



Endotracheal Tube Holder

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Overview

- Problem Statement
- Background
- Current Methods
- Product Design Specifications
- Design Options
- Design Matrices
- Final Design
- Future Work
- Acknowledgements

Problem Statement

- To develop a device that:
 - Secures endotracheal tube in place within mouth
 - Able to function with patient in variety of positions
 - Does not restrict access to the face
 - Works with varying diameters of tube

Background

- Endotracheal tubes keep airways open
- Technique used for 1000+ years
- Current uses in surgical procedures
- Used by anesthesiologists
- Important to stay in place during surgeries

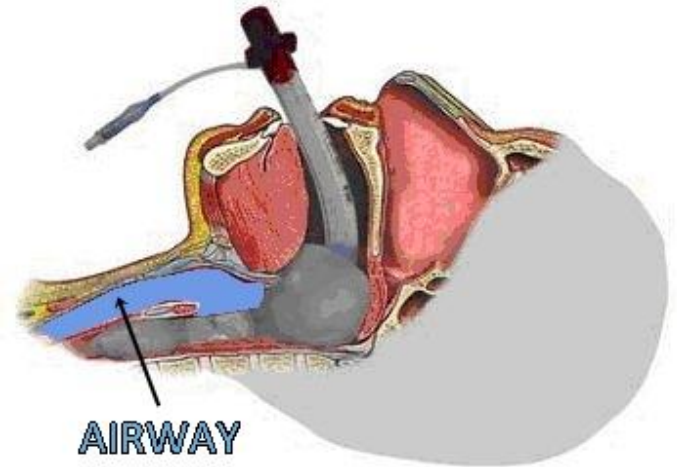


Image taken from:
<http://www.ti-rescue.org/KING.htm>

Current Methods

- Types:
 - Tape
 - Cloth strap
 - Plastic strap
- Problems:
 - Not secure enough
 - Decreases access to face



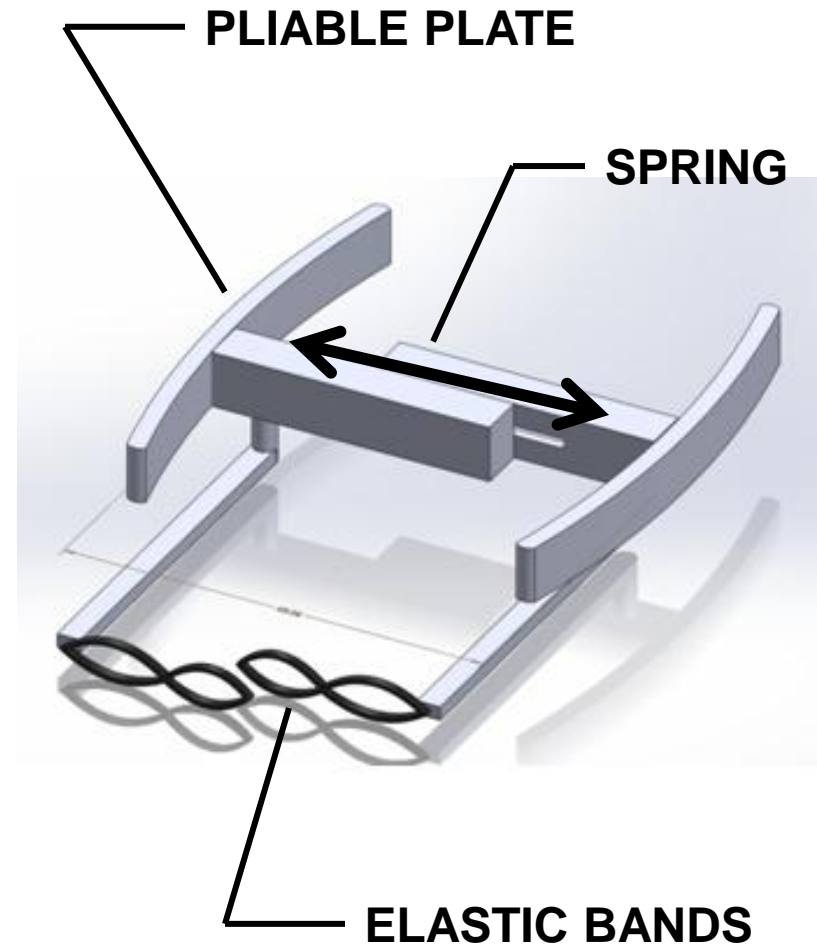
Images taken from:
http://www.alibaba.com/product-free/255323541/endotracheal_tube_ET_Tape/showimage.html
<http://www.lighthouse.me.com/products/tracheal.html>
<http://theopsdeck.com/MEDKIT%20CONTENTS/PROD%20-%20AWY.Thomas%20ET%20Holder.BT.htm>

