Course Objectives

• Describe the shift from desk top to mobile usage in the consumer
• Present the use of digital media to affect behavior change in 3 domains:
  1. Patient education
  2. Outcome measure clinical application
  3. Movement analysis
• Describe a conceptual pathway for Physical Therapist to leverage digital media to change the world

Villenard “En l’an 2000”

Shift from desktop computing to mobile...
Time spent per day on mobile devices

How much time are the consumer spending on their smartphone?

When does the consumer use their devices?
2017 CSM- Get with the Guidelines!

- Dr. Teyhen talked about the guideline implementation tool/patient education tool
- JOSPT Patient Perspectives
The problem:

- How many of you have seen the Patient Perspectives?
- How many of you know which Patient Perspectives exist?
- How many of you have used this tool designed for patients... for your patients....?
- How can I extend the therapeutic window of my care, outside of the face to face examination and treatment time?

Solution:
Diagnosing with Empathy

What do patients want to know?

- Diagnosis
- Is it serious?
- Can I expect to get better?

“Although you are in a lot of pain, and I can tell that is probably very scary, the good news is there is nothing seriously wrong with your neck. Based on my exam today – you have mechanical neck pain – which – as you know – can be very painful. But, rest assure – it is not serious. You should expect to get better.”
Roadmap of today's session:

- Patient education
- Outcome tools

2017 CSM- Neck pain preconference course

- Dr. Dave Walton, PhD
- Researcher on neck pain and outcome measures
- NDI-5
- TIDS
- Use of apps to help make these powerful tools more clinically useable
The problem:

• How many of you have used outcome tools on a regular basis?
• How many of you find it easy to interpret the findings?
• How many of you know what score to aim for to assess for meaningful change?
• How can we use digital apps to help improve result interpretation and enhance care?

Solution:

Dr. Dave Walton  
Outcome measure researchers

Dr. Michael Wong

Augmented Rehabilitation
The case for PROs

• Dr. David M. Walton PT PhD
• Associate Professor Western University
Outline

- Choosing, Scoring and Interpreting good-quality Patient-Reported Outcomes is hard
- The reason we need not continue to clog valuable mindspace remembering cut-scores and CIDs

Good Quality PROs are hard

- Since the 1800's measurement science has evolved from simple counts (e.g. death, income) to sophisticated methods of quantifying unquantifiable experiences (e.g. happiness, pain)
- Clinically, Patient-Reported Outcomes (PROs) are widely considered the 'gold standard' for understanding subjective patient experiences
- Some form of measurement is a key element of patient-centered PT care and serves many purposes: Diagnosis/Screening, Prognosis, Evaluation, Discharge
- Survey evidence consistently reveals very low use of PROs in routine practice globally, with NRS by far the most common

Good Quality PROs are hard

- The move towards psychometrics as a science for measuring subjective experience has demanded advanced techniques based heavily on theoretical constructs like Latent Constructs, Shared Variance and Random Error that are hard enough for measurement eggheads to understand
- New techniques in measurement science, like Rasch or Item-Response Theory, add yet more complexity to an area that is already not well-adopted by clinicians
What tech allows

- To date, many screening, diagnostic and evaluative tools have been restricted by the need to provide relatively simple methods for interpretation
- One or two cut scores at most for screening
- A single, universal change score for clinical importance
- Consistently we are seeing that the use of a single interpretation that is equally applicable across a) all scale scores and b) all clinical populations is leading to misinformed practice decisions
- The emergence of ubiquitous mobile technologies means we are no longer constrained to providing simple “rules of thumb” so clinicians can remember and interpret them
- Rich information can be accessed at point-of-care
A view to the future

• The emergence of mobile technologies will lead to more informed treatment decisions. Patient responses on PROs can be interpreted within a proper context including things like:
  • Age
  • Sex
  • Body region
  • Income
  • Litigation status
  • Culture and Ethnicity
  • Literacy
  • And why not – Genetics, Early Life Adversity, Environment, Diet, and many many others

The future of clinical decision making?

