ENDOTRACHEAL TUBE TO REDUCE VENTILATOR ASSOCIATED PNEUMONIA

Team Members:

Evan Joyce- Co-Team Leader

Scott Carpenter- Co-Team Leader

Ozair Chaudhry - Communicator

Ryan Childs – BSAC

Paul Fossum - BWIG

Advisor:

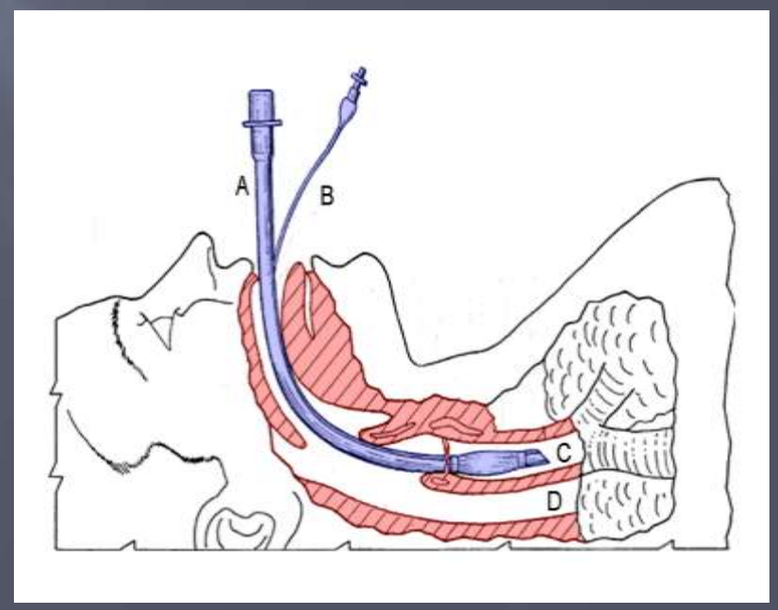
Professor Amit Nimunkar, PhD

Client:

Mark E. Schroeder, MD

Mechanical Ventilation

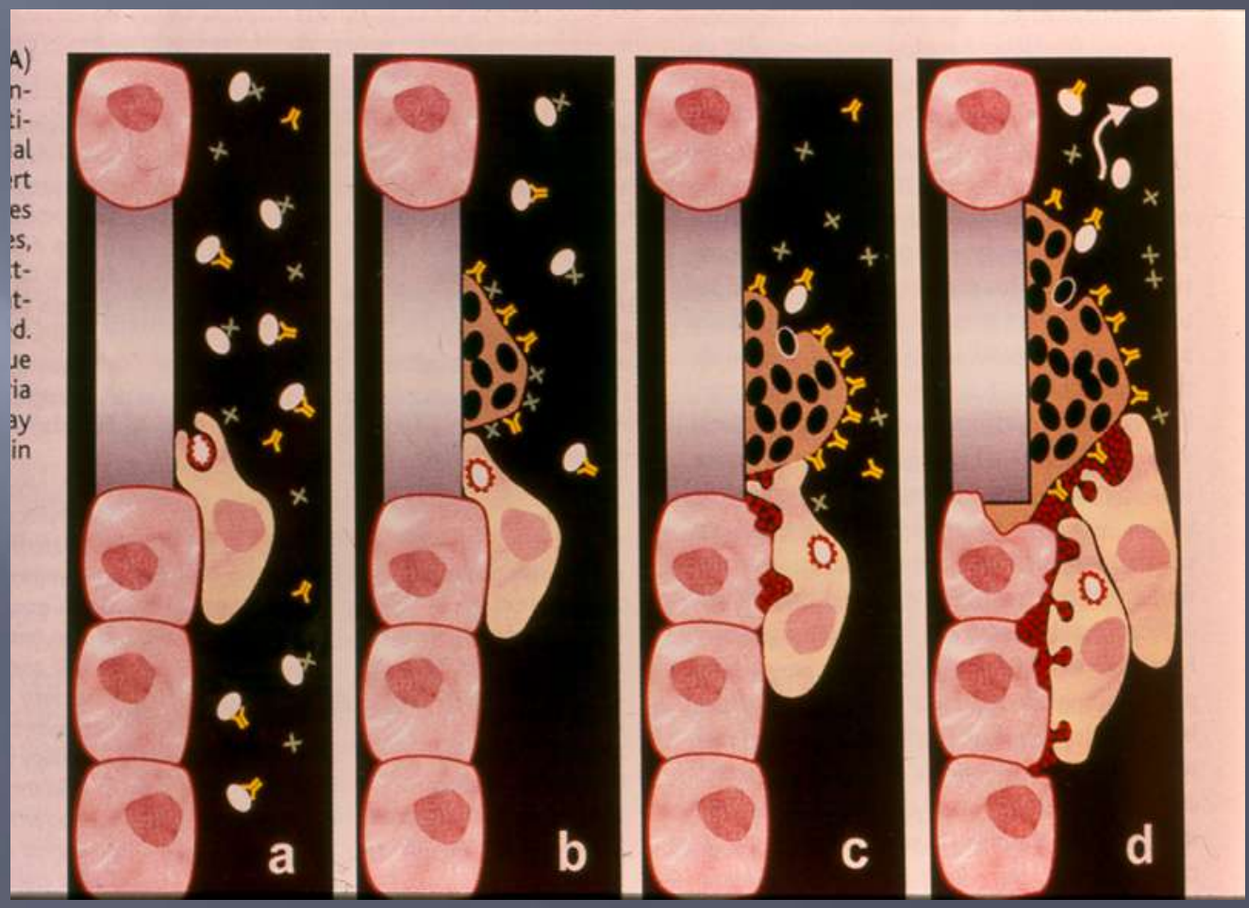
- Mechanical Ventilation: a method to mechanically assist or replace spontaneous breathing
- Invasive and non-invasive methods
- Use of endotracheal tube (ETT) common for prolonged intubation
- Intubation can lead to various infectious diseases



