Spinal Cord Injury Movement-Index (SCI-MI)

Craig H. Neilsen Foundation (CHNF) Grant #597640

Spinal Cord Injury-Movement Index- Background

- 2015 Workshop UE COA [Jones LAT et al. Spinal Cord, 2018;56(5):414-425]

  - CHNF in partnership with SCOPE

  - "…identify important concepts in COA, provide guidance on how emerging and existing measures can be used to assess therapeutics in SCI"

- Spinal Cord Functional Index (SCI-FI)

  - Calibrated item banks of fine motor, self-care, basic mobility, ambulation, WC mobility

  - Patient-reported outcome measure

  - Computerized adaptive test and short form

"Consideration should be given to a complementary capacity assessment (by observation in the clinic) using the concepts of CAT, namely that the activities assessed are tailored and appropriate to an individual's level of function" [Jones et al. pg 422]

The Ideal….

- Calibrated item bank(s)
  - Represent meaningful function to persons with SCI
  - Assess recovery\repair within the context of function – strong link between motor function physical function
  - Administered as a CAT (preferred) or short form
- One measure on a common metric, regardless of endpoint (eg. UE or walking) or type of injury (tetra, para, AIS)
- Administration and scoring low burden

Spinal Cord Injury Movement Index (SCI-MI)

- Fundamentally different than SCI-FI, but leveraging SCI-FI items, calibration data, filters
  - Items developed by persons with SCI (high meaning)
  - Item characteristics provide insight into difficulty, discriminatory ability, when used as PR
  - Filters tested

	SCI-FI	SCI-MI
Construct	Self-reported physical function	Movement in the context of physical function
Compensatory function	Not addressed	Addressed within scoring
Function by substitution	Not addressed	Addressed within scoring
Response category	Difficulty	Intended movement

SCI-MI – Process of Development

- Articulate conceptual model of the construct
  - Unidimensional continuum of movement within the context of function
  - Future calibration study to test the assumptions of the model
- Identify SCI-FI items amenable to observation in performance based measure
  - Retain item "stem" – transform from PRO to performance test
  - Articulate item intent
  - Write administration and scoring procedural guidelines

Beta-testing

- Administration burden
- Scoring burden
- Feedback from people with SCI
  - Compensation
  - Substitution
  - Perceived difficulty

Focus Groups

- Item mapping- conceptual model
- Measurement properties
- Functionality of items
- Administration and scoring instructions
- Equipment
- Orthoses
- Potential challenges

Work Groups

- Iterative writing
- Beta-testing, focus group, consultation (Jette, Slavin) debriefing
- Conceptual decisions
- Identify stakeholders for consultation
- Planning next-steps
- IRB development
- COVID-19 workaround

- Working with approximately 250 SCI-FI items – approximately 20% thrown out
- Reviewed calibrated item banks from PEDI-SCI AM – retained approximately 90 items
- Current SCI-MI item pool consists of:
  - 56 UE items
  - 58 single intent general movement items
  - 78 combined general movement items
- SCI MI filter item candidates
  - Csc63 – When sitting up, are you able to bring your hand to your mouth?
  - PFC45 – Are you able to get out of bed into a chair?
  - CMob22 - Are you able to stand without any support for 1 minute, for example, long enough to brush your teeth?
  - CMob44 – I can take a step with each foot

Unimanual Sample Item

Unimanual Item #16 - Pick up Paper

Administration Guidelines		Item Intent
Required materials: timer; 3 pieces of flat paper (with no raised corners) **Set-Up:** Flat paper (<u>no raised corners</u>) is placed on tabletop in front of the participant at the midclavicular line of tested side, within arm's reach.	***With your hand, pick up this piece of paper, like this. Do not drag the paper from the tabletop.*** [Administrator demonstration] Timer starts when administrator says, "begin."	*Radial digital grasp, forearm supination, and wrist extension to pick paper up from table* **Forearm supination (move from pronation towards neutral); wrist movement (flexion to extension); radial digital grasp:** Use one hand to reach for the paper with the forearm pronated and wrist in neutral to flexion; grasp the paper via radial digital grasp. After the paper is secured in the hand, move the forearm into neutral and extend the wrist to bring the paper off the table, without dragging it off the edge.

