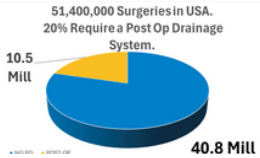
14 MODIFIED SURGICAL ADAPTOR FOR HIGHER COMFORT AND EASIER FLUSHING OF SURGICAL DRAINS

Joie Chen, Terry Coley, Natty Lapinski, Nuha Mirza, James Virtucio
Dr. Adrian Shieh, Dr. Timothy Niesen, Dr. Wan Shih

DREXEL UNIVERSITY School of Biomedical Engineering, Science and Health Systems

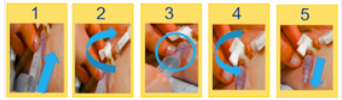
NEED

USER PROBLEM



Patients and caregivers rely on flushing to prevent complications

Current Flushing Process



Low Comfort, High Complexity

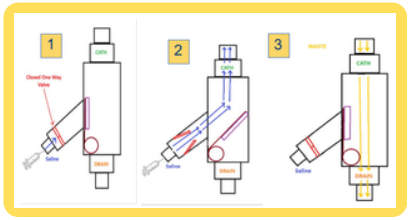
5 steps every **4-6 hrs**, with consequences of:

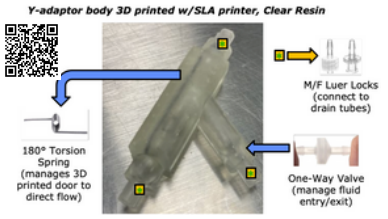
- Air bubbles
- Backwash
- Infection
- Flush Failure

OBJECTIVE

Develop a modified Y-adaptor to increase patient comfort and reduce complexity while maintaining effective drainage

SOLUTION



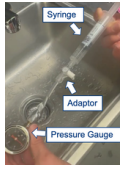


VERIFICATION

Flow Rate

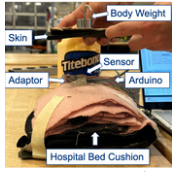
67.2 mL/min ✓

Leakage Prevention



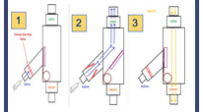
20.7 kPa ✗

Contact Pressure



20.9 kPa ✓

Complexity Reduction



3 steps ✓

DESIGN INPUTS

Constraints:

- Material Biocompatibility
- Adaptor Size & Type (Luer Lock, 6FR - 16FR size)
- Ease of Operation

Requirements	Quantifications
Flow Rate	$Q_{existing} = Q_{prototype}$ (72±12 mL/min)
Leakage Prevention	No leaks @ 41.4 kPa
Contact Pressure	$P_{prototype} < P_{exisiting}$ (41.3 kPa)
Complexity Reduction	<5 steps to flush

CONCLUSION

FUTURE REVISIONS

Switch to Injection Molding:

- Eliminate print artifacts and ensure smoother internal surfaces

Redesigned Door Geometry:

- Explore hinged mechanisms for easier access

Specialized Connector System:

- Add intuitive, color-coded Luer lock or snap-fit connections

IMPACT

- Increased cost savings
- Better quality of care
- Optimized infection control
- Shortened recovery times

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