[1]

What is VAP?

- VAP: ventilator associated pneumonia
  - Nosocomial pneumonia occurring in patients after 48 hours of mechanical ventilation [3]
- Aerobic gram-negative bacilli, *S. aureus*, *P. aeruginosa*, and *E. coli*
- Occurs in 9-27% of all intubated patients [4]
- ICU stay increased by 28% and patient cost increased by $10,000-$37,000 [4]



[2]

Design Requirements

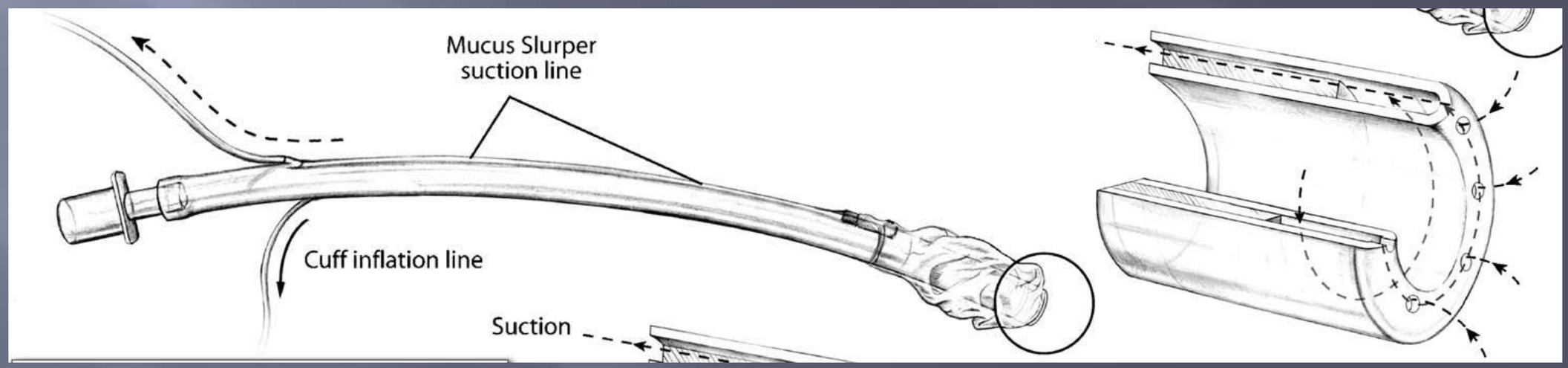
- Create an ETT or ETT attachment that:
  - Greatly reduces the risk of VAP
  - Maintains patient safety
  - Is cost-efficient
  - Reduces pressure on vocal cords

- Possible areas of improvement:
  - Cuff seal
  - Inner lumen sterilization
  - Elimination of biofilms

[5]

Existing Technology

- Normal ETTs
  - Cuffed and un-cuffed
  - Double lumen
  - RAE-preformed
- VAP-reducing ETTs
  - Silver coated/impregnated
  - Secretion removal
  - Cuffs made from various materials



[6]

Cuff Matrix

Cuff Related	Feasibility [15]	Efficacy [30]	Patient Safety [20]	Cost [20]	Ease of Use [15]	Total [100]
Gel/ Putty Wrapping	10	29	17	18	11	**85**
Subglottic Secretion Trap	13	21	18	15	10	77
Space Filling Gel/Foam	8	19	13	15	13	68

Inner Lumen Matrix

Inner Lumen	Feasibility [15]	Efficacy [30]	Patient Safety [20]	Cost [20]	Ease of Use [15]	Total [100]
Current Coil	12	28	12	14	12	**78**
Silver/Anti-microbial Coating	7	25	16	14	14	76
Anti-adhesive Polymer	7	18	18	18	14	75

Miscellaneous Matrix

Miscellaneous	Feasibility [15]	Efficacy [30]	Patient Safety [20]	Cost [20]	Ease of Use [15]	Total [100]
Lavage & Suction	8	24	17	12	13	74
Esophageal Plug	7	18	14	12	10	61
External Mucus Shaver	13	25	19	17	14	**88**
Sterile Wrapper	10	21	19	18	14	**82**

Future Work

- Manufacture Prototype
  - Triangular tube design
- Meeting with Professors Webster & Kao
  - Learn about electricity and possible materials
- Testing Prototype
  - Realistic trachea model or make testing apparatus

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- Josh Medows, MD
- Keith Meyer, MD
- Andrea Parks, PA-C
- Mark Childs

Questions

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