

Medtronic

Patient Monitoring

Always on watch

Patient safety is at the heart of what we do.

Our suite of innovative technologies and ongoing support can help you streamline workflow, reduce costs, and protect patients – in-hospital and hospital-to-home.

Medtronic's Patient Monitoring products should not be used as the sole basis for diagnosis or therapy and are intended only as an adjunct in patient assessment.



Our vision

Today, we help reduce the risk of dangerous and costly patient complication in the hospital. But we won't stop there. We will use real-time data and artificial intelligence to support our patients from hospital to home. Our solutions will enable clinicians to predict and prevent complications, reducing costs, and improving outcomes.

At Medtronic, we're transforming the future of health monitoring.

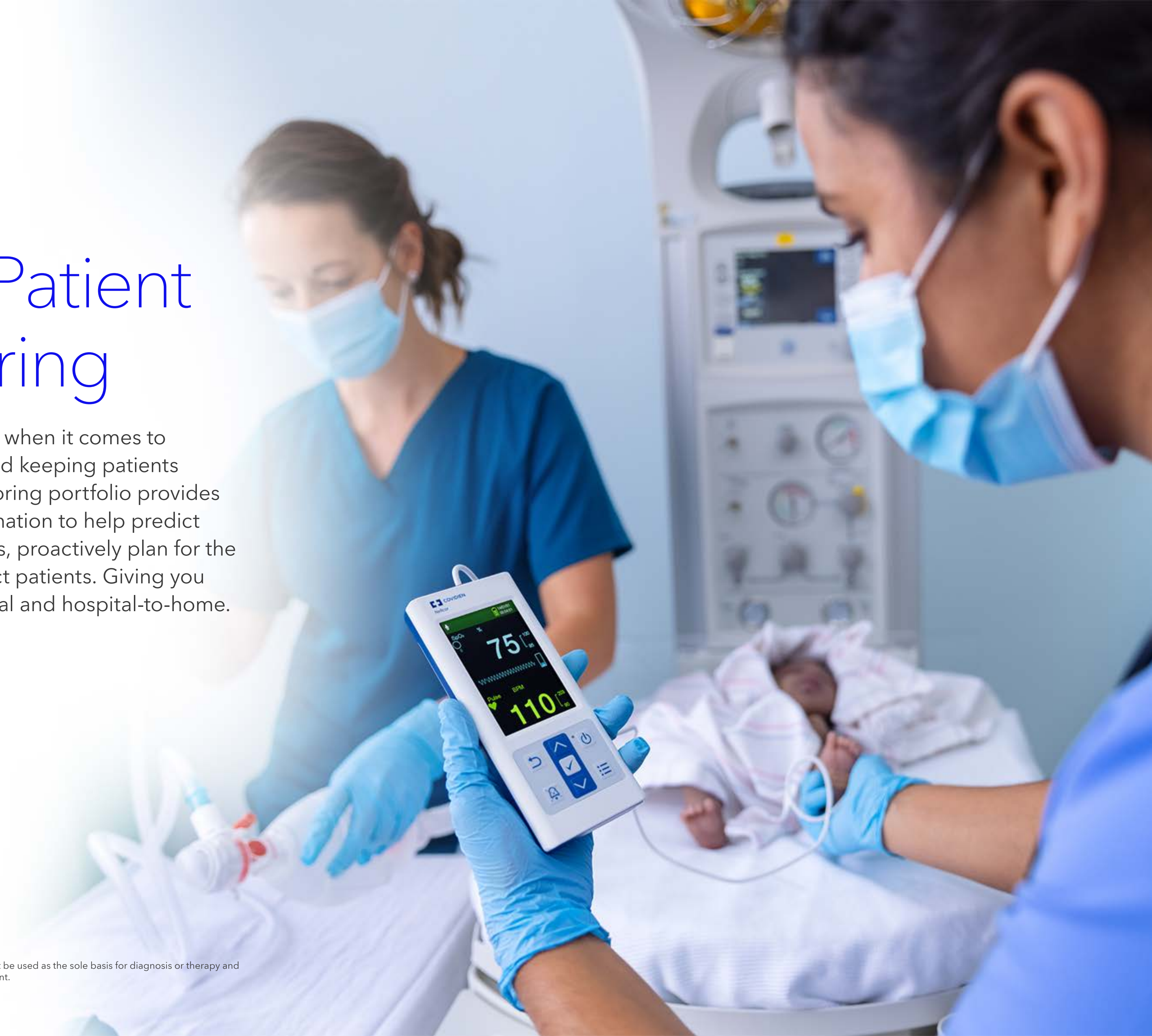
We empower clinicians and patients with actionable insights to personalize care – anytime, anywhere.



