The Knotorious Five

September 5th - September 11th

Client: Dr. Margene Anderson, Dr. Sara Colopy. Dr. Paul Merkatoris
Advisor: Professor Wally Block

Team Members:
Madison Michels (mmichels2@wisc.edu), Leader
Lucy Hockerman (lhockerman@wisc.edu), Communicator
Presley Hansen (pmhansen3@wisc.edu), BWIG
Sadie Rowe (skrowe2@wisc.edu), BPAG
Kate Hiller (khiller@wisc.edu), BSAC

Problem Statement:

In veterinary training, mastering the skill of applying appropriate suture tension is essential for successful wound closure and patient recovery, However, novice practitioners often struggle to judge the correct amount of force needed, leading to either insufficient tension or excessive tension, which can cause plastic deformation of the suture material or tissue damage. Currently, the evaluation of suture technique relies heavily upon subjective instructor feedback, lacking objective, real-time metrics to guide learners. This gap hinders consistent skill development and increases the risk of procedural errors. There is a critical need for a real-time suture tension measurement and feedback system to help students learn to apply optimal tension, prevent material or tissue compromise, and improve surgical outcomes through data-driven training.

Brief Status Update:

The majority of this week was spent on researching suture types, similar studies, and familiarizing ourselves with the client's needs. We met with the client to discuss their desires in the project and set up an opportunity to watch a procedure in the upcoming week.

Team Goals:

- To familiarize ourselves with the project
- Explore potential study formats to mimic
- Obtain initial force values that we plan to model in our design

Individual Accomplishments:

- Lucy:
    - Researched existing methods to measure tensions in sutures
    - Prepared client questions and attended client meeting
    - Researched types of suture material

- Presley:
    - Attended the client meeting at SVM and received suturing materials
    - Researched whether hand suturing tension is reproducible and if surgical experience influenced reproducibility
    - Researched the differences of tensile strength between surgical instructors and trainees
    - Research different types of suture techniques and compare their mean forces while tying
- Maddie:
    - Researched previously studied ways of measuring suture tension in studies
    - Researched an existing tensioning system used during procedures
    - Attended the client meeting to familiarize myself with the project
    - Prepared questions for the client prior to the client meeting
- Sadie:
    - Researched the provided journal articles to learn more about how suture tensioning has been explored in the past
    - Researched an existing tensioning device
    - Researched suture sizing and brands based on client conversation
    - Met with the clients to better understand needs and ask preliminary design questions
- Kate:
    - Attended the client meeting and received suturing supplies
    - Researched the provided journal articles
    - Researched about suture strength based on sutures provided by the client
    - Contributed questions to ask the client at the meeting

Individual Struggles:

- Lucy:
    - Identifying locations on the suture we could place a device that would be able to measure tension between the knot and user's hands without interfering with the suture process
    - Identifying a correct range of force for each type of suture
- Presley:
    - Finding a location to place the device that would not interfere with the suturing process (also become more familiar with the suturing process)
- Maddie:
    - I hope to understand the suturing style better, as the differences in techniques will affect both the tension measured and the location of our sensor.

- Sadie:
    - Need to understand suturing technique better in order to brainstorm solutions that would not interfere with the process and typical workflow
- Kate:
    - Understanding exactly what part undergoes plastic deformation.
    - Understanding the suture process.

Individual Goals:

- Lucy:
    - Continue to research topics discussed in the client meeting
    - Create a testing plan/preform testing to sutures to determine when the string plastically deforms
- Presley:
    - Continue to research to become more familiar with the suturing process
    - Begin brainstorming and sketching design ideas with team
    - Decide upon a surgical training to attend
    - Begin working on the PDS
- Maddie:
    - Look into suturing materials and learn the technique on my own
    - Attended a workshop held by the client
    - Begin brainstorming design ideas
    - Conduct research on the effects and scope of this project to better complete the PDS
- Sadie:
    - Continue research following client meeting to learn more about: Suturing techniques, force gauge options, and existing similar design concepts
    - Begin brainstorming design ideas
    - Create sketches to discuss with team
- Kate:
    - Conduct research on current measurement systems of suture strength and explore other similar products.
    - Start brainstorming ideas
    - Attend or decide when the team will attend a surgical training

Design Accomplishments:

The team is organizing a meeting with the client to discuss project requirements.

Weekly/Ongoing Difficulties:

No difficulties have been identified at this early stage of the project.

Project Timeline:

Week	Description	Status
9/5 - 9/13 Week 1	Initial research	Complete
	Client Meeting 1	Complete
	Team Meeting 1	Scheduled for 9/12
	Advisor Meeting 1	Scheduled for 9/12
9/14 - 9/20 Week 2		
9/21 - 9/27 Week 3		
9/28 - 10/4 Week 4		
10/5 - 10/11 Week 5		
10/12 - 10/18 Week 6		
10/19 - 10/25 Week 7		
10/26 - 11/1 Week 8		
11/2 - 11/8 Week 9		
11/9 - 11/15 Week 10		
11/16 - 11/22 Week 11		
11/23 - 11/29 Week 12		
11/30 - 12/6 Week 13		
12/7 - 12/13 Week 14		

12/14 - 12/20 Week 15		
Winter Break		
1/20 - 1/24 Week 16		
1/25 - 1/31 Week 17		
2/1 - 2/7 Week 18		
2/8 - 2/14 Week 19		
2/15 - 2/21 Week 20		
2/22 - 2/29 Week 21		
3/1 - 3/7 Week 22		
3/8 - 3/14 Week 23		
3/15 - 3/21 Week 24		
3/22 - 3/28 Week 25		
Spring Break		
4/5 - 4/11 Week 27		
4/12 - 4/18 Week 28		
4/19 - 4/25 Week 29		
4/26 - 5/2 Week 30		
5/3 - 5/9 Week 31		

Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link