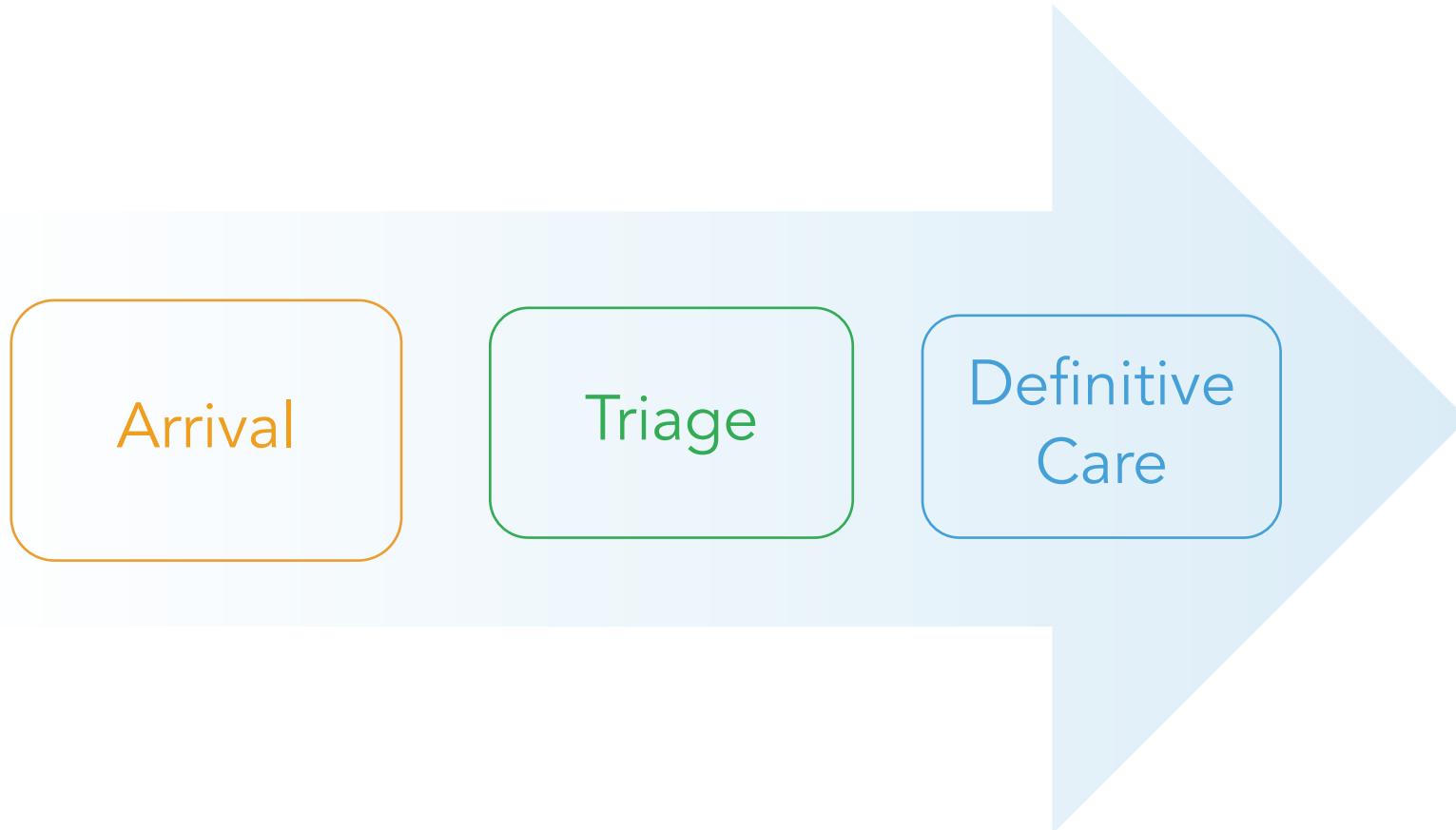


# Ál'arm

A Vitals Monitoring Solution for  
Emergency Departments

# The Patient Journey



# The Central Node: Triage

91%

ED directors oversee  
overcrowded ERs

11%

Patients who leave  
without being seen are  
hospitalized in < 1 week

32%

ED volume increase  
between 1997 and 2006

186

Less EDs between 1997  
and 2006

1 in 4

Patients waited longer to  
see a physician than  
triage recommendations

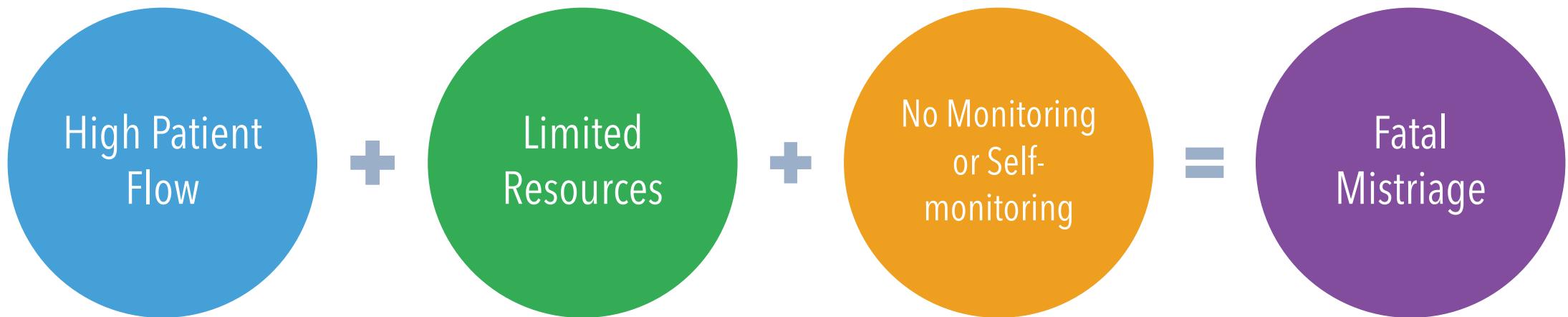
