

Canary: Flap Failure Prognosis

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What is a Free Flap Procedure?

Free flap procedure is a reconstructive surgical technique that involves transfer of autologous tissue with its vascular pedicle to a recipient site. At the recipient site, vessels are reconnected using microsurgical anastomosis. However, the anastomotic site is vulnerable to postoperative thrombosis which can cause rapid blood flow compromise, leading to ischemia and ultimately tissue death, unless detected within one hour.

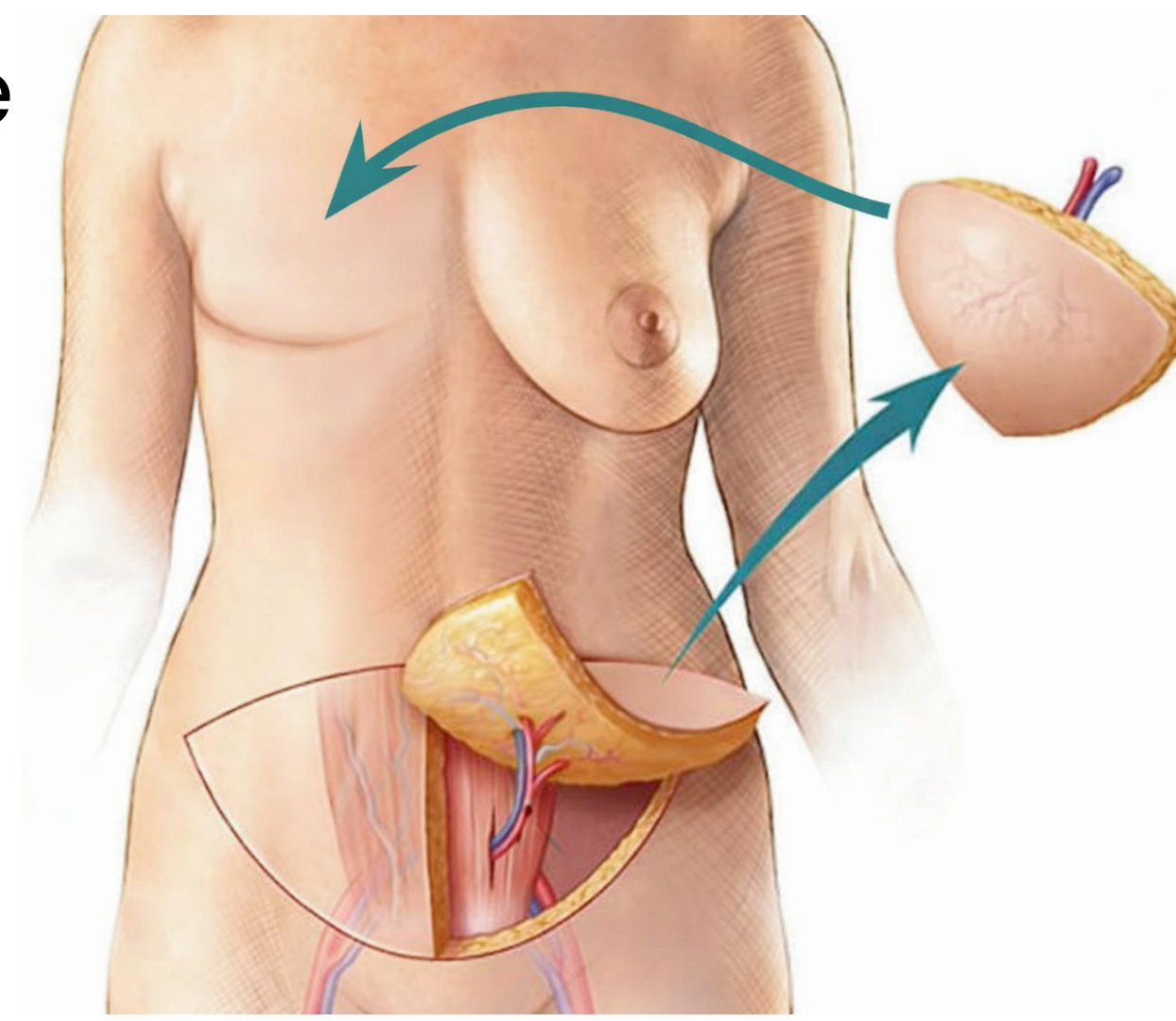


Fig. 1 Free Flap Overview
Adapted by authors from PRMA Plastic Surgery¹,
ChatGPT used for label clean up

206k Free flap surgeries performed annually in the US²

32k Estimated cost per procedure³

6% Of flap reconstructions fail⁴

25% Of nurses shifts are spent monitoring flaps^{5,6}

Where is the Problem?

