

Application for Mentorship Grant:

## Advancement of Skilled Prosthetic Training: A Web-Based Tool for Physical Therapists Treating Lower Limb Amputees

Laura Sloan PT, DPT, NCS

Job Title: Staff Physical Therapist

Department: Outpatient Physical Therapy, manager: Jerrill Mathew PT, DPT, NCS

Mentor and Collaborator: Kelly Lee, Certified Prosthetist

Department: Prosthetics & Orthotics, manager: Tim Lewandowski, CO, MHA

Mentor and Collaborator: Levi Hargrove, Ph.D, Scientific Chair for the Regenstein Foundation Center for Bionic Medicine

Department: Regenstein Center for Bionic Medicine

Total Funds requested: \$20,381.67

## Introduction:

There is a gap in the entry level knowledge a physical therapist (PT) has from school compared to what is needed to treat patients with lower extremity amputations for prosthetic training. Rapidly changing prosthetic technology coupled with the complexity of prosthetic patients seen at Shirley Ryan AbilityLab (SRAlab), make it critical to close this knowledge gap to maintain excellent patient outcomes and provide staff with the necessary tools to work with novel populations. Therapists currently rely on expert support from more experienced PTs, SRAlab prosthetists, or text-based resources. In attempting to update a text-based decision matrix we realized: they are time and labor intensive to create, they are difficult to use, they become outdated quickly, and they are difficult to apply during a treatment session. These considerations make the development of a web-based tool essential to supporting meaningful knowledge transfer among SRAlab staff, and show the potential for an external, revenue generating product.

The creation of an adaptive web-based tool for PTs to use will address the multifaceted nature of treating this population, and will allow both novice and expert clinicians to problem solve with a patient in front of them, compared to delaying care to contact another team member for support. The proposed tool is a decision tree in electronic form, which makes it modifiable, customizable, and accessible at any level of care. Its accessibility facilitates continuity for patients transitioning from inpatient to day rehab to outpatient settings. In addition, the current global health crisis makes it crucial to have flexibility in staffing without compromising patient care and this tool will facilitate this premise. Its flexibility allows for immediate use of the tool by SRAlab staff, while also being a potential revenue generating subscription product for the hospital. The knowledge gaps highlighted previously are even more pronounced in the larger external rehabilitation community where most facilities do not have PTs with amputee experience or an on-site prosthetist. This would also dovetail with the Academy's ongoing projects for strategic alliance partnerships and products developed for the rehabilitation community as a whole.

The team represents multiple levels of involvement in research. This project is Laura Sloan's first experience with research. Her goals are gaining skills in grant writing, scientific methods, journal submission and possible conference presentation. Kelly Lee has experience conducting research and is currently finishing her first clinical grant project. Her goals include improving in grant writing, budget management, authoring papers for peer review and presenting at a conference. Levi Hargrove, Ph.D, has an extensive research portfolio and over 50 publications. He offers invaluable research mentoring experience. Although not a goal of a mentorship grant, this project also exposes an engineer to clinical prosthetic and therapy topics.

**Project Aims: Develop a web or app-based therapy tool for lower extremity prosthetic training accessed through staff's existing clinical technology. Improve PT knowledge and comfort working with the amputee population.**

## Methods:

The interface will be developed in collaboration with an engineer from the Center for Bionic Medicine (CBM) with clinical input from the prosthetist and PT. Clinical content including images, videos or links will be created and collected by the clinical contributors and included by the programmer in each step of the decision tree. In addition to clinical content, the tool will allow analysis of frequency and duration of user access. An initial survey to gauge a PT's experience, comfort level, and specific knowledge treating

amputees will be developed with input from the Center for Rehabilitation Outcomes Research (CROR) to ensure the questions and rankings generate meaningful data. Additional surveys will be administered post-trial as comparison. The surveys will be distributed to physical therapists throughout the organization, including Inpatient, Outpatient, Day Rehab, and Flexstaff via email. This is approximately 195 staff and with estimated need of an 18-20% response rate for sufficient data for statistics, which is within expected survey response rates. Access to the web-based tool for use on their existing laptops and phones will be distributed to PT staff for use after completion of the initial survey for a 6 month period.

#### Outcomes:

Two surveys, one prior to use of the tool and one after the trial period (see appendix), will be used to track knowledge progression and feasibility of use of the tool to determine the benefit of the web-based tool for PTs treating lower limb amputees. These questions will also assess the usability of the tool and its role in improving a clinician's ability to provide quality patient care. Further assessment of the pertinence of the tool will be analyzed through built-in features of the tool that include: tracking the actual use of the application, time spent using the application, number of log ins, trends and/or patterns of log ins for a given user, and the overall number of users. Having this data will allow for a comparison of who is using it correlated with years of experience as a physical therapist and number of lower limb amputees the clinician sees in a year. It is expected that experienced therapists will use the tool less, and a therapist with less overall experience or less experience treating this population will use the tool more. We anticipate that therapists who fall into the latter category will have improved ratings of their comfort level and general knowledge treating lower limb amputees for prosthetic training compared to before using the tool. In addition, these responses provide insight into why the clinician did or did not use the tool to guide future iterations.

