take a break if symptoms increase, but do not have to wait to be symptom free before resuming activity

• “Habituate to Symptoms”
  • This means the patient may have symptoms during exercise/work and should attempt to push through them without a break.
Contact

• Ned Crane, DPT, DAC
  – Office 215-826-0166
  – Cell 215-779-4391
  – ecrane@selectmedical.com