UC San Diego
Independent Study Projects

Title
Designing exercise and muscle strengthening videos to increase physical therapy compliance and effectiveness in non-operative pediatric orthopedic patients

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Final ISP Report
Luke Burns

Title: Designing exercise and muscle strengthening videos to increase physical therapy compliance and effectiveness in non-operative pediatric orthopedic patients

Abstract: This project set out to create a series of short narrated videos displaying proper stretching and strengthening techniques for the treatment of non-operative muscular complaints in pediatric patients. Three headings of disorder were addressed: core strengthening, patellofemoral pain and shoulder injury. Within each of these categories, a number of short videos were produced using several actors demonstrating correct technique. Narration was then added to describe what was occurring onscreen and prevent incorrect form. A total of 32 videos were produced and made available for free on the Rady Children's Hospital 360 Sports Medicine website (http://www.rchsd.org/programs-services/sports-medicine/) for easy access by physicians, physical therapists, patients and their parents.

Method:

Stage 1: Storyboarding & Research

The project began with a storyboard session with my ISP chair, Dr. Eric Edmunds who described the desired framework for a series of videos that educated patients on appropriate exercises for non-operative muscular complaints. Dr. Edmunds and I discussed the most common disorders, and devised three categories in which to group the videos. I then began research into the most effective and commonly used stretching and strengthening exercises to address these disorders. I next devised a script for each of these videos, and met in person with two physical therapists from Rady Children's Hospital San Diego. Dr. Jessica Garfin and Dr. Nicole Archambault offered feedback on my scripts, and, where appropriate, suggested more feasible and effective alternative exercises. Their input was invaluable, particularly as they work to rehabilitate pediatric patients everyday and are acutely aware of the strengths and weaknesses of the more common exercises.

Stage 2: Filming

Filming took place in a residential living room apartment, in part because it was an easily accessible space but also because it replicated the home setting where patients would be performing these exercises themselves. Medical students Noelle van Rysselberghe (a former D1 cross-country athlete) and Abdul Hassan (a weightlifter) served as models for these exercises. I received substantial assistance from JD Bomar, MPH, a research coordinator at Rady Children's Hospital, who provided filming advice, editing and web organization. I used Rady Children's Hospital equipment to film the videos, and later added audio narration via my own home recording equipment. Filming took place over 4 days, while recording narration was spread over an additional two days.

After completing my videos, Dr. Edmonds asked me to create scripts and narrate several additional videos that had been previously recorded. These were also added to the website and made available for patients.

Stage 3: Uploading and organization

The videos were uploaded to the Rady Children's Hospital Sports Medicine website, accessible here: http://www.rchsd.org/programs-services/sports-medicine/exercise-plans/ Physicians and physical therapists are able to direct their patients to this site.

Exercises:

- **Knee Exercises** (Phase 1)
  - IT band rolling (https://youtu.be/IoN2UVFrtns)
  - IT band rolling with foam roller (https://youtu.be/Xs_Yhijutr0)
  - VMO cueing (https://youtu.be/NlZZG1OaApg)
  - VMO kicks (https://youtu.be/lS-lXIZxbes)
  - Straight leg raises (https://youtu.be/HdzzPtbbs7w)
  - Side-lying hip abduction (https://youtu.be/EIiFv4clRDg)
  - Clamshells (https://youtu.be/z7yG_vTQn2Q)
  - Double leg bridge (https://youtu.be/1JmrRRe0Zog)
  - Single leg bridge (https://youtu.be/4OLi_LhgOXQ)
- **Knee Exercises (Phase 2)**
  - Squats (https://youtu.be/75oeg3-2Lac)
  - Single leg dips (https://youtu.be/NV-qcBDmPcs)
  - Plank (https://youtu.be/dgiGESJkXEE)
- **Knee Exercises (Phase 3)**
  - Lunge (https://youtu.be/O0swmIO2aaQ)
  - Side-lying hip abduction (https://youtu.be/EIiFv4clRDg)
  - Single leg dead lift (https://youtu.be/y36Wramn9ow)
  - Single leg stars (https://youtu.be/h4z2NJdshtY)
- **Core Exercises**
  - Transverse ab strength (https://youtu.be/PbgCHeqnw6k)
  - Small bridge (https://youtu.be/q8F0TuBJ34Y)
  - Superman lifts (https://youtu.be/pCH8YoFoNP4)
  - Dead bugs (https://youtu.be/Jxt6-UN9m2Q)
- **Shoulder Exercises (Phase 1)**
  - Prone scapular retraction (https://youtu.be/9baTe9tF9MA)
  - Prone horizontal abduction (https://youtu.be/qkGZeyPK54c)
  - External rotation (https://youtu.be/UTgaA11lP64)
  - Banded internal rotation (https://youtu.be/xSBoRg9Ux30)
- **Shoulder Exercises (Phase 2)**
  - Elbow plank (https://youtu.be/19xAdQ0v_i4)
  - Isometrics (https://youtu.be/Z4BwJjUWCRE)

- Seated scapular retraction (https://youtu.be/eiFEbTDOtao)
- PNF D2 (https://youtu.be/cPTjG8_lyRk)

- **Shoulder Exercises (Phase 3)**
  - Prone scapular retraction (https://youtu.be/9baTe9tF9MA)
  - Plank progression (https://youtu.be/WVMZhUVj3VI)
  - Plank progression advanced (with sliders) (https://youtu.be/TcDhm74SXGs)
  - Burpy slam (https://youtu.be/uhu3EMF7Lvs)

Conclusion: This project successfully created a series of stretching and strengthening exercises for pediatric patients with non-operative muscular complaints to be made available for open access to physicians and physical therapists. Throughout this project, I had the opportunity to not only expand my knowledge of orthopedics, but to gain a better understanding of the principles of patient education.

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