Product Design Specifications

- Consistently holds tube in place
- Maintains position for full-length surgery
- Small enough to fit in mouth comfortably
- Holds varying sizes of tubes
- Non-toxic and safe for patient
- Must not interfere with surgery

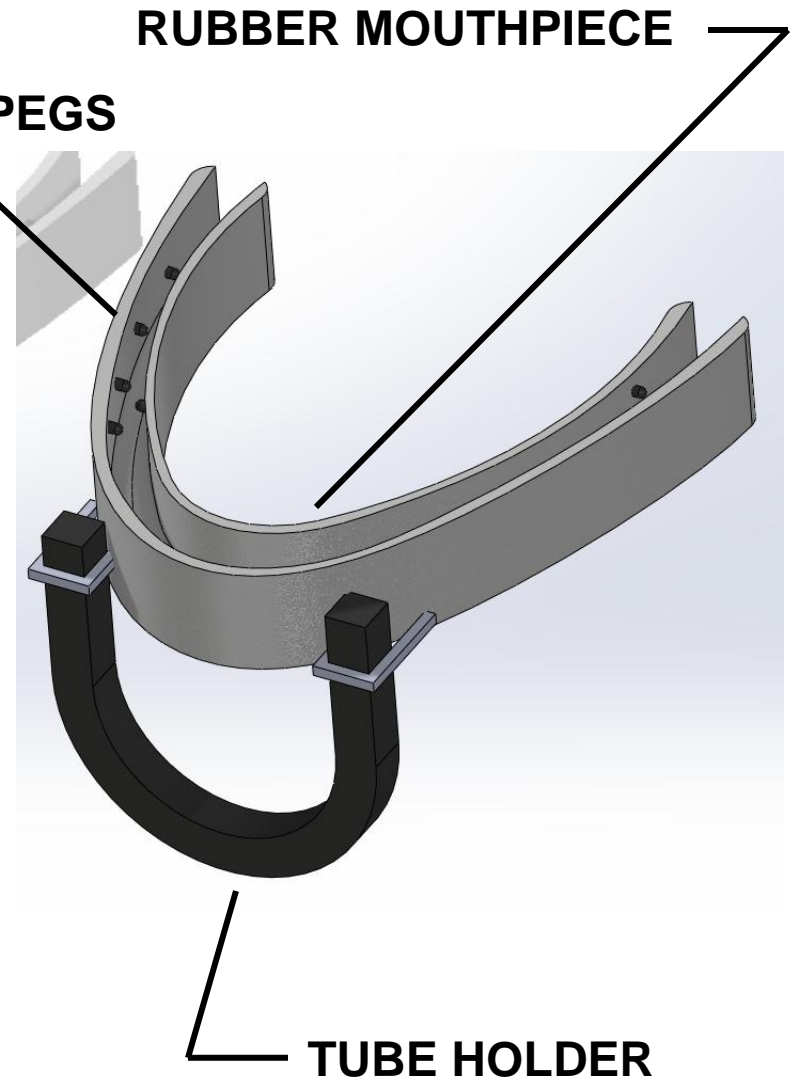
Spring-Loaded

- Compressible spring mechanism
- Fits into roof of mouth
- Removable pads
- Presses against inside of teeth
- Elastic band holds tube in place



Fitted Mouthpiece

- Pressurized points along rim; keep in place
- Mouthguard shape
- Made out of pliable rubber
- Different sizes
- Flexible U fastener
- Reusable