About Patient Monitoring

Every decision is critical when it comes to supporting your staff and keeping patients safe. Our patient monitoring portfolio provides you with valuable information to help predict potential adverse events, proactively plan for the unexpected, and protect patients. Giving you more visibility, in-hospital and hospital-to-home.

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Committed to patient safety

Patient safety is at the heart of all we do. Our market-leading patient monitoring technology has been tested and verified to help you predict potential adverse events, so clinicians can respond earlier. Continuous and remote monitoring capabilities help you keep patients and staff safe, providing accurate readings to help you protect your hospital's most vulnerable patients. All backed by volumes of peer-reviewed evidence, more than 40 years of experience, and partnership with respected patient safety organizations.

Always looking out for patients.

Medtronic Patient Monitoring helps more than **100 million patients annually¹**

Driving connected care

We are transforming the future of health monitoring. Accurate and reliable technology enables your team to identify patient deterioration and intervene earlier. Greater connectivity can help reduce the cost of care and ease workload while extending monitoring from in-hospital and from hospital-to-home.

Always looking out for your team.

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Delivering value beyond the product

We're committed to helping create long-term value across your organization, while working toward meeting your individual goals. Our offerings range from customized contracts that come with equipment, consumables, and technology support tailored to your business and budget, to advanced education and training for your team.

Always looking out for you.

Our portfolio

Nellcor™ pulse oximetry monitoring system

Offers easy, fast, accurate oxygenation monitoring performance that leads to more informed decisions

Microstream™ capnography monitoring system

Delivers real-time insights on respiratory status so clinicians can intervene early and fast

RespArray™ patient monitor

Provides continuous monitoring of SpO₂ (Nellcor™ pulse oximetry) and etCO₂ (Microstream™ capnography) proprietary algorithms, plus ECG, NiBP, and temperature

INVOS™ regional oximetry system

Allows for quick identification of hemodynamic changes and deteriorating patient conditions

BIS™ brain monitoring system

Monitors depth of sedation to help you determine and administer the precise amount of anesthesia



HealthCast™ Vital Sync™ remote patient monitoring system

Enables remote monitoring so providers can respond proactively, through EMR connectivity that leverages existing hospital networks/software

BioButton®* multi-parameter wearable device

Extends patient monitoring in-hospital and hospital-to-home

HealthCast™ services

Facilitates setup of newly purchased monitoring devices, annual technical service assistance, and complete support to connect monitoring devices to your EMR

*Third-party brands are trademarks of their respective owners.
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Never miss a beat

Nellcor™ pulse oximetry monitoring system

Empower staff to be always looking out for their most vulnerable patients by providing quick and reliable information. We look at every heartbeat to help ensure that readings are sensitive and timely, even in the most challenging monitoring conditions.†

- Trusted by clinicians for 30+ years for simple-to-use, fast, accurate, and consistent pulse oximetry performance that leads to confident decisions
- Helps you manage the challenges of your most vulnerable patients with stable and accurate readings
- Includes personalized and ongoing customer service, free education, and seamless product integration



Nellcor™ MaxA
SpO₂ sensor



Nellcor™ OxySoft™ SpO₂
sensor



Nellcor™ non-adhesive
SpO₂ sensor



Nellcor™ SpO₂
forehead sensor with
OxiMax™ technology



†The Nellcor™ pulse oximetry monitoring system should not be used as the sole basis for diagnosis or therapy and is intended only as an adjunct in patient assessment. Oxygen saturation accuracy can be affected by certain environmental, equipment, and patient physiologic conditions (as discussed in the operator's manual for the monitor) that influence readings of SpO₂. Please consult the IFU & manual for full safety information.

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Detect early. Act fast.

Microstream™ capnography monitoring system

Addressing respiratory compromise begins with detecting it – the earlier, the better. By raising accurate alarms at the earliest sign of trouble, Microstream™ capnography helps you identify and react to developing respiratory compromise before it becomes a problem.

