

Hwa Chong  
Institution Project  
Work Category 3  
Invention Log Book

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| Project Title: Easy Bandage  |
| Project Group: 3-08  |
| Group members:<br>2i118 Reyes Liong - Group leader<br>2i113 Lee Yi<br>2i203 Clarence Loi<br>2i119 Liu FengXu |

## 1A Problem Finding

Our group got together and brainstormed on problems that we and others face in daily life., we came up with 3 best problems that we feel are most in need of solving:

Spillage of food contents - It is a constant struggle for every driver to keep his takeaway soup upright while driving. There is a possibility that some of the contents would spill out, and it is difficult to constantly keep food upright. How can we prevent the possibility of food spillages on vehicles?

Difficulty administering first aid - When people encounter an accident, many bystanders are often unsure on how to administer first aid. Even for people who know first aid, not many of them practise often and the quality and speed of the treatment is not adequate. How can we create a first aid item that everyone can use easily and effectively in times of need?

Escaping fires - In the unlikely situation of a fire blocking evacuation pathways, people are unable to escape, often causing death due to smoke inhalation. How does one escape his/ her unit in a high rise building when fire blocks the path to the front door?

## 1B Considerations made

We selected our problem to work on based on the following considerations:

1. How large is the market?
2. Is it a significant problem?
3. Is it feasible to solve the problem?

The size of the market is the number of people who encounter the problem selected. The larger the market size, the more people would be able to benefit from our innovation.

How significant a problem is determines how big a help our product would be to users. A solution to a significant problem would see more people wanting and benefitting from our innovation.

The more feasible a problem is to solve, the easier and more likely we would be to be able to create a good solution to the problem. This also takes into consideration whether we as students have the necessary means to come up with a good solution.

## 1C Evaluation grid

Based on the considerations mentioned above, we created a table and weighed our ideas to decide which problem to work on. **\*1 is the lowest score, and 4 is the highest**

| Problem Selection                  | Size of Market | Problem Significance | Feasibility | TOTAL |
|------------------------------------|----------------|----------------------|-------------|-------|
| Spillage in moving vehicles        | 3              | 2                    | 3           | 8     |
| Difficulty administering First Aid | 4              | 4                    | 3           | 11    |
| Escaping from fires                | 3              | 4                    | 2           | 9     |

## **2. Define the Problem**

### **2A Extent of problem**

Problem statement: How might we create a solution that helps everyone in dire situations administer first aid quickly and easily?

Firstly, we did some online research to find out exactly how large the scale of the problem was. We found out that someone sustaining severe wounds can bleed to death within 5 to 8 minutes<sup>1</sup>, and in Singapore, an ambulance will typically take a maximum of 11 minutes to arrive<sup>2</sup>. This is alarming, as it shows that someone in an accident could bleed to death much faster than it takes for an ambulance to arrive. As such, bystanders must be able to provide first-aid for others, as it would likely make the difference between life and death. However, studies show that only approximately 5% of adults have the skills and confidence to provide first aid in emergency situations<sup>3</sup>. This means that in the case of a severe accident, it is highly likely that nobody at the scene is able to administer first aid.

To further our research, we sent out a survey (**Refer to Appendix A**) which got responses from 53 students and adults. 79.2% found first-aid difficult and troublesome to administer. 73.6% have also never been trained in first-aid before, showing the need for a product that caters to non-first aiders. It does not need much prior experience and should be quite intuitive to use. Meanwhile, 92.5% also expressed that they would be willing to use a fast and simple bandage that is effective in treating large wounds should the need arise.

## **3. Your BIG IDEA**

### **3A Describe your proposed invention.**

Our goal is to make an effective and easy-to-use bandage which anyone can use. The bandage should effectively stop the bleeding by covering the wound and applying pressure like a traditional bandage, while also being fast and easy to use. It is mainly targeted at large open wounds.

### **3 B Explain the purpose of your proposed invention and its potential benefits to users.**

The purpose of our invention is to allow everyone, but especially non-first aiders, apply first aid easily and effectively, during a situation where first aid is urgently required, while also making the process of administering first aid faster to reduce blood loss. Non-first aiders should also be able to apply this bandage without any prior knowledge. The usage of it should be very intuitive and easy to use. This would help reduce cases of death from excessive blood loss.

### **3C How would your proposed invention be different and/or better than existing solutions?**

Compared to the existing crepe and bandage method, our solution will allow even non first aiders to administer first aid, as it does not require prior experience to put on, and it will be easier to apply pressure. It will be just as hygienic and effective in stopping bleeding, by utilising the same materials as in crepe and bandage, but also making it faster, as it is a one piece bandage, instead of the separate materials required in crepe and bandage.

### **3D What problems do you expect in the course of designing your proposed invention?**

We foresee having difficulty in finding the suitable materials. We will need to find a material with the right amount of elasticity and firmness required in applying pressure on a wound, which would stop

the bleeding, and ensure effectiveness.

We also have to design our invention so that it would be up to par with the medical standard of the traditional crepe and bandage method, so that our product would be safe and hygienic to use.