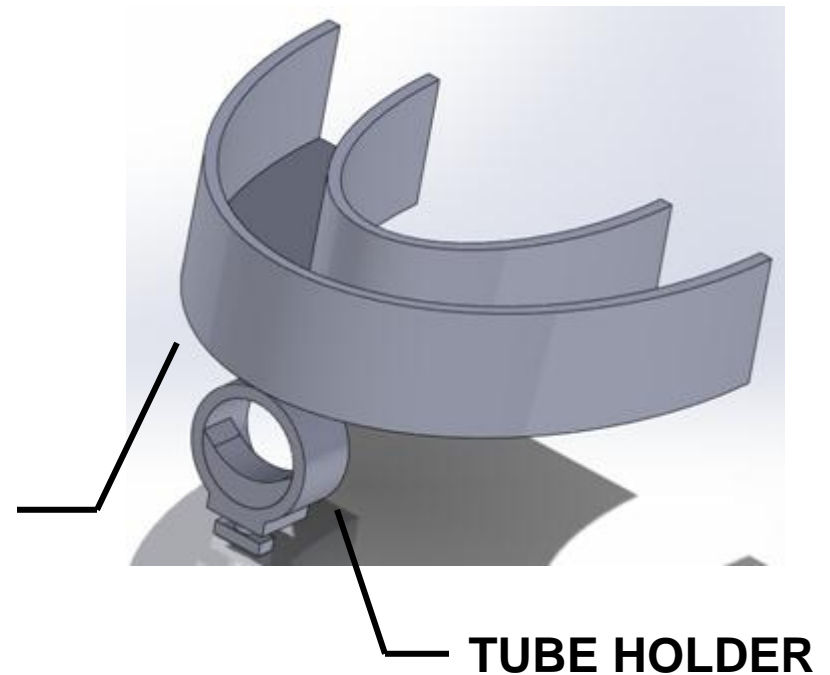


Moldable Mouthguard

- Moldable “boil and bite” mouthguard; disposed after use
 - Snap-in tube clamp
 - Spring-loaded clamping mechanism
 - Reusable clamp piece
- MOUTHGUARD**



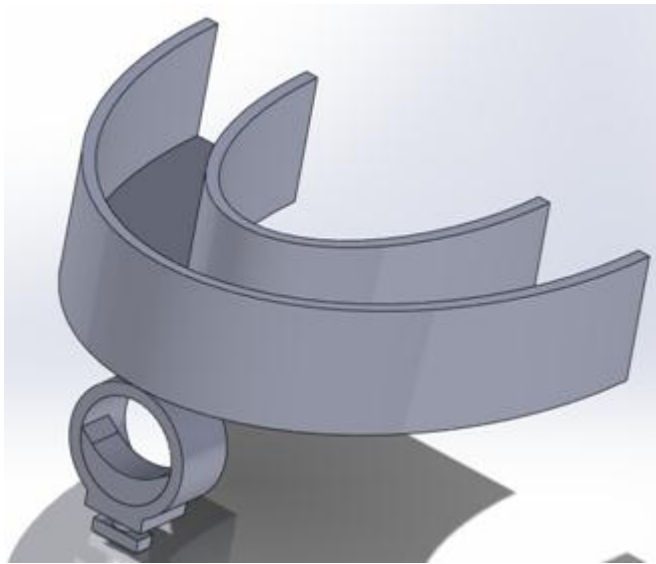
Image taken from:
<http://www.dickssportinggoods.com/product/index.jsp?productId=11596131>



Design Matrix

Design Aspects	Spring-Loaded	Fitted Mouthpiece	Moldable Mouthguard
Effectiveness (25)	15	22	18
Feasibility (20)	12	14	18
Safety (20)	12	18	19
Ease of Use (15)	10	13	11
Cost (10)	7	7	8
Patient Comfort (5)	2	4	5
Maintenance (5)	4	2	4
Total (100)	62	80	83

Final Design



- Easy to construct
- Low cost
- Comfortable for patient
- Good stability
- Low injury risk

Future Work

- Research mouth sizes, tube attachments and materials
- Fabricate prototype
- Test prototype
- Analyze stability and functionality
- Refine final design
- Deliver to client

Acknowledgements

- Mitchell Tyler
- Dr. Scott Springman

Resources

1. Suro International. 2012. *Endotracheal Tube*. <http://www.suru.com/endo1.htm>
2. Radiologyinfo. 2012. Anesthesia. <http://www.radiologyinfo.org/>
3. Szmurk, Peter. 2007. A brief history of tracheostomy and tracheal intubation, from the Bronze Age to the Space Age. https://childrenshospital.org/cfapps/research/data_admin/Site2275/securepages/Documents/IntensiveCare2008Historytracheostomy.pdf
4. Healthwise, Incorporated. 2011. Anesthesia-Topic Overview. <http://www.webmd.com/pain-management/tc/anesthesia-topic-overview>