- Critical insights help alert staff to respiratory compromise early so they can act fast, keeping patients safe
- Proprietary Smart Capnography™ algorithms are engineered to enhance patient safety, improve clinical workflow, and ease alarm fatigue by reducing clinically insignificant nuisance alarms by 53%²
- A median-sized hospital could save \$535,531 per year and reduce the average length of stay by 103 days when continuously monitoring high-risk patients on opioids in medical-surgical units with Microstream™ capnography and Nellcor™ pulse oximetry^{3,†}



Microstream™
Advance long-term
filter lines



Microstream™
Advance short-term
filter lines



OxyMask™ etCO₂
with Microstream™
connector

[†]This assumes a 20% respiratory depression reduction and an annual general care floor volume of 2,447 patients receiving opioids per median-sized hospital. 90% of surgical patients and 45% of medical patients on U.S. general care floors receive opioids. Continuous pulse oximetry and capnography device pricing assumptions used list pricing for the following: a Capnostream™ 35 portable respiratory monitor prorated over 7 years; a Microstream™ capnography filter line, and a disposable Nellcor™ pulse oximetry sensor, resulting in \$52.73 in device costs per continuously monitored patient stay on a medical surgical floor. For intermittent pulse oximetry monitoring, device pricing consisted of a multiparameter monitor prorated over 7 years and a reusable pulse oximetry sensor, resulting in \$0.68 in device costs per patient stay. Additional information on pricing and assumptions are available in the study publication.

Safety made simple

RespArray™ patient monitor

Your hospital's unwavering commitment to keep every patient safe can be challenging. With the RespArray™ patient monitor, staff can continuously monitor every patient from anywhere in the hospital, including when used with Vital Sync™ remote continuous monitoring. Designed for procedural sedation and in areas of care where spot checking might not be enough, this solution helps clinicians detect respiratory compromise early and intervene sooner.

- 90% of prolonged desaturations ($\text{SpO}_2 < 90\%$) go unrecognized by intermittent monitoring⁴
- Features simple connectivity and seamlessly integrates into workflow so staff will have more time to focus on patients
- Provides optimal value with next-level support, education, and training that effectively reduce adverse events and enable your team to deliver exceptional patient care⁵



Because seconds matter

INVOS™ regional oximetry system

Rely on the clinical reference standard⁶ as a first alert to regional desaturation. The INVOS™ regional oximetry system is designed to give you the confidence to intervene when an informed, rapid response is critical – a core component in successful patient outcomes.

- Expedite interventions^{7,8}
- Help reduce postoperative complications including cognitive decline⁹, major organ morbidity and mortality (MOMM)¹⁰, strokes^{10,11}, and renal failure^{10,12}
- Help reduce length of ICU and hospital stays^{9,10,13} and contribute to a lower cost of care^{10,11,12}



Anesthesia personalized

BIS™ brain monitoring system

Personalized anesthesia helps you deliver a tailored, well-balanced anesthetic that protects patients during procedures. It also helps your patients avoid postoperative complications for a smoother, expedited recovery.^{14,15}

- BIS™ brain monitoring system helps you provide individualized anesthetic for every patient
- Features a density spectral array (DSA) with visual display of EEG bands
- Can help patients be discharged sooner from the PACU¹⁶
- Helps reduces anesthesia use by as much as 38%¹⁵⁻²¹ – for potentially lower cost of care