### **3E What are the major milestones (project timeline) in your invention process?**

Besides formal meetup sessions with our mentor every Thursday, here are some major milestones that we have presented in the form of a timeline:

| <b>Time period</b> | <b>Milestone</b>   |
|--------------------|--|
| Term 1 Week 4      | First formal meetup and consultation with mentor on ideas  |
| Term 1 Week 7      | Finalised problem to solve   |
| Term 1 Week 9      | Used engineering software and sketching tools to come up with model prototype 1                    |
| March Holidays     | Visited 3M Centre, presented and gained feedback from external mentors on how to improve our ideas |
| Term 2 Week 3      | Completed construction of Prototype 1  |
| Term 2 Week 4      | Testing of Prototype 1   |
| Term 2 Week 6      | Planning and construction of Prototype 2   |
| Term 2 Week 10     | Completion of Prototype 2  |
| June Holidays      | Carried out testing of Prototype 2   |
| Term 3 Week 1      | Planning and construction of Prototype 3   |
| Term 3 Week 3      | Completion and Testing of Prototype 3  |
| Term 3 Week 4      | IVP Project judging at NUS   |
| Term 3 Week 5      | Final amendments to Prototype 3  |

## **4. Construction Process**

### **4A Explain how and why the materials were chosen for the product of your invention**

To achieve the aim of our product, we made sure that it was, effective, fast, and easy to use. When considering the materials to be used, we also made sure the materials were up to medical hygiene standards. To ensure that the solution was effective, we also ensured that materials chosen had enough firmness and elasticity to apply the adequate amount of pressure required in stopping the bleeding in a wound.

In ensuring that administering first aid was fast and also easy to use, we ensured that there were minimal steps required in putting the bandage on, and that the bandage was already assembled together and was in “one-piece”, further reducing the time needed.

#### **4B Explore the different considerations that may guide the construction of your product**

We made sure not to compromise on the hygiene and safety standards when constructing the product. We also ensure that the product fulfils all our intended outcomes (fast, easy to use, effective). We made decisions on the construction of our prototype according to what would best fit the intended outcomes of the product.

#### **4 C Document the development stages of your invention**

(Refer to Appendix B)

### **5. Modification and Evaluation**

#### **5A Product Testing**

We evaluated how successful each of our prototypes were based on how well they fulfilled our intended outcomes (easy to use, effective, fast). We tested out the completed prototypes by getting students and teachers to try out using it, and asking for their comments. Based on these comments, we have compiled scores and areas for improvement for each prototype.

##### Prototype 1

| <b>Test date:<br/>11/4/19</b> | <b>Score<br/>(Out of 5)</b> | <b>Remarks</b>   | <b>Areas for improvement</b>   |
|-------------------------------|-----------------------------|--|--|
| <b>Easy to use</b>            | <b>3</b>                    | Metal rods are difficult to put into the bandage         | Remove metal rods altogether to make the product “one-piece”         |
| <b>Effective</b>              | <b>1</b>                    | Unhygienic, does not apply any pressure to stop bleeding | Use materials of proper medical standard; use stronger elastic bands |
| <b>Fast</b>                   | <b>2</b>                    | Difficult to slot hand in, does not fit all hand sizes   | Wrap to put on instead of slotting hand inside bandage               |

##### Prototype 2

| <b>Test date:<br/>17/6/19</b> | <b>Score<br/>(Out of 5)</b> | <b>Remarks</b>   | <b>Areas for improvement</b>   |
|-------------------------------|-----------------------------|--|--|
| <b>Easy to use</b>            | <b>5</b>                    | Does not require any prior experience to use   | -  |
| <b>Effective</b>              | <b>2</b>                    | Sewing medical padding on makes product unhygienic and unsightly. Some pressure is applied | Use alternative methods to attach bandage. Use larger velcro patches to hold and apply pressure more effectively |

|             |          |   |                                |
|-------------|----------|---|--------------------------------|
| <b>Fast</b> | <b>3</b> | Individual elastic strips make it slightly difficult to pull the strips to apply pressure | Use 1 individual elastic strip |
|-------------|----------|---|--------------------------------|

### Prototype 3

| Test date:<br>18/7/19 | Score<br>(Out of 5) | Remarks   | Areas for improvement   |
|-----------------------|---------------------|---|---|
| <b>Easy to use</b>    | <b>5</b>            | Does not require any prior experience to use  | -   |
| <b>Effective</b>      | <b>4</b>            | Padding is sealed onto the bandage, making the overall product hygienic and look neat. A good amount of pressure can be applied, and is comparable to the traditional crepe and bandage method. | Research for alternatives to elastic strips that have stronger elasticity, so as to apply even more pressure on wound |
| <b>Fast</b>           | <b>5</b>            | Bandage is compact, and takes less than 15 seconds to apply.<br>Testing proof<br><b>(Refer to Annex C)</b>  | -   |

### 5B Conclusion

These tables show our evaluation and the improvements we have made for every prototype.