**Man dies in New York hospital waiting room, found hours later**

# **Actor James Woods sues R.I. hospital in brother's death**

Posted Friday, November 6, 2009 9:10 pm

**Family sues Bronx hospital after father dies following 9-hour ER wait**

# The Breakdown: Waiting Room



# Our Solution

Continuous vitals monitoring for patients triaged non-emergent and released back into the waiting room

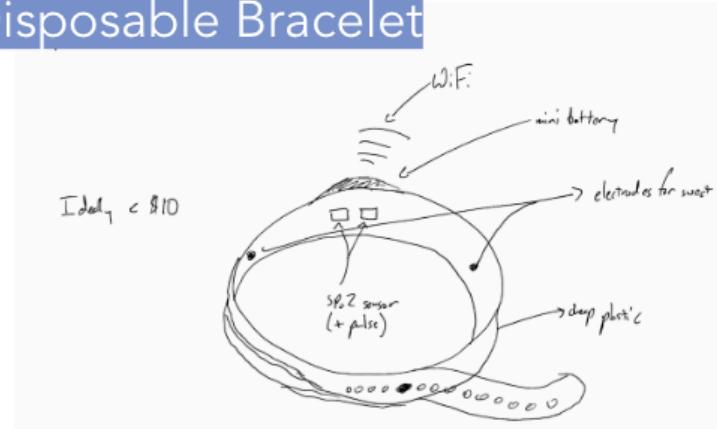
Blood Pressure & SPO<sub>2</sub> monitoring can catch pulmonary emboli, slowly progressing MI, sepsis, among others