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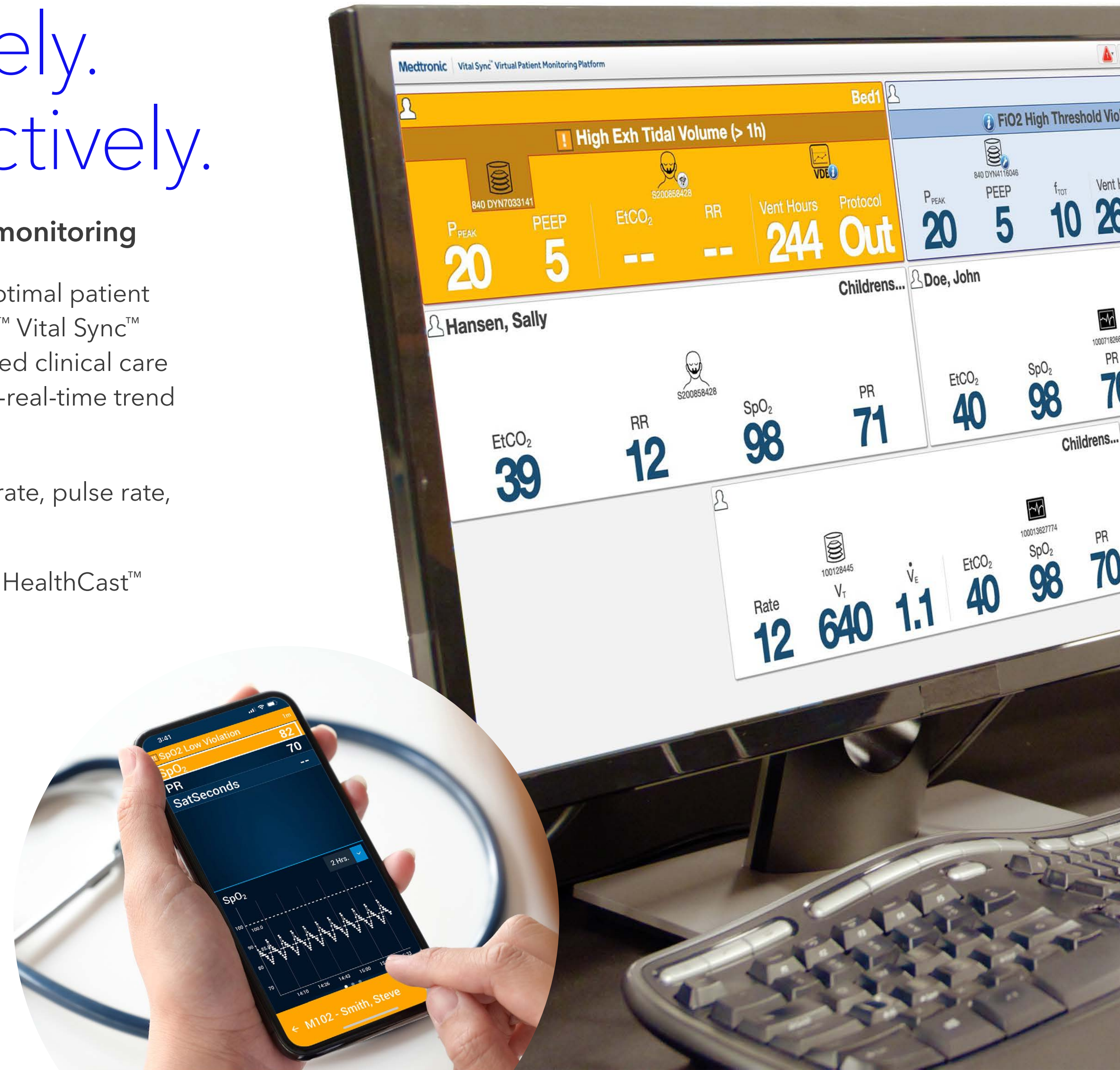
Monitor remotely. Respond proactively.

HealthCast™ Vital Sync™ remote patient monitoring

Help improve clinical workflow and promote optimal patient safety throughout the hospital. The HealthCast™ Vital Sync™ system mobile app version 3.0 enables enhanced clinical care with access to smart, actionable data, and near-real-time trend and alert data on any web-enabled device.[†]

- Remotely monitor patient SpO₂, respiratory rate, pulse rate, etCO₂, vital signs, and ventilator data
- Automatically admit and discharge from the HealthCast™ Vital Sync™ system or mobile app
- Integrates with your existing EMR, ADT, and alarm annunciation systems

[†]Mobile app version 3.0 is only compatible with HealthCast™ Vital Sync™ platform version 3.0. Medtronic's Patient Monitoring products should not be used as the sole basis for diagnosis or therapy and are intended only as an adjunct in patient assessment.



Helping you prioritize. When everything is a priority.

BioButton®* multi-parameter wearable device

Stay connected with hourly trends on 20+ biometrics with this small, non-invasive wearable built to track and capture 1,440 vital sign measurements per day.† The BioButton®* device is designed to help you prioritize care and identify patients ready for discharge, enabling mobility as they transition from hospital to home.

- Simplifies workflow, reduces manual vital sign collection, and improves patient and staff satisfaction
- Monitors temperature, respiratory rate at rest, and heart rate at rest, which can serve as predictors of deterioration²²⁻²⁴
- Allows for freedom of movement, eliminating need to disconnect from a bedside monitor to get out of bed, move around, or use the restroom
- Integrates with existing EMR systems

*Third-party brands are trademarks of their respective owners.