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Bimanual Sample Item

Bimanual Item #5 - Typing (standard keyboard)

Administration Guidelines		Item Intent
Required materials: timer; standard keyboard; computer; document with prompts **Set-Up:** Raised keyboard is placed on tabletop in front of participant at midline. The sentence prompt document is open on screen (administrator to scroll down as necessary). **Note:** • Administrator to cue participant to correct errors, if participant does not initiate self-correction. • Timer to continue until errors are corrected.	*Use both hands to type the sentence you see on the screen, like this. If you push a wrong button by mistake, correct it.* [Administrator to demonstrate typing practice prompt.] Practice trial: I am happy. Test trial: **There are seven days in a week.** Timer starts when administrator says, "begin."	*Coordinated movements of at least two fingers of each hand to type the prompt on standard keyboard* **Wrist neutral to extension; finger movement (flexion/extension, abduction/adduction); bilateral coordination:** Type the full prompt with good accuracy, using movement of at least 2 digits of both hands (digit flexion/extension and abduction/adduction), with the wrist in neutral to extension. **Note:** Forearm should rest on tabletop during test item completion.
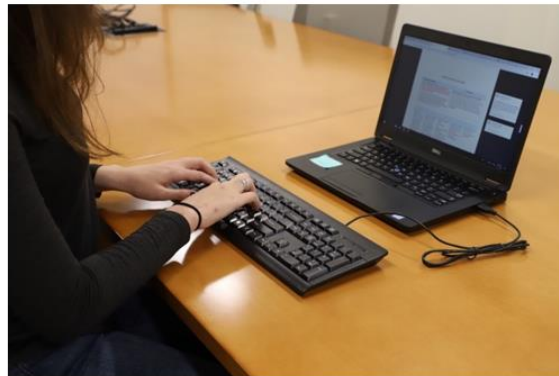
Response Categories

Intended Movement		Completes with Compensations		Unable
5	4	3	2	1
Completes using intended movement	Completes using intended movement with increased effort or decrease in quality or fluidity of movement	Completes with some intended movement	Completes with no intended movement	Unable to do

Scoring is based on intended movement, accounts for compensation and disallows substitution

Where Are We?

- Just finished year 1 of funding cycle
  - Beta-testing with volunteers with SCI suspended for 6 of the 12 months due to COVID-19 – relaunch tomorrow
  - Focus and work groups moved to virtual platforms - will remain virtual
- IRB under review – reliability testing and item characteristics –moved from multi-site to single site effort due to COVID-19
  - Launch date October 2020
  - Will help refine items and will give us more information about item characteristics in preparation for calibration study (not included in this funding source)

Plans and Challenges – as of Today

- Seek input from more diverse stakeholders – including regulatory bodies and measurement experts
  - 2 f-2-f meetings cancelled due to COVID-19
  - *SCOPE as a consistent feedback loop?*
- Reduce administration burden of individual items
- Examine 3-D modeling to address issues with item specification, availability, cultural relevance, lifetime and cumbersome test kit
- Definitive decisions about orthoses and AD still pending for ambulation items
- Identify models for future calibration study (this will be high burden)
- Identify potential sources of funding for future calibration study

Spinal Cord Independence Measure-III

Background and Goal

- SCIM-III used routinely in SCI clinical trials and outcomes research
  - Procedural guidelines for administration and scoring have been largely study-specific or facility specific (clinical use), which introduces potential variation
  - Appreciation for the variation realized while developing procedural manual for a study we conducted on validating SCIM-III in children

- **<u>Goal</u>**:
  - Standardize administration and scoring guidelines to reduce potential for variation and better enable comparisons across studies and facilities
  - Provide a resource for the field that reflects guidelines that developed via systematic process of expert consensus

Methods

- <u>Modified Delphi Survey-</u> survey methodology that uses iterative waves of surveys to develop consensus among experts on a given topic.

- Using standardized Modified Delphi Methodology
  - Engaged the field to standardized administration and scoring guidelines for SCIM-III self-care and mobility sub-scales
  - Four questions:
    - Are the administration guidelines clear;
    - Can you replicate it in the clinic;
    - Are the scoring procedures clear; and
    - Can you conclude the score based on the provided flowsheet.