# Brainstorming

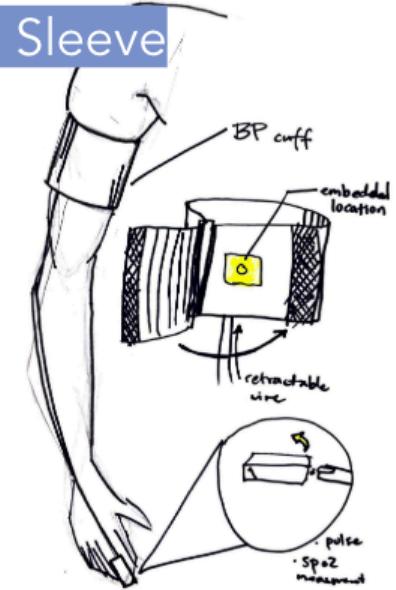
Wearable Patch



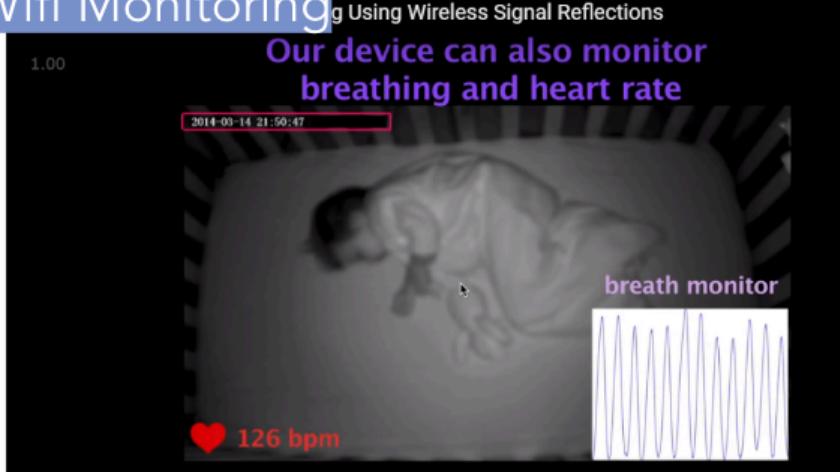
Disposable Bracelet



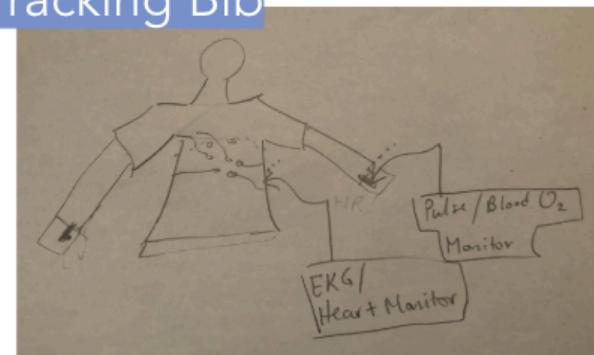
Vitals Sleeve



Wifi Monitoring  
Using Wireless Signal Reflections  
Our device can also monitor breathing and heart rate



