

Tracheotomy tube security device

Client: Dr. Timothy McCulloch

Team Members: Katie Pollock (Leader)

Becca Clayman (Communicator)

Kim Safarik (BWIG)

Paul Fossum (BSAC)

March 27 to April 2, 2009

Problem Statement

In patients who have had a tracheotomy performed, a major post surgery problem is discomfort from the tracheotomy collar. The collar must be secured tightly to keep the tracheotomy tube in place so the patient can breathe. However, if the collar is kept at the proper tension, it can cause ulcers on the patient's skin. Our goal is to design a tracheotomy strap that is comfortable, easy to clean, and equipped with monitoring devices to ensure that proper pressure is exerted on the tube and neck.

Last Week's Goals

- Order remaining materials
- Obtain client feedback on current project status
- Begin fabrication

Summary of Accomplishments

- This week we met as a group and came across a few issues that will need to be resolved before purchasing or fabrication can continue:
- Hat snaps – we cannot purchase these in long strips and will need to switch to bi-directional cable ties or a belt design. Both of these are readily available and easy to work with and fabricate. It should not hinder our construction process.
- The pressure design on the back of the neck is proving problematic. Based on our design and the math that we've done, it appears that the pressure on the back of the neck will be negligible and we may not even need a release valve as the pressure will never get close to the capillary relapse pressure of 30mmHg. This is convenient because we have been unable to find valves which operate at this low pressure. Instead, we have discussed changing our design to include a monitor instead that alerts the doctors/nurses when the strap becomes loose via a simple circuit which would be re-usable.

- This week we also decided that we would travel to the hardware store and determine what some of our readily available options were for bag material on the back of the neck. We have discussed shower curtains or some sort of glove. Both are extremely water proof and easy to manipulate.
- Once we have obtained a bag material, we will be close to beginning fabrication, all that remains is to make final decisions regarding the frontal connections and the valves on the back. We will then need to determine exact dimensions before we fabricate.

This week’s goals

- Go to the hardware store and determine what kinds of valves are readily available.
- Determine a solution to the valve issue. Decide whether or not to continue to pursue it.
- Make a decision about which strap we are actually going to use for the front of the collar
- Find a suitable material for the balloons in the back.
- Obtain client consent/acknowledgement to proceed with design

Project Difficulties

We are currently questioning some of the elements of our design because of difficulty in obtaining or even finding parts that fit our specifications. We haven’t found any valves so far that advertise a check pressure of 30 mmHg. Our math also shows that if we do decide to use a balloon with dimensions close to 3cm x 5cm, we may not even need to worry about this pressure as it will be no where even close. We may have to scrap the valve design in favor of some kind of alert system that lets the doctor know if the strap has become loose. We also could not find hat snaps online that had long straps. We will be switching to a bi-directional cable tie or a belt design.

Activities –Team total should be added to each individual total

Member	Activity	Hours	Cumulative
Katie Pollock	Math for pressure/force on back of neck and tube	.75	8
	Progress report	.25	

Becca Clayman	Pricing research Communication	.5 .5	6.75
Kim Safarik	Research Update website	.5 .25	5.75
Paul Fossum	Pricing research	1.25	6.25
TEAM	Advisor Meeting Team meeting	.5 .5	21.075

Project Schedule

Number	Task	Start	End	Duration	1/23	1/30	2/6	2/13	2/20	2/27	3/5	3/13	3/20	3/27	4/3	4/10	4/17	4/24	5/1	5/8
1	Assign teams and duties	1/23/09	1/21/09	1	█															
2	Research project statement and contact client	1/23/09	1/30/09	7	█	█														
3	Initial Brainstorming Client meeting, obtained basic materials	1/30/09	2/13/09	14		█	█													
4	Refine brainstorming	2/4/09	2/5/09	1			█													
5	PDS	2/5/09	2/27/09	22			█	█												
6	Design Matrix	2/13/09	2/20/09	7				█												
7	Select final Idea	2/21/09	2/27/09	6					█											
8	Work on mid semester presentation	2/27/09	2/28/09	1						█										
9	Mid semester report	2/27/09	3/5/09	7							█									
10	Mid semester presentation	3/5/09	3/11/09	7								█								
11	Order materials	3/5/09	3/11/09	7									█							
12	Spring break	3/14/09	3/22/09	8																
13	Fabrication of strap Comfort testing/safety evaluation	3/23/09	4/10/09	18																
14	Redesign	4/10/09	4/11/09	2																
15	Final testing	4/14/09	4/24/09	11																
16	Final presentation	4/24/09	4/25/09	2																
17	Report	4/27/09	5/1/09	5																

We are currently slightly behind schedule. We haven't obtained client approval of our design yet and haven't finished ordering all of our materials. However, it should not take long at all to construct our first prototype.

Expenses

Item	Amount	Price
Jersey mesh fabric	0.5 yds	\$1.50