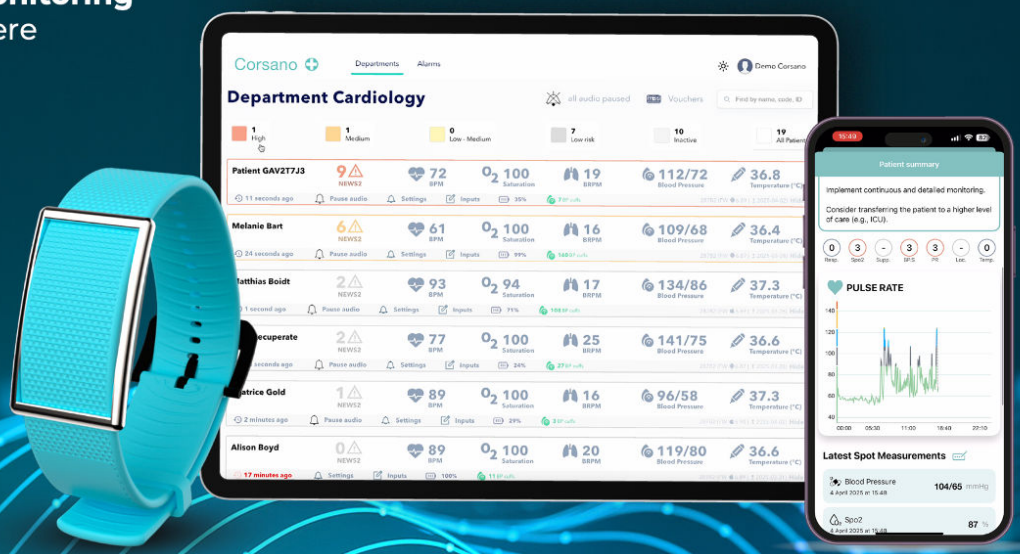
Corsano

Continuous Patient Monitoring
Anytime, Anywhere



White Paper

The Economic and Clinical Case for Continuous Patient Monitoring

Evidence-Based Analysis for Hospital C-Level Leadership

Reducing Healthcare Costs, Hospital Readmissions,
Healthcare Professionals' Burden, and Patient Mortality

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Executive Summary

Hospital general wards face a critical patient safety gap: vital signs are typically checked every 4-6 hours, leaving patients unmonitored approximately 95-96% of the time. This intermittent monitoring approach fails to capture deterioration between scheduled observations, contributing to preventable adverse events, unplanned ICU transfers, extended hospital stays, and mortality.

The magnitude of this challenge is substantial. **The Lancet Commission on Global Surgery estimated that at least 4.2 million people die within 30 days of surgery worldwide each year.**[1] The VISION study found that 69.9% of 30-day postoperative deaths occur in general wards, precisely where monitoring is least frequent.[2]

This white paper synthesizes peer-reviewed evidence demonstrating that continuous vital sign monitoring with wearable technology delivers measurable improvements across four critical dimensions: healthcare cost reduction, decreased hospital readmissions, reduced burden on healthcare professionals, and improved patient outcomes including mortality reduction.

Key Findings from the Evidence Base:

- **Cost Savings:** Potential savings of $6.8 million annually for an average-sized US community hospital; 16% reduction mean total patient cost
- **Readmission Reduction:** Up to 58% reduction in days lost to cardiovascular rehospitalizations
- **Nursing Efficiency:** More than 8,000 avoided bedside nursing visits for 2,000 patients
- **Clinical Outcomes:** Code blue and mortality rates decreased from 7% to 1%

The Corsano CardioWatch 287-2 System represents the next generation of continuous monitoring technology. CardioWatch is a CE-MDR certified and FDA 510(k) cleared medical-grade wearable that provides 24/7 monitoring of up the key vital parameters, seamlessly integrating into hospital workflows and extending monitoring from admission through post-discharge recovery.

1. The Case for Change: Why Intermittent Monitoring Falls Short

The Monitoring Gap on General Wards

Intermittent monitoring of vital signs, typically coupled with an early warning score, remains the standard of care in most general and surgical wards.[3] This approach presents significant limitations that directly impact patient safety and operational efficiency.