Connect with me:

• Email: dwalton5@uwo.ca
• Twitter: @uwo_dwalton
• YouTube: www.youtube.com/davewaltonPT
• Website: www.piriresearch.com
Roadmap of today's session:

- Patient education
- Movement analysis
- Outcome tools

The problem:

- A profession that has declared itself to be movement specialists
- What resources equip our students and clinicians with to understand human movement?
- Is it easy for movement to be learned by reading books and looking at pictures?
- How can we use digital apps to help train clinicians to understand movement and their potential relationship to tissue stresses?
Solution:

Using Technology to Prepare Movement Analysis Experts
Chris Patterson PT, DPT, OCS

What do you want to be when you grow up?
APTA Vision Statement

“Transforming society by optimizing movement to improve the human experience” - APTA 2013

Identity Principle - “The physical therapist will be responsible for evaluating and managing an individual’s movement system across the lifespan to promote optimal development; diagnose impairments, activity limitations, and participation restrictions;....”
Teaching Movement Analysis

- Phases of movement
- Critical Events
- Normal range of motion of the involved joints
- Muscle activity requirements
  - Observe normal movement
  - Observe abnormal movement
  - Connect abnormal movement to tissue stress
  - Link abnormal movement to contributing impairments

LOADING PHASE
The 2nd phase of gait begins with foot contact and will end with opposite limb toe off
CRITICAL EVENTS
- 15° of knee flexion
- Shock Absorption
- Promote progression
- Stable base for weight acceptance

Obstacles to Defining Movement

Phase Definition

Heung et al., JMC Musculoskeletal Disorders, 2009
Forward Flexion + Return From Flexion

Teaching Movement Analysis
- Phases of movement
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Movement Phases
- Breakdown of the movement into parts
- Describes key positions for visual observation
- Specify critical events
- Phases defined by the change in intention of the body during the motion
  - Initiation
  - Execution
  - Termination

Initiation Phase – Forward Flexion
Begins with anterior movement of the trunk and ends when the shoulders are anterior to the hips.

Execution Phase – Forward Flexion
Begins as the trunk starts its descent to the floor and ends with the trunk near 90° of flexion.

Termination Phase – Forward Flexion
Begins at the end of the execution phase as the passive structures become taut with the intention to decelerate motion.
Initiation Phase – Return From Flexion

Begins with initiation of upward movement of the trunk and ends as the trunk starts to accelerate into extension.

Execution Phase – Return From Flexion

Begins as the trunk accelerates into extension and ends with shoulders anterior to the hips.

Termination Phase – Return From Flexion

Begins with shoulders slightly anterior to hip and ends when the shoulders are over the hips.
Learning to Analyze Movement

- Phases of movement
- Critical Events
- Normal range of motion of the involved joints
- Muscle activity requirements
- Observe normal movement
  - Observe abnormal movement ✔
  - Connect abnormal movement to tissue stress ✔
- Link abnormal movement to contributing impairments
Critical Events – Initiation Phase

Return from forward flexion initiated with hip extension followed by lumbar extension

Possible Contributing Impairments

- Poor motor control
- Gluteus maximus weakness

Forward Flexion
Sit to Stand
Lunge
Squat
Step Down
Transforming society by optimizing movement to improve the human experience — ATPA 2013

REFERENCES


So you want to build an app?!!
How do I develop apps of my own?

- Q1: What problem are you trying to solve?
- Q2: Is digital media the optimal medium to answer this problem?

HARD WORK AHEAD

[Flowchart:
  - What is the problem you are trying to solve?
  - Is digital media the optimal solution?
  - Do alternative solutions already exist?
  - What elements must be developed to achieve the goal?
  - Development of mockup
  - Generation of digital media
  - Beta testing
  - Worldwide release
  - Refinement and real-world testing]
What problem are you trying to solve?
I want to figure out a way to have my kids spend more time on their phones.

Human movement: Get

Is digital media the best solution?

iOS 2.2 million apps in the app store (2017)

Development of Mock up
Observations:
- Irregular and incoordinated movements
- Upper extremity movements less than 90 degrees
- Typically does not cross midline
Asymmetric Tonic Neck Reflex

Observations:
- Usually identified and seen within the first 3 months after birth
- The reflex is initiated when the head is turned to the left or the right whilst the baby lies on its back

Generation of media

Programming and Beta testing

- 3 systems, 3 programmers
- $100-$150 per hour
- All in one solutions exist...
- “It’s easier to dream, than it is to build”
Closing thoughts:

- Digital solutions to affect behavior change
- Can digital or mobile solutions truly solve the problem?
- A blend of dreaming, reality, perseverance and capital

Where are we headed?

- The sky's the limit
- Gamification of clinical reasoning
  - Wound care
  - Orthopaedics
  - Cardiopulmonary rehabilitation
  - Neurologic movement dysfunction

Dream big! Take action!
“We are the music makers, the dreamers of dreams!”

Thank you and Questions!

- Ideas and suggestions!!!

Contact us!

- Mike@physiou.com
- drydres.teyhen.mil@mail.mil
- dwalton5@uwo.ca
- cpatterson@spu.edu