†The BioButton® multi-parameter wearable device is not intended for critical care monitoring.

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Support through every stage

HealthCast™ services

Our HealthCast™ services team will tailor support to your needs, with Delivery Assist, EMR Connect, technical training, and more.

- With Delivery Assist, our team will set up monitors, assist Biomed with asset tagging, perform initial device configurations, and establish default settings in line with hospital protocol
- After implementation, get the most out of your investment with additional technical training for IT and Biomed at any time
- An EMR Connect consultation assesses your device EMR connectivity needs followed by a comprehensive outline of our complete connectivity service recommendation – customized for your facility

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Your dedicated partner

Taking care of you and your patients is what we do. Our ongoing partnership provides you with more than just the right products. We include advanced education and training opportunities, strategic industry collaborations, and societal alliances focused on patient safety initiatives.

With Medtronic Patient Monitoring as your dedicated partner, we help you focus on your top priorities – supporting staff, improving efficiency, and keeping patients safe.

Partnership



Education and training

Offering more than 120 accredited and non-accredited courses available by care setting, clinical discipline, and technology, we are proud to be a trusted partner in helping clinicians meet their educational and training needs. See why 4,500+ clinicians participate in our training and education opportunities annually.

Partnership

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Strategic partnerships

We bring market-leading technology to more than 70 OEM partners so you get a monitoring technology partnership that offers integration-ready OEM platforms from a single source. We offer access to ground-breaking technology, giving clinicians the ability to choose their preferred respiratory function and advanced parameter monitoring technology.

Partnership

We're proud to work with these organizations

Medtronic Patient Monitoring has invested more than \$7 million toward foundations that focus on patient safety initiatives. Through our corporate partnerships with globally recognized, trusted organizations, Medtronic works to move the field forward and foster innovation in patient safety across the world.



Partnership

1. https://medtronic-promomats.veevavault.com/ui/#doc_info/50961/1/0.

2. Hockman S, Glembot T, Niebel K. Comparison of capnography derived respiratory rate alarm frequency using the SARA algorithm versus an established non-adaptive respiratory rate alarm management algorithm in bariatric surgical patients. *Resp Care*. 2009 Open Forum Abstract; December 2009.

3. Khanna, A.K., Jungquist, C.R., Buhre, W. et al. Modeling the Cost Savings of Continuous Pulse Oximetry and Capnography Monitoring of United States General Care Floor Patients Receiving Opioids Based on the PRODIGY Trial. *Adv Ther* 38, 3745–3759 (2021).

4. Sun Z, Sessler DI, Dalton JE, et al. Postoperative Hypoxemia Is Common and Persistent: A Prospective Blinded Observational Study. *Anesth Analg*. 2015;121(3):709-715. doi:10.1213/ANE.0000000000000836.

5. Williams, Jill S. Opioid Safety & Patient Monitoring Conference Compendium. The National Coalition to Promote Continuous Monitoring of Patients on Opioids. *JSW Communications*. November 2014.

6. Yu Y, Zhang K, Zhang L, et al. Cerebral near-infrared spectroscopy (NIRS) for perioperative monitoring of brain oxygenation in children and adults (review), Cochrane Library, Cochrane Database of Systematic Reviews - Intervention Version, 2018, Issue 1. Art. No.: CD010947, DOI: 10.1002/14651858.CD010947.pub2.

7. Moerman A, Vandenplas G, Bové T, Wouters PF, De Hert SG. Relation between mixed venous oxygen saturation and cerebral oxygen saturation measured by absolute and relative near-infrared spectroscopy during off-pump coronary artery bypass grafting. *Br J Anaesth*. 2013;110(2):258-265.

8. Prabhune A, Sehic A, Spence PA, et al. Cerebral oximetry provides early warning of oxygen delivery failure during cardiopulmonary bypass. *J Cardiothorac Vasc Anesth*. 2002;16(2):204-206.

9. Slater JP, Guarino T, Stack J, et al. Cerebral oxygen desaturation predicts cognitive decline and longer hospital stay after cardiac surgery. *Ann Thorac Surg*. 2009;87(1):36-44.

