Abstract
A way to avoid accidental punctures and missed veins for all patients and healthcare workers undergoing and performing any blood drawing procedures to prevent nerve damage and blood-borne infections.

Introduction
Venipuncture is the most common invasive medical procedure that is performed by clinicians. When the vein is not accurately punctured, the clinician must remove the needle and attempt to access a vein through another injection site. This process can cause discomfort to the patient as well as increase susceptibility to infections and diseases. Some of the complications caused by inadequate venipuncture include pain, nerve damage, hematomas, blood-borne infections, fainting, edema, thrombosis, and vein damage.

A device in which an accessible vein is shown on a monitor for the clinician to see decreases the likelihood of misplacement of puncture site. It would decrease the uncertainty involved in placement of an viable vein in a vulnerable patient. Current devices available for purchase are not user friendly, lack proper resolution, and projection techniques. Therefore, the objective of this project is to develop a device that will decrease complications from blood drawing procedures and improve patient safety.

Methods | Design | Analysis

Results

Table 1: Statistical Summary of complication due to venipuncture

<table>
<thead>
<tr>
<th>COMPLICATION</th>
<th>TOTAL (n=4050)</th>
<th>MEN (n=3200)</th>
<th>WOMEN (n=850)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRUSING</td>
<td>436 (10.8)</td>
<td>376 (11.8)</td>
<td>60 (7.1)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>HEMATOMA</td>
<td>80 (2.0)</td>
<td>36 (1.1)</td>
<td>44 (5.2)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>PAIN</td>
<td>80 (2.0)</td>
<td>40 (1.3)</td>
<td>40 (4.7)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>TOTAL</td>
<td>576 (14.2)</td>
<td>252 (7.7)</td>
<td>324 (38.1)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Conclusion
The objective of this vein detection device for venipuncture is to reduce accidental punctures for patients and healthcare workers. Nonetheless, there are a few conditions that still require further mitigation such as:

- Improve light source for better absorption of light on a wide range of skin complexions
- Heighten contrast to increase sharpness of image
- Create one software to use along device to capture grayscale images, increase image contrast, process, and display live images
- For future testing, capture more images on individuals of various age range and BMI ranges to observe detection of veins.

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References