Tracking Bib



Phone Home Button



# Iterations

## Technology

Auscultation

Pressure

Electrical Impulses

Wi-Fi Monitoring

## Vitals Monitored

- ✓ BP trends
- ✓ Pulse
- ✓ SpO<sub>2</sub>
- ✓ Skin moisture

- ✗ Lung sounds
- ✗ Respiratory Rate
- ✗ EKG
- ✗ Absolute BP

## Formats

- Chest Patch
- Wristband
- Smartphone
- Sleeve
- Gown

# Design Considerations

Integration in Existing Ecosystem

Theft

Patient Comfort

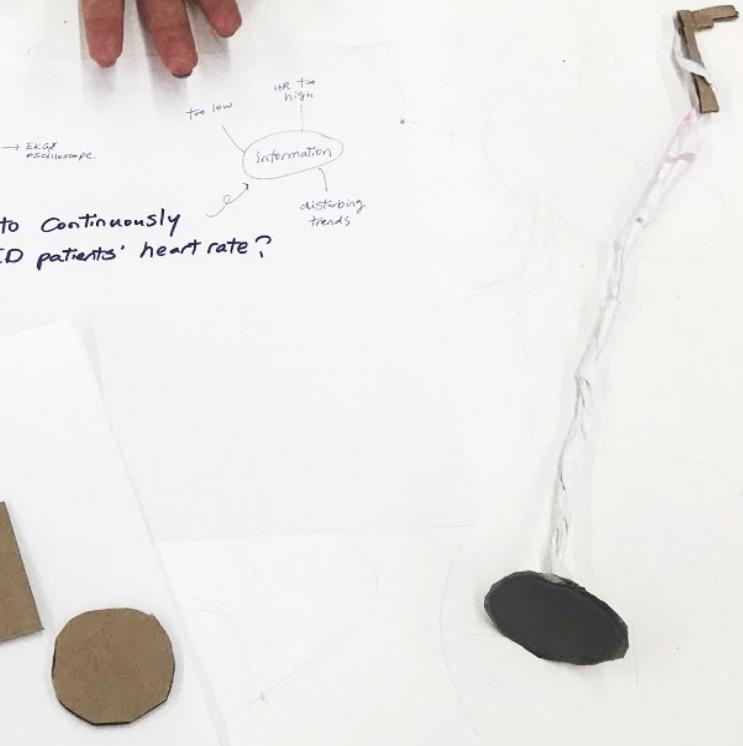
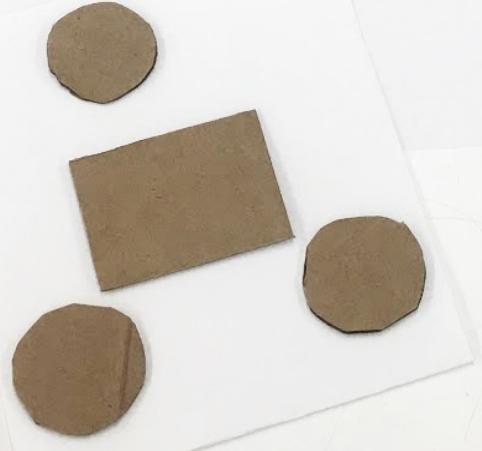
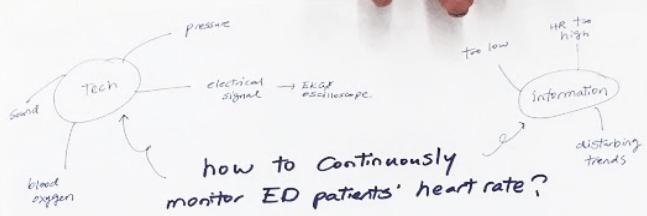
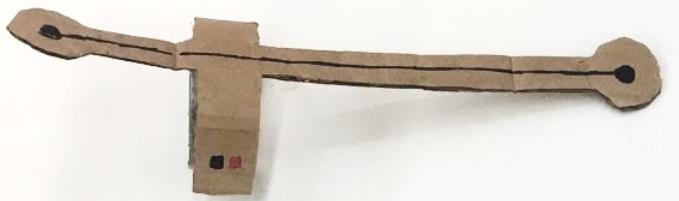
Data security