10. Murkin JM, Adams SJ, Novick RJ, Quantz M, Bainbridge D, Iglesias I, Cleland A, Schaefer B, Irwin B, Fox S. Monitoring brain oxygen saturation during coronary bypass surgery: a randomized, prospective study. *Anesth Analg*. 2007;104(1):51-58.

11. Goldman SM, Sutter FP, 9. Wertan MC, Ferdinand FD, Trace CL, Samuels LE. Outcome improvement and cost reduction in an increasingly morbid cardiac surgery population. *Sem Cardiothorac Vasc Anesth*. 2006;10(2):171-175.

12. Theodoro D, Palmer R. Improving value through cerebral oximetry monitoring: Mitigating surgical complications in the cardiac operating room. *Harvard Health Policy Review*. Jan 7 2018; Accessed online Oct 2 2018. <http://www.hhpronline.org/articles/2018/1/7/improving-value-through-cerebral-oximetry-monitoring-mitigating-surgical-complications-in-the-cardiac-operating-room>.

13. Casati A, Fanelli G, Pietropaoli P, et al. Continuous monitoring of cerebral oxygen saturation in elderly patients undergoing major abdominal surgery minimizes brain exposure to potential hypoxia. *Anesth Analg*. 2005;101(3):740-747.

14. Punjasawadwong Y, Chau-In W, Laopaiboon M, Punjasawadwong S, Pin-On P. Processed electroencephalogram and evoked potential techniques for amelioration of postoperative delirium and cognitive dysfunction following non-cardiac and nonneurosurgical procedures in adults. *Cochrane Database Syst Rev*. 2018;5:CD011283. Hall D, Steel A, Heij R, Eley A, Young P. Video laryngoscopy increases ‘mouth-to-mouth’ distance compared with direct laryngoscopy. *Anaesthesia*. 2020. doi:10.1111/anae.15047.

15. Lewis SR, Pritchard MW, Fawcett LJ, Punjasawadwong Y. Bispectral index for improving intraoperative awareness and early postoperative recovery in adults. *Cochrane Database Syst Rev*. 2019;9(9):CD003843.

16. Lohse J, Kriege M, Alflen C, Noppens R. Video laryngoscopy vs. direct laryngoscopy - Influence of the training status on the performance in both settings: An interim evaluation of a prospective, randomized, clinical trial. *Trends in Anaesthesia and Critical Care*. 2017;12:18. doi:10.1016/j.tacc.2017.01.011.

17. Chan MTV, Cheng BCP, Lee TMC, et al. BIS-guided anesthesia decreases postoperative delirium and cognitive decline. *J Neurosurg Anesthesiol*. 2013;25(1):33–42.

18. Gan T, Glass P, Windsor A, et al. Bispectral index monitoring allows faster emergence and improved recovery from propofol, alfentanil, and nitrous oxide anesthesia. *Anesthesiology*. 1997;87(4):808–815.

19. Punjasawadwong Y, Phongchiewboon A, Bunchungmongkol N. Bispectral index for improving anaesthetic delivery and postoperative recovery (Review). *Cochrane Database Syst Rev*. 2014;17;(6):CD003843.

20. Liu SS. Effects of bispectral index monitoring on ambulatory anesthesia: a metaanalysis of randomized controlled trials and a cost analysis. *Anesthesiology*. 2004;101(2):311-5.

21. Song D, Joshi GP, White PF. Titration of volatile anesthetics using bispectral index facilitates recovery after ambulatory anesthesia. *Anesthesiology*. 1997;87(4):842-8.

22. Cretikos M, Chen J, Hillman K, Bellomo R, Finfer S, Flabouris A. The objective medical emergency team activation criteria: a case-control study. *Resuscitation*. Apr 2007;73(1):62-72.

23. Varela M, Ruiz-Esteban R, Martinez-Nicolas A, Cuervo-Arango JA, Barros C, Delgado EG. ‘Catching the spike and tracking the flow’: Holter temperature monitoring in patients admitted in a general internal medicine ward. *Int J Clin Pract*. Dec 2011;65(12):1283-8. doi:10.1038/s41598-021-82771-7.

24. Sun L, Joshi M, Khan SN, Ashrafian H, Darzi A. Clinical impact of multiparameter continuous non-invasive monitoring in hospital wards: a systematic review and meta-analysis. *J R Soc Med*. Jun 2020;113(6):217-224.

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