Methods

- Three iterative surveys were administered, with survey #2 and #3 informed by responses and feedback on previous survey
    - Purposeful and snowball sampling
    - Each survey "opened" for two weeks, completed anonymously
- IRB approved
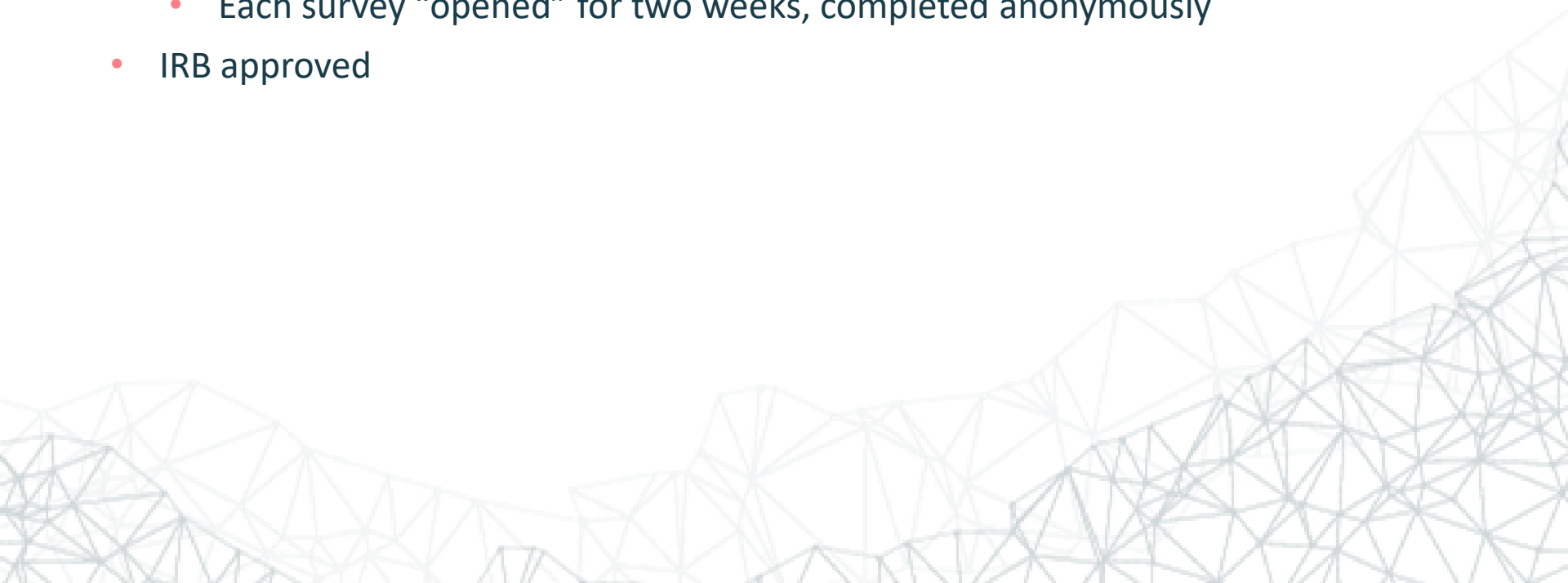
- Round 1 – 56 responders
  - PT (45%), OT (29.4%), MD (11.8%)
- Round 2 – 54 responders
  - PT (45.8%), OT (29.2%), MD (14.6%)
- Round 3 – 66 responders
  - PT (51.6%), OT (26.6%), MD (7.8%)
- Majority practice acute in-patient, approximately 20% in research
- Administered as a combined self-report and observation, within the same administration
- By wave 3, reached minimum of 80% (80-95%) agreement on each of the 4 questions for each SCIM-III self-care and mobility items.
- Consensus that administration guidelines should include standardize equipment

- Available at no cost for download:

https://www.jefferson.edu/university/rehabilitation-sciences/departments/outcomes-measurement/measures-assessments/spinal-cord-independence-measure-version-iii-administration-and-scoring-guidelines.html

- Manuscript under development- submission targeted in October