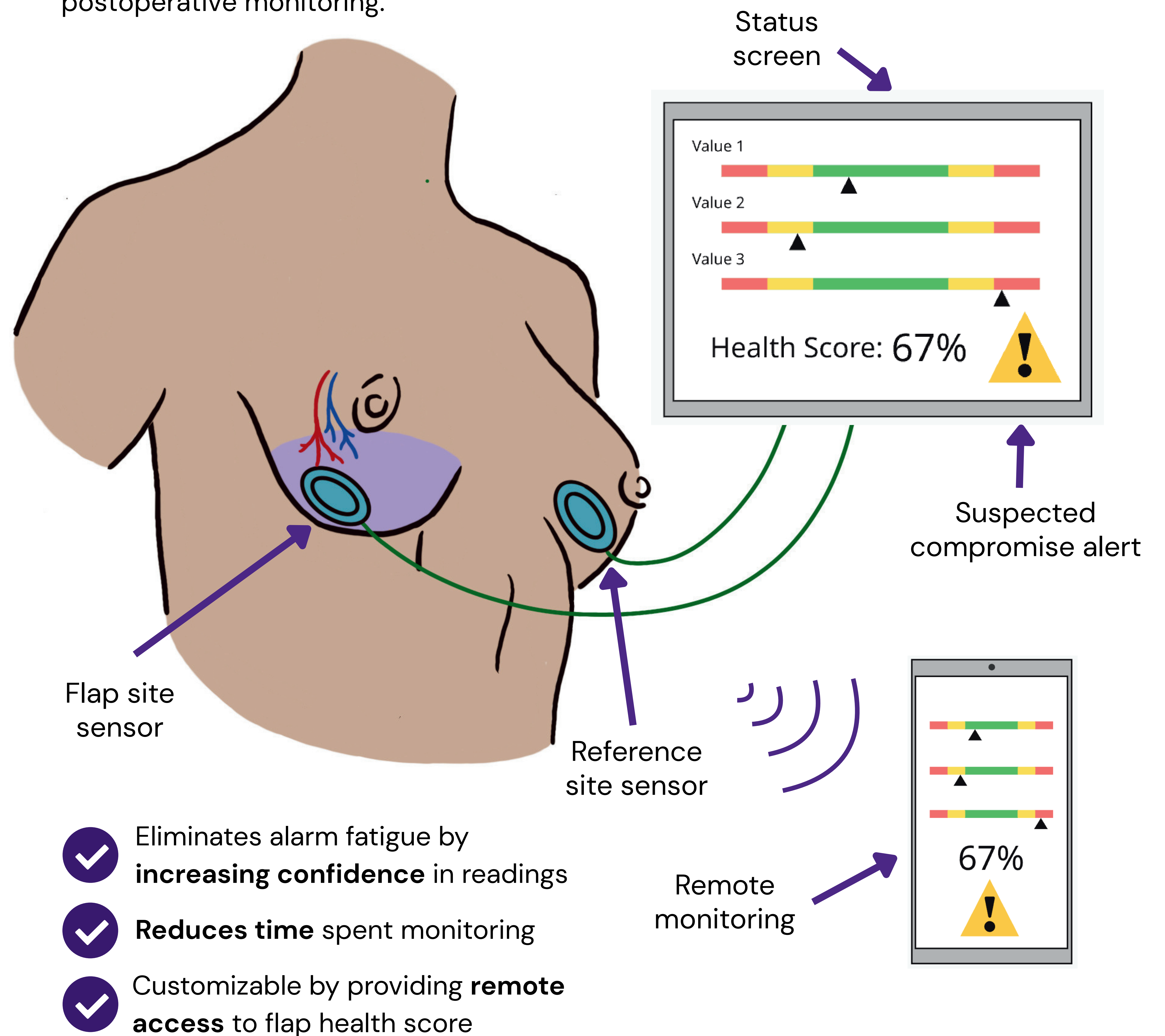
- The current gold standard – hourly manual flap monitoring is **labor-intensive**, diverting clinician time from other patient care duties.
- Existing solutions, while sensitive, have **high false positive rates**, which causes **alarm fatigue** in clinical staff and may lead to true flap compromise being overlooked.
- Undetected flap failure leads to **costly revision surgeries**, **prolonged hospital stays**, and increased **psychological burden** on the patient.

Unmet Need:

Nurses need a higher specificity method to monitor free flap vascular integrity to minimize operational barriers that prevent failure revision within one hour.

Our Solution

A continuous, self-referencing, multimodal sensor that provides a single **flap health score** to predict flap failure, streamlining the traditionally arduous process of postoperative monitoring.



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