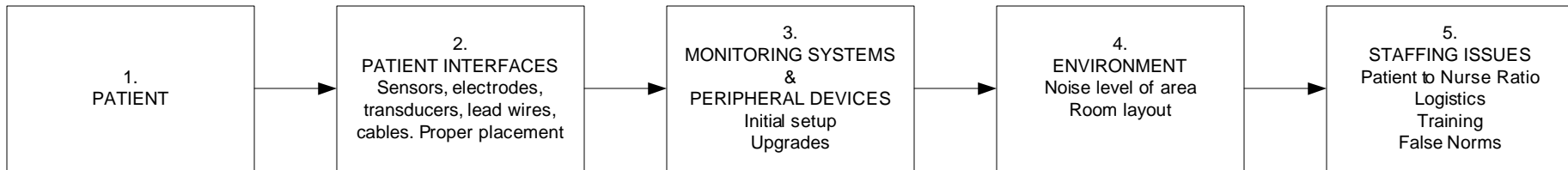


# ALARMS Defining the Problem



## FAILURE MODE

Source of artifacts, poor signal and false alarms.

## CAUSES

Movement  
Trembling  
Obese

Becomes apprehensive/  
agitated as alarms are  
activated/heard in the room.

## ROOT CAUSES

HF- C 2, 3, 7 & 13  
HF-T 1, 2 & 3  
HF- F 1, 2, 3, 6, & 8  
E 3, 6, 8, 16, 19, 20, 22  
R 13  
B 7

## SOLUTIONS

Staff must assess and convey the patient's conditions to other shifts and team members. Use a checklist to make sure that the source is under control, at ease and comfortable. (Note: as the nursing population ages, those nurses who are experiencing hot flashes will be more comfortable in a cooler environment but the patient might be trembling). Training by monitoring companies usually cover just their devices and not the patient nor the environment

## FAILURE MODE

Loose/intermittant connections  
Electrodes falling off resulting in nuisance "Leads off" alarms.  
Improper placement of electrodes resulting in poor quality traces.  
Transducers are not calibrated/  
not compatible with the amplifiers.

## CAUSES

Poor quality electrodes  
Diaphoretic patient  
Improper placement  
Patient's skin not properly prepped  
In a hurry  
Not really understanding the idiosyncrasies of the system  
Improper calibration of sensors/  
transducers

## ROOT CAUSES

HF - C 14  
HF - T 1, 3, 6, 8  
HF - F 8  
E 6, 7, 8, 15, 16, 20

## SOLUTIONS

Must have multidisciplinary input in the selection and procurement of disposable, patient interface devices.  
Proper training and skills validation of skin preparation, selection of site, proper calibration and application of electrodes, transducers, catheters, sensors to the patient.

## FAILURE MODE

Too many alarms  
False positives  
False negatives  
Caregiver makes mistakes because too complex for the average caregiver  
Alarms are too faint/too loud

## CAUSES

Alarms are not configured properly and or misunderstood by the caregiver  
Manufacturer of device did not manufacture the other components of the system and/or did not approach the design from systems perspective

## ALARMS Defining the Problem

### EXPLANATIONS

1.

Is the patient comfortable?  
Trembling patient (because the room is cold, or because of apprehension, from a number of things: scared, worried, being sick, actual disease state, constant alarms in the room) will cause artifacts and display on the monitoring screen. Somatic tremor looks like 60 Hertz interference. Will cause false (nuisance) alarms.  
Other forms of patient movement (sleeplessness because patient is not used to the bed, pain, other noises on the floor) will cause false alarms.  
Sometimes patient tries very hard to stay still (to not trigger alarms) and caused his/her vitals to violate alarm thresholds. Are the alarm thresholds appropriately set for the type of patient? Can staff demonstrate that they understand the alarm configurations and appropriately adjust? Are they empowered to do so?

2.

This is the most **critical** part of the system.  
Patient electrodes (disposable ECG electrodes), transducers, sensors, lead wires and cables must be carefully chosen with representation from, physicians, nurses, clinical engineers, patient safety managers, and purchasing. Do they meet ANSI standards? These devices must be compatible with the patient and selected for short term vs long term use, they must be compatible with the monitoring systems and the peripheral devices.

**1.  
PATIENT**

FAILURE MODE

Source of artifacts, poor signal and false alarms.

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Trembling  
Obese

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HF-T 1, 2 & 3

HF- F 1, 2, 3, 6, & 8

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2.

PATIENT INTERFACES

Sensors, electrodes, transducers, lead wires, cables. Proper placement

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Transducers are not calibrated/ not compatible with the amplifiers.

CAUSES

Poor quality electrodes

Diaphoretic patient

Improper placement

Patient's skin not properly prepped

In a hurry

Not really understanding the idiosyncrasies of the system

Improper calibration of sensors/transducers

ROOT CAUSES

HF - C 14

HF - T 1, 3, 6, 8

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E 6, 7, 8, 15, 16, 20

SOLUTIONS

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**MONITORING SYSTEMS  
&  
PERIPHERAL DEVICES**

**Initial setup**

**Upgrades**

FAILURE MODE

Too many alarms

False positives

False negatives

Caregiver makes mistakes because the monitoring system has become too complex for the average caregiver

Alarms are too faint/too loud

CAUSES

Alarms are not configured properly and or misunderstood by the caregiver

Manufacturer of device did not manufacture the other components of the system and/or did not approach the design from systems perspective

**4.**  
**ENVIRONMENT**  
**Noise level of area**  
**Room layout**

5.

STAFFING ISSUES

Patient to Nurse Ratio

Logistics

Training

False Norms