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Early detection of patient deterioration and the impact to the general wards

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USE CASE: Protecting Ward Patients

It's not that patients suddenly deteriorate, it's that caregivers suddenly notice.



USE CASE: Protecting Ward Patients

Early detection of patient deterioration to optimize patient safety on the wards is critically important



Globally, *eight patients per minute die within 30 days* of surgery each year. (Lancet 2019¹) Sepsis interventions are time-sensitive and must be instituted early to achieve better outcomes. (J Intensive & Crit Care 2016³)

For many patients *there is ample time prior to cardiac arrest* to provide potentially life-saving interventions. (CHEST 2012²)





Most post-operative deaths occur on the wards. (Lancet 2012⁴)



In one study, over half of adult in-hospital cardiac arrests occurred on the general wards. (Resuscitation 2014⁵)



USE CASE: Protecting Ward Patients

Relying on manual spot checks is suboptimal and can increase the risk of patient deterioration & safety issues

In one study, *nurses doing spot checks missed 90% of hypoxemic events*. (Anesth Analg 2015⁶)



Respiratory events can occur despite regular spot checks



In another study, *at least 42% of patients had been checked by the nurse* within two hours of a respiratory depression event. (*Anesth Analg* 2015⁶)



The Importance of Respiratory Rate

Early Predictor



RR is an important predictor of potentially serious clinical events, including in-hospital mortality⁷

RR is the highest ranked variable in models predicting clinical deterioration in the wards⁸

A Growing Problem



Inadequate monitoring for respiratory depression in patients receiving opioids is a **top 10 patient safety concern⁹**

Patient Outcomes



General ward patients with respiratory compromise are **29 times more likely to die**.¹⁰

Perioperative death is a leading cause of death in the United States.¹¹

A Cost Driver



Respiratory compromise is the **third most rapidly increasing hospital inpatient cost** in the United States.¹⁰





Reinventing the Respiratory Rate Parameter





Greater than 99% Accuracy¹²





TruSignal RRdv[™] – Reinventing the RR Parameter Accuracy, low alarm burden, patient comfort and patient mobility





Range and proportions of RR values recorded with capnography (CO2) and the wearable sensor in 36 ward patients



Patient Monitoring as IoMT





Barriers to Wireless Monitoring

A Delicate Balance



	GE MBAN Byndr™ Protocol	Bluetooth®	Zigbee	Wi-Fi [®]
Low power	۲ (j)			
Frequency diversity	ے ا	شک		
Bond latency	ے ا	شک	ش	
Sensor capacity	<u></u>	شک	ش	
Sensor pairing	ے ا			
Data bandwidth	شک	Ш́Ь		ش

Poor

Good Good Fair

GE Healthcare MBAN Byndr Protocol:

- Deterministic protocol
- Robust and reliable
- Adaptive frequency hopping



Portrait Mobile[™]

Wireless and Wearable





Portrait Mobile Ecosystem and Dataflow





Robust wireless connectivity with a novel architecture Short-range Medical Body Area Network (MBAN) communication



Proprietary MBAN protocol from sensors to monitor

- GE Healthcare's proprietary Byndr[™] protocol running on MBAN spectrum designed to meet clinical workflow, latency, reliability and power draw requirements.
- Adaptive Frequency Hopping allows sensors to hop to a different frequency to ensure high quality, continuous data delivery.
- Reliable continuous monitoring of patients even with unexpected network dropouts; data syncing back to the network.
- Smart workflow for clinical users, MBAN link created through NFC touch-pairing.

Patient Monitor can remain docked while patient is inroom



Patient Monitor easily accompanies the patient when ambulating outside the room





Portrait Mobile ecosystem

Patient-Centered Monitoring







Wireless Respiration (semidisposable)



Bedside charger; Patient Mobile Monitor & rechargeable batteries



Portrait Mobile Monitor – wireless bedside monitor

Flexible Infrastructure



Edge services



Wi-Fi



On-premise computing infrastructure

Management





Ward optimized Viewer Software solution (24 patients per display)

Provider-Centered Data

IHE-based alarm notifications

Clinical **Alarming Unit**





Integrating with other hospital networks

Seamless integration

By adopting IHE/HL7[®] standards, Portrait Mobile can easily integrate with EMR systems to enable ADT workflows for admit and discharge, publish clinical documentation to patient records, or connect with other third-party platforms such as a distributed alarm system.

Epic MEDITECH **Security**



001-107 Williams, Patricia 🛩

100% @



Integrating with other hospital networks

Leverage existing IT infrastructure such as WLAN access points and LAN wiring.

Portrait Mobile Monitor communicates over WLAN

Patient worn sensors wireless communicate with the Portrait Mobile Monitor using MBAN The Portrait Viewer runs on a hospital provided PC and provides real-time data, trends, and alarms for up to 48 patients. The Portrait Core Services server manages bi-directional communication, integrating EMR data, providing real time data and trending to the central viewer.

Leverage Existing Infrastructure

Portrait Mobile's routable communications architecture enables hospitals to leverage their existing network infrastructure when deploying the system, reducing installation and maintenance costs.



Portable Mobile Monitoring Solution







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Introducing Portrait Mobile Usability study results¹³





90% agree that they feel more reassured about their patient's condition when continuous monitoring is used versus vital signs spot check measuring. 99% agree that Portrait Mobile can help in earlier detection of patient deterioration than routine

observation.





76% agree they are more confident in assessing respiratory function using Portrait Mobile.



Greater than **99%** measurement accuracy²²

Unique TruSignal RRdv[™] technology has been shown to be very accurate when compared to capnography.



I had no problems at all. I didn't even notice they were there."

- Hospital ward patient, when asked about the sensors' comfort



References and Citations

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