Critical Limitations of Intermittent Monitoring:

- **Time Between Checks:** 4-6 hour intervals may be too long for timely recognition of clinical deterioration[4,5]
- **Snapshot Limitations:** Spot checks provide only a point-in-time view, preventing meaningful trend analysis[6]
- **Nursing Burden:** Manual vital sign collection places significant burden on already stretched nursing capacity[4]
- **Sleep Disruption:** Nightly checks disrupt patient rest and recovery[7]
- **Discharge Limitations:** Current technology cannot extend monitoring post-discharge, potentially prolonging hospitalization[6]

2. Evidence for Healthcare Cost Reduction

Multiple peer-reviewed studies have proven the economic benefits of continuous vital sign monitoring. The evidence base includes both conventional monitoring devices and the newer generation of portable and wearable solutions.

Study 1: Beard et al. (2023)

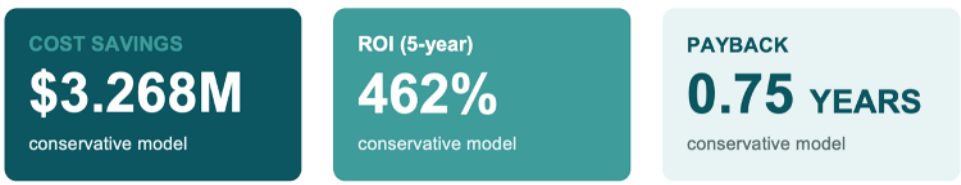
Study Design: Cost-savings analysis for an average-sized U.S. community hospital (153 beds) over a 1-year time horizon, comparing continuous vital sign monitoring (SpO_2, HR, RR) versus standard intermittent measurements.

Key Finding: Potential cost-savings of over **$6.8 million** per year in an average-sized US community hospital through improved patient outcomes via continuous monitoring implementation.

Source: Beard JW, Sethi A, Jiao W, et al. Cost savings through continuous vital sign monitoring in the medical-surgical unit. Journal of Medical Economics. Taylor & Francis; 2023;26:760–768.

Study 2: Slight et al. (2014)

Study Design: Before-and-after implementation study on a 33-bed medical-surgical unit comparing 9-month pre- and post-implementation periods of continuous monitoring.



Key Finding: Implementation was associated with a **highly positive return on investment**, supporting accelerated adoption across remaining inpatient non-ICU wards.

Source: Slight SP, Franz C, Olugbile M, Brown HV, Bates DW, Zimlichman E. The Return on Investment of Implementing a Continuous Monitoring System in General Medical-Surgical Units. Critical Care Medicine. 2014;42:1862.

Study 3: Khanna et al. (2021)

Study Design: Decision tree model comparing intermittent pulse oximetry versus continuous pulse oximetry and capnography monitoring for 2,447 patients receiving opioids on general care floors.

Key Finding: **Continuous monitoring has a high chance of being cost-effective** compared to intermittent pulse oximetry for general care floor patients receiving opioids.

Source: Khanna AK, Jungquist CR, 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. 2021;38:3745–3759.

Study 4: Javanbakht et al. (2020)

Study Design: Cost-utility analysis of continuous monitoring with wearable sensors (SensiumVitals) in addition to intermittent monitoring compared to usual care for surgical ward patients.

Key Finding: **Continuous wearable monitoring is a cost-saving and cost-effective strategy**, yielding improvements in recovery with decreased health resource use.

Source: Javanbakht M, Mashayekhi A, Trevor M, et al. Cost utility analysis of continuous and intermittent versus intermittent vital signs monitoring in patients admitted to surgical wards. Journal of Medical Economics. Taylor & Francis; 2020;23:728–736.

Study 5: Javanbakht et al. (2022)

Study Design: Cost-utility analysis of automatic respiratory rate monitoring with wearable sensors (RespiraSense) plus intermittent nurse-led monitoring versus intermittent monitoring alone for pneumonia patients.

Key Finding: **Automatic respiratory rate monitoring could be a cost-saving and cost-effective intervention** when minimum clinical thresholds are met.

Source: Javanbakht M, Moradi-Lakeh M, Mashayekhi A, Atkinson J. Continuous Monitoring of Respiratory Rate with Wearable Sensor in Patients Admitted to Hospital with Pneumonia Compared with Intermittent Nurse-Led Monitoring in the United Kingdom: A Cost-Utility Analysis. Pharmacoecon Open. 2022;6:73–83.