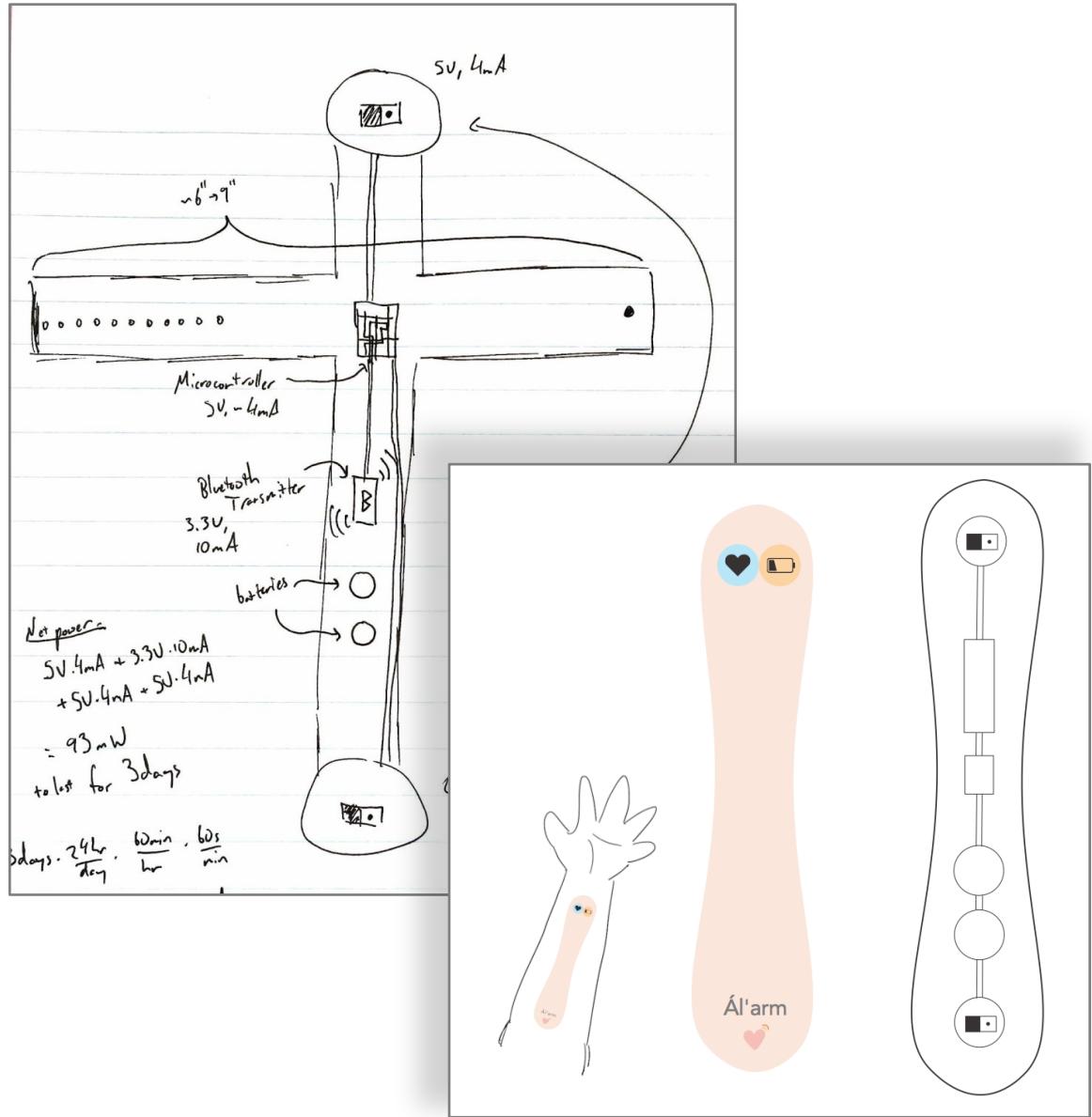
Caretaker Usability

Accuracy

Wear and breakage

Sterilization





2 spO<sub>2</sub> photo-sensors

Microcontroller

Bluetooth transmitter

2 batteries

- (Power consumption:  $93 \text{ mW} * 3 \text{ days} = 24.1 \text{ kJ}$ )