#### Project Timeline:

##### Month 1-4:

- Engineering: develop app or web-based interface from existing flowchart
- Clinical: assemble images and supplemental clinical content

##### Month 5:

- Clinical: distribute initial survey
- Team: review app for content and function, revise as needed

##### Month 6-12:

- Distribute access to app to PTs
- Engineering: respond to app issues

##### Month 12:

Distribute final survey

##### Month 12-18

- Correlate survey and user data
- Write journal article
- Prepare presentation

#### Deliverables:

- Web or app-based decision program for use by PTs treating the amputee population for internal and potential external revenue generating use
- Presentation for internal audience and external conference
- Journal submission

## Bibliography

1. Gailey, R.S., Gaunaurd, I.A., Laferrrier, J.Z. (2016) Physical Therapy Management of Adults with Lower Limb Amputations. In Krajbich, J.I. et al. (Eds) *Atlas of Amputations and Limb Deficiencies*, (4<sup>th</sup> ed., pp. 597-620). American Academy of Orthopedic Surgeons.
2. Mosa, A.S.M., Yoo, I. & Sheets, L. (2012). A Systematic Review of Healthcare Applications for Smartphones. *BMC Med Inform Decis Mak* 12, 67. <https://doi.org/10.1186/1472-6947-12-67>
3. Tilson, Julie K et al. (2016) Use of Tablet Computers to Promote Physical Therapy Students' Engagement in Knowledge Translation During Clinical Experiences. *Journal of neurologic physical therapy : JNPT*. 40(2), 81-9. doi:10.1097
4. Podgorelec, V., Kokol, P., Stiglic, B., Rozman, I. (2002) Decision trees: an overview and their use in medicine. *Journal of medical systems*, 26(5), 445-63
5. Sezgin, E., Okzan-Yildirim, S., Yildirim, S. (2017). Investigation of physicians' awareness and use of mHealth apps: a mixed method study. *Health policy and technology*. 6(3), 251-67. <https://doi.org/10.1016/j.hlpt.2017.07.007>

## Appendix 1- Draft Intake Survey

Name/Identifier:

Date:

Education level:

1. Years of physical therapy experience:

0-2

3-5

5-10

10-20

25+

2. How would you rate your skill set with treating a patient for lower limb prosthetic training (chosed one)?

- inexperienced/uncomfortable
- inexperienced/comfortable
- experienced/uncomfortable
- experienced/comfortable
- expert/comfortable

3. What care setting best describes where you currently work? Check all that apply

- Inpatient
- Outpatient
- Day Rehab

If more than one, what is your primary location?

- Inpatient
- Outpatient
- Day Rehab

4. What percentage of your caseload has lower limb prosthetic training goals?

0-20%

20-40%

40-60%

60-80%

80-100%

5. What type of assistance or support do you typically utilize when you are unable to solve an issue with your patient's prosthesis in a therapy session (Check all that apply)?

- Call a Prosthetist
- Contact a more experienced PT
- Internet search
- Book
- Other, please explain:

### Knowledge Check

1. I am confident I can identify a prosthetic versus patient impairment related cause of decreased foot clearance of a prosthetic limb.
- False
  - Somewhat false

- Neutral
- Somewhat true
- True

2. I am confident I can instruct my patient in correct donning of their prosthesis

- False
- Somewhat false
- Neutral
- Somewhat true
- True

Appendix 2- Draft Post Survey

Name/Identifier:

Date:

Education level:

6. How would you rate your skill set with treating a patient for lower limb prosthetic training? Chose one.

- inexperienced/uncomfortable
- inexperienced/comfortable
- experienced/uncomfortable
- experienced/comfortable
- expert/comfortable

7. What care setting best describes where you currently work? Check all that apply

- Inpatient
- Outpatient
- Day Rehab

If more than one, what is your primary location?

- Inpatient
- Outpatient
- Day Rehab

8. What percentage of your caseload has lower limb prosthetic training goals?

0-20%

20-40%

40-60%

60-80%

80-100%

9. Did you log in?

Yes      No

10. If no, why not? Check all that apply

- I did not see a patient for lower limb prosthetic training
- I did not know how to use the tool
- I did not feel comfortable using it with a patient
- I did not need it to solve my patient's issue
- Other, please explain:

11. Rate the ease of navigation of the application

- Difficult
- Somewhat Difficult
- Neutral
- Somewhat Easy
- Easy

12. Did using the tool solve your patient's problem?

Yes      No

13. Would you have needed the outside support to solve your patient's problem if you did not have access to the application?

Yes                      No

If yes, who or what type? Check all that apply.

- Call a Prosthetist
- Contact a more experienced PT
- Internet search
- Book
- Other, please explain:

Please rate the following items:

14. Using this tool was helpful to me in providing quality patient care.

- Strongly Disagree
- Somewhat Disagree
- Neutral
- Somewhat Agree
- Strongly Agree

15. Having this web-based tool increases my preparedness for treating a patient with for lower limb prosthetic training.

- Strongly Disagree
- Somewhat Disagree
- Neutral
- Somewhat Agree
- Strongly Agree

#### Knowledge Check

3. I am confident I can identify a prosthetic versus patient impairment related cause of decreased foot clearance of a prosthetic limb.

- False
- Somewhat false
- Neutral
- Somewhat true
- True

4. I am confident I can instruct my patient in correct donning of their prosthesis

- False
- Somewhat false
- Neutral
- Somewhat true
- True