All in all, although there is still some room for improvement, it is fully functional. The final prototype was also able to achieve many of the outcomes we had intended for. It was easy to use, fast, and mostly effective. We hope that our product will be able to reduce the number of cases of death from excessive blood loss in the future, and save lives.

### 6. References

1 Gunshot wound first aid can save a life. Here's what to do. (n.d.). Retrieved from

<https://www.popsci.com/gunshot-wound-first-aid-triage/>

2 Emergency Medical Statistics (2016) - SCDF. (n.d.). Retrieved from <https://www.scdf.gov.sg/>

3 Press release - New research shows just 5% of adults have the skills and confidence to provide first aid in emergency situations. (2018, January 28). Retrieved from

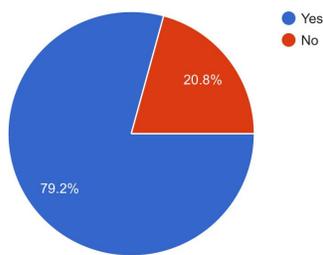
<https://www.redcross.org.uk/about-us/news-and-media/media-centre/press-releases/press-release-new-research-on-adults-and-first-aid>

## 7. Appendix

### Appendix A

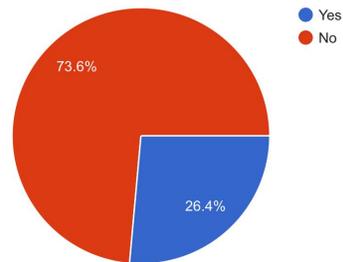
Do you find it difficult and troublesome to administer first aid?

53 responses



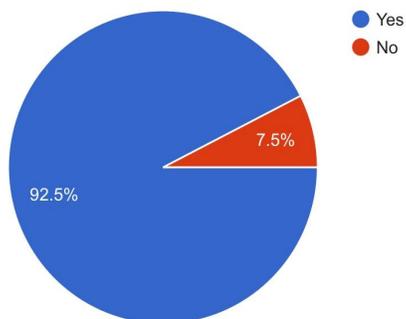
Have you been trained in first aid?

53 responses



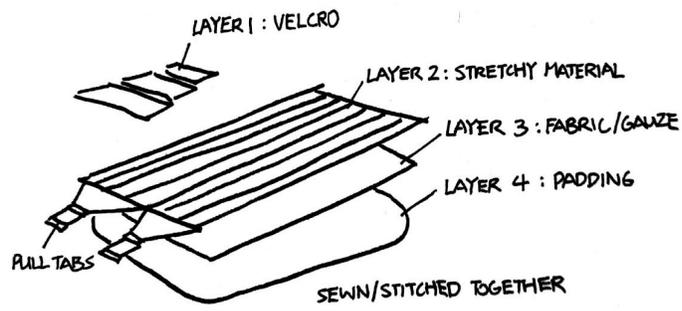
If such a bandage is available to the public, will you be willing to use it when the need arises?

53 responses

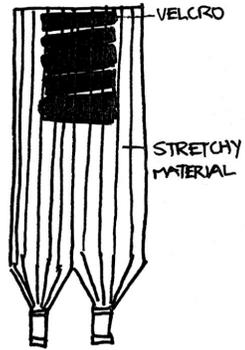


### Appendix B

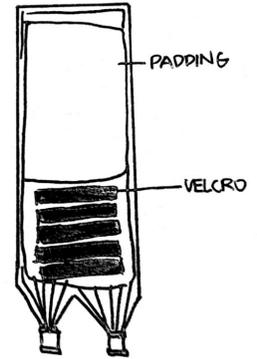
## Preliminary Sketches



FRONT



BACK



## Prototype 1



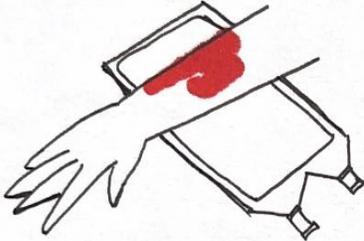
## Prototype 2



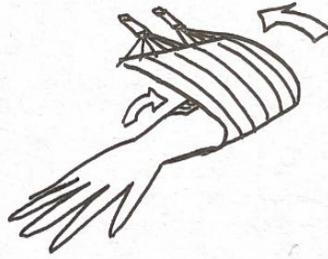
**Final Prototype**



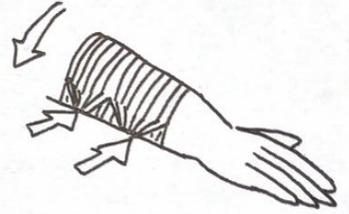
1. ALIGN TO INJURED AREA



2. WRAP BANDAGE & PULL TABS TO TIGHTEN



3. SECURE WITH VELCRO



## Appendix C

Link to video of testing:

[https://drive.google.com/open?id=1Felpc18W5iZ7I\\_Z\\_FscTnY8FrXecRsAF](https://drive.google.com/open?id=1Felpc18W5iZ7I_Z_FscTnY8FrXecRsAF)