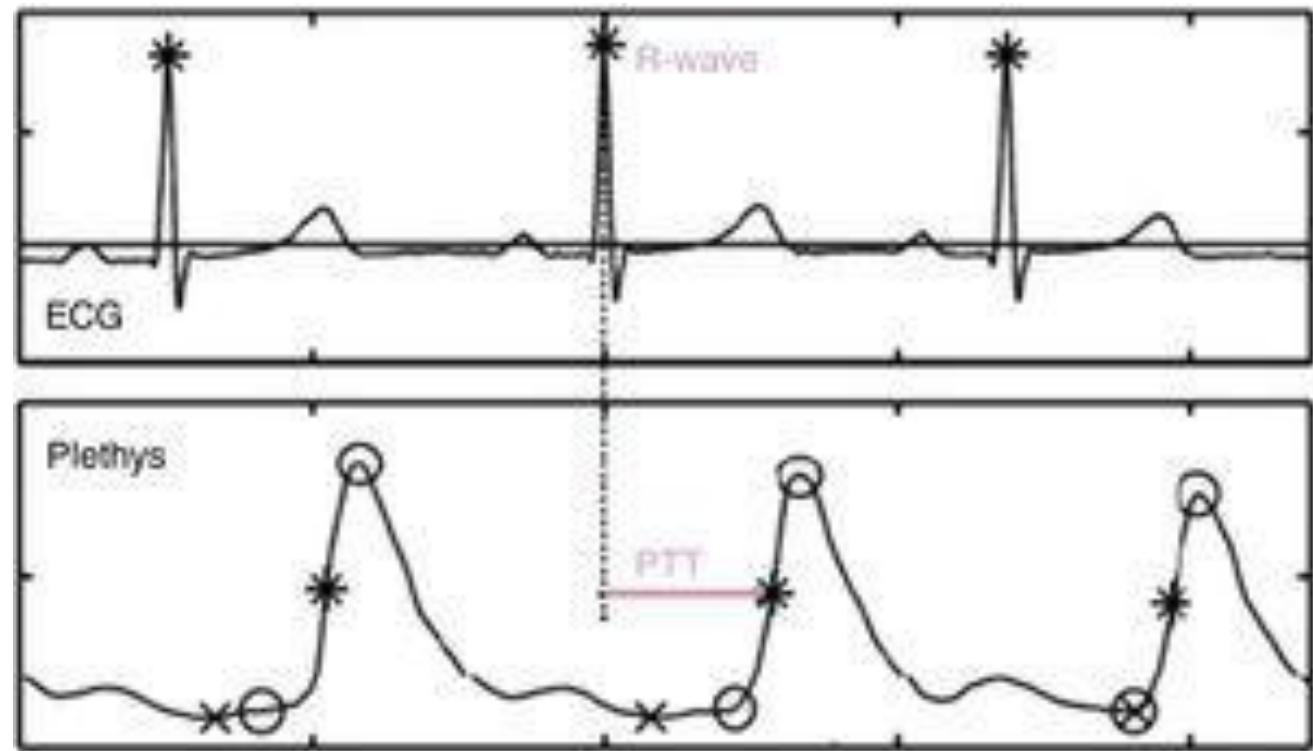
Gel-based disposable sticker pads

LED indicators (battery life and HR)

