# Pressurized Wound Irrigation for Effective Wound Cleaning in Emergency Rooms

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***Our mission is to create an accessible, effective pressurized wound irrigation system that enhances healing, reduces infections, and improves care for all.***

## Clinical Needs

**Background:** Wound care is a important procedure in the E.R as infections can lead to further complications. Around 40 million emergency department visits per year in the US are related to traumatic injuries, including open wounds from falls, car accidents, violence, and surgical procedures.

**Current solutions**:

- Plastic Bottles
- Syringes

**Fig 1.** Traditional methods of wound irrigation

## Market Analysis

- Global Market Size: $285.67 million USD in 2022
- Projected growth: $347-411 million USD by 2030
- CAGR: 2.6-3.9% increase between 2023-2030

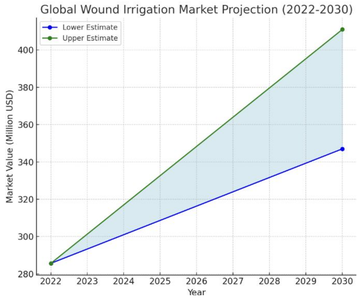



**Fig 2.** US irrigation market size graph

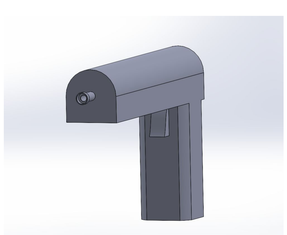
## Target Specifications

| Customer Needs | Specifications |
|---|---|
| Infection Prevention | Infection Rate less than 1% |
| Consistent Pressure | 5-15psi, adjustable |
| Sterility | Should follow Health standards |
| Easy to use | Should take less than 5 mins to use |
| Affordable | Less than 40 USD |

**Table 1.** Top customer needs with corresponding functional specifications.

## Dominant Device Concept and Design

**Device concept and design:** Compact, portable, handheld size device that provides adjustable and constant pressure and volume, enhancing patient comfort and reducing the risk of infection. With splash guard, it promotes safety for both patients and healthcare providers. It aims to reduce the procedure down to two to five minutes.



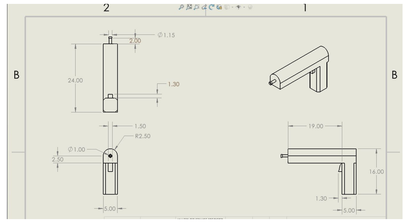


**Fig 3.** Product Architecture showing main frame of our device.

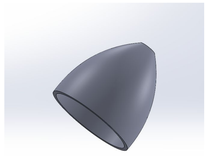


**Fig 4.** Product Architecture showing splash guard of our device.

## Mathematical Modeling

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2$$

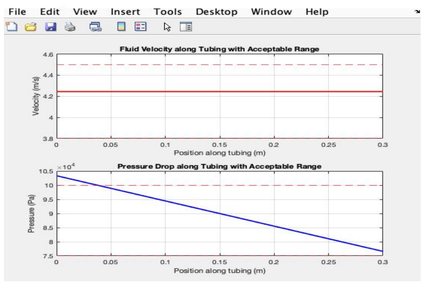



**Fig 5.** The top graph is the velocity of the fluid as it goes through the system. The bottom graph is the pressure drop through the system. Both of these must be consistent and at acceptable levels.

## Design for Manufacturing

| Part | Cost |
|---|---|
| Pressure Mechanism | $25 |
| Sterilized disposable Nozzle/Tip | $3 |
| Reservoir | $2 |
| Battery and Charger | $5 |
| Housing/Frame | $5 |
| **Total Cost** | **$40** |

**Table 2.** Breakdown of cost for every device unit assuming bulk production.

## Project Timeline

| TImeline | Project |
|---|---|
| September | Team formation, Project selection, Benchmarking |
| October | Idea generation, IP, Prior Art search |
| November | Technical models, Product Architecture |
| December | Symposium |

**Table 3.** Concise project timeline

## Future Directions

Future directions include prototyping and submitting FDA. Device prototyping is planned to execute in Spring 2025. Our device is classified as FDA class II: Moderate risk, thus, it will follow 510(k) premarket notification to demonstrate substantial equivalence to a predicate device.

## Acknowledgments

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