Study 6: Treskes et al. (2022)

Study Design: Randomized trial of acute myocardial infarction patients comparing eHealth intervention (blood pressure monitor, weight scale, ECG device, step counter, e-visits) versus regular follow-up.

Key Findings:

Metric	Intervention	Standard Care	Difference
Mean total costs per patient	€2,417	€2,888	-16.3%
Patient-related costs	€426	€570	-25.3%
In-office outpatient visits	2.1	4.1	-48.8%
Quality of Life Score	0.74	0.69	+7.2%

Source: Treskes RW, Marle ME van den A, Winden L van, et al. The Box—eHealth in the Outpatient Clinic Follow-up of Patients With Acute Myocardial Infarction: Cost-Utility Analysis. Journal of Medical Internet Research. JMIR Publications Inc., Toronto, Canada; 2022;24:e30236.

2.7 Study 7: Kraal et al. (2017)

Study Design: Randomized trial of 90 low-to-moderate cardiac risk patients comparing 3 months of home-based training with telemonitoring versus centre-based training.

Key Findings:

- **Healthcare costs lower by €437 per patient** in home-based group
- **Societal perspective savings of €3,160 per patient** in favor of home-based group
- **Probability of cost-effectiveness: 75-97%** across willingness-to-pay thresholds

Source: Kraal JJ, Van den Akker-Van Marle ME, Abu-Hanna A, Stut W, Peek N, Kemps HM. Clinical and cost-effectiveness of home-based cardiac rehabilitation compared to conventional, centre-based cardiac rehabilitation: Results of the FIT@Home study. Eur J Prev Cardiol. 2017;24:1260–1273.

3. Evidence for Hospital Readmission Reduction

Hospital readmissions represent a significant financial burden and quality concern. The average U.S. hospital readmission rate is approximately 14.5%,[8] with annual costs exceeding $52 billion.[9] Continuous monitoring extends the care continuum beyond discharge, yielding substantial readmission reductions.

Study 8: Frederix et al. (2016)

Study Design: Multi-centre randomized controlled trial of 140 cardiac rehabilitation patients randomized 1:1 to 24-week telerehabilitation plus conventional cardiac rehabilitation versus conventional rehabilitation alone.

Key Findings:

- **The number of days lost due to cardiovascular rehospitalizations was significantly lower** in the intervention group (0.33 ± 0.15) than in the control group (0.79 ± 0.20) (p = 0.037). This represents a 58% reduction in days lost to cardiovascular rehospitalizations.
- Total average cost per patient significantly lower in intervention group: €2,156 vs €2,720 (p = 0.01)
- Incremental cost-effectiveness ratio: €-21,707/QALY (dominant)

Source: Frederix I, Hansen D, Coninx K, et al. Effect of comprehensive cardiac telerehabilitation on one-year cardiovascular rehospitalization rate, medical costs and quality of life: A cost-effectiveness analysis. Eur J Prev Cardiol. 2016;23:674–682.

Study 9: Dawson et al. (2021)

Study Design: Randomized controlled trial in 1380 patients at high risk for readmission receiving 30-day telemonitoring after discharge or standard care

Key Findings:

- **Telemonitoring reduced 30-day readmission or death among high-risk patients** compared with usual care (18.2% vs 23.7%; absolute risk difference −5.5% [95% CI −10.4 to −0.6%]; RR 0.77 [95% CI 0.61–0.98]; P = 0.03)

- **Emergency department visits within 30 days were lower** in the telemonitoring group than in the control group (8.6% vs 14.2%; absolute risk difference −5.6% (95% CI −9.4 to −1.8%); RR 0.61 (95% CI 0.42–0.87); P = 0.005)

Source: Dawson NL, Hull BP, Vijapura P, et al. Home Telemonitoring to Reduce Readmission of High-Risk Patients: a Modified Intention-to-Treat Randomized Clinical Trial. J Gen Intern Med. 2021;36:3395–3401.

Study 10: Stergiopoulos et al. (2024)

Study Design: A systematic review of studies using telemonitoring to assess its impact on hospital readmission rates, including patients with COPD.