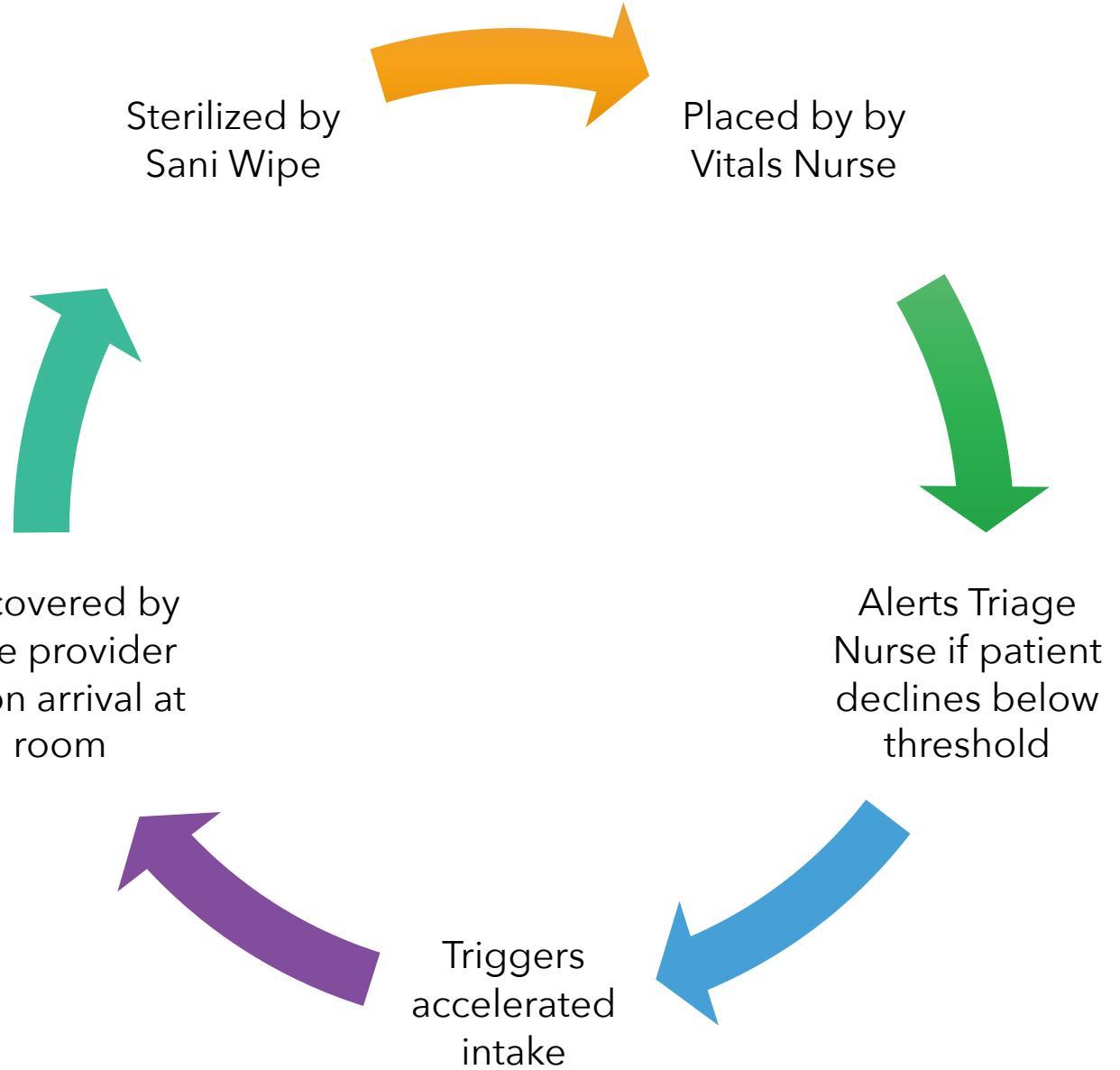
# Final Specifications

# Vitals Monitored

- ✓ BP trends
- ✓ Pulse
- ✓ SpO<sub>2</sub>
- ✓ Skin moisture



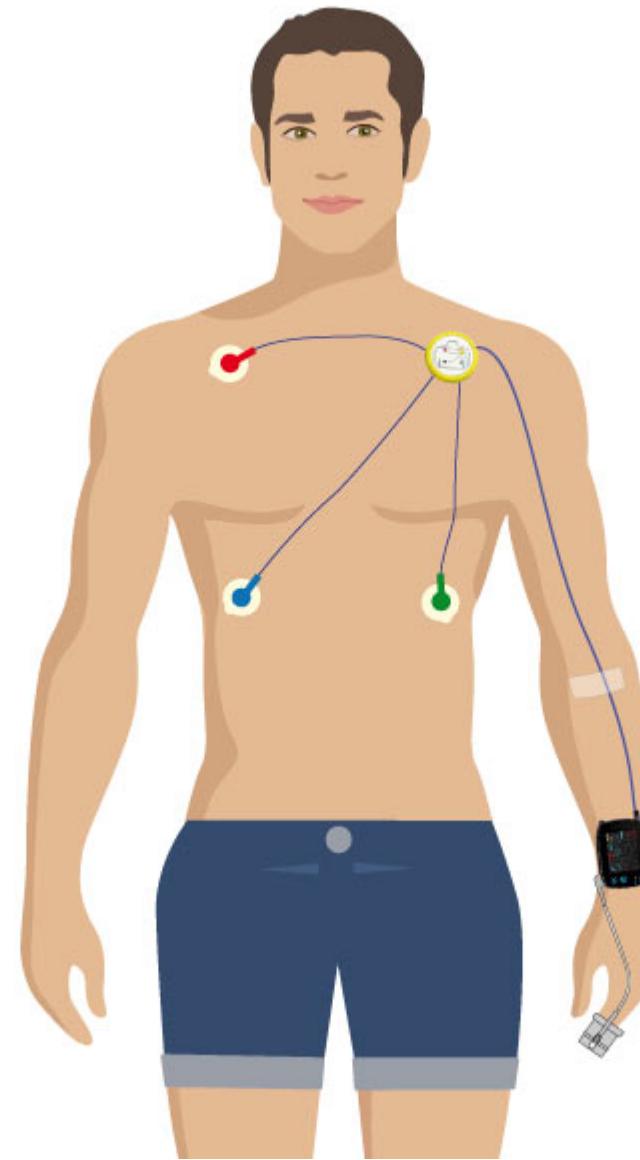
# Integration in the ED Ecosystem



# Stakeholder Impact

|                | Pros  | Cons                       |
|----------------|---|----------------------------|
| Hospital       | lower risk<br>patient satisfaction<br>more data to improve care                 | cost (<\$10)               |
| Doctors/Nurses | healthier patients<br>peace of mind   | alarm fatigue, data burden |
| Patients       | tangible reassurance of care<br>better outcomes<br>Increased patient engagement | slightly more intrusive    |

# Market Analysis



# Next Steps

Integration into EHR systems

Test functional prototype

Evaluate and improve reliability

# Many Thanks!

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D+H Advisors:

Thomas Lutzlow, Maya Singh, and Jess Hile