Key findings:

- For **all-cause readmissions**, 100% of reports showed a decrease in readmissions in the telemedicine group.
- For **readmissions due to acute COPD exacerbations**, 67% of reports showed a statistically significant decrease in the telemedicine group.

Source: Stergiopoulos GM, Elayadi AN, Chen ES, Galiatsatos P. The effect of telemedicine employing telemonitoring instruments on readmissions of patients with heart failure and/or COPD: a systematic review. Front Digit Health [online serial]. Frontiers; 2024;6.

Study 11: Umeh et al. (2022)

Study Design: A systematic review to determine the aggregate effect of telemonitoring on all-cause mortality, heart failure-related mortality, all-cause hospitalization, and heart failure-related hospitalization in heart failure patients.

Key findings:

- **All-cause hospitalization was reduced with telemonitoring** (RR = 0.87, 95% CI 0.80–0.94, P = 0.002)
- **Heart-failure–related hospitalization showed a trend toward reduction** (RR = 0.88, 95% CI 0.77–1.01, P = 0.066).
- **Prolonged telemonitoring (≥12 months) was associated with reductions in both all-cause and heart-failure–related hospitalization**, unlike shorter-duration telemonitoring (≤6 months).

Source: Umeh CA, Torbela A, Saigal S, et al. Telemonitoring in heart failure patients: Systematic review and meta-analysis of randomized controlled trials. World J Cardiol. 2022;14:640–656.

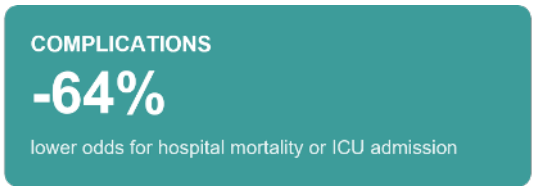
4. Evidence for Improved Clinical Outcomes

The most compelling evidence for continuous monitoring comes from studies examining hard clinical endpoints including ICU transfers, rapid response team activations, and mortality.

Study 12: Rowland et al. (2025)

Study Design: Retrospective, observational propensity-matched analysis (contemporaneous control: continuous vs intermittent monitoring). US academic medical center, 7,971 medical-ward admissions.

Key Finding: Patients receiving **intermittent vital sign monitoring had 2.79 times higher odds** (OR 2.79, 95% CI 1.89-4.25; P<0.001) of a composite outcome of **in-hospital mortality or ICU admission** compared to those with continuous wireless monitoring.



Source: Rowland B, Saha A, Motamedi V, et al. Impact on Patient Outcomes of Continuous Vital Sign Monitoring on Medical Wards: Propensity-Matched Analysis. Journal of Medical Internet Research. JMIR Publications Inc., Toronto, Canada; 2025;27:e66347.

Study 13: Rowland et al. (2024)

Study Design: Retrospective observational propensity-matched analysis of general surgical ward admissions (single tertiary US center; 2018–2019) comparing continuous wireless vital-sign monitoring versus intermittent monitoring.

Key Findings: Analysis of 34,636 surgical ward patients showed **3.42 times higher odds** (OR 3.42, 95% CI 3.19-3.67; P<0.001) of **mortality or ICU admission** with intermittent monitoring.

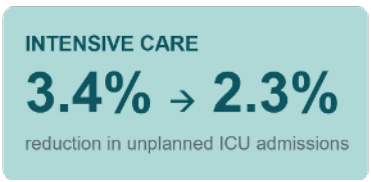
Source: Rowland BA, Motamedi V, Michard F, Saha AK, Khanna AK. Impact of continuous and wireless monitoring of vital signs on clinical outcomes: a propensity-matched observational study of surgical ward patients. British Journal of Anaesthesia. 2024;132:519–527.

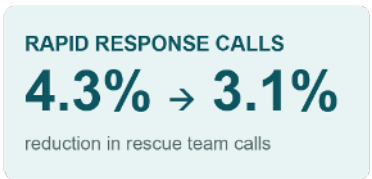
Study 14: Eddahchouri et al. (2022)

Study Design: Single-centre before-and-after cohort study at a Dutch university hospital comparing baseline vs post-implementation periods after introducing continuous wireless vital-sign monitoring using wearable monitors linked to hospital systems, in medical and surgical ward patients.

Key Findings:

- **Unplanned ICU admissions:** Reduced from 3.4% to 2.3% (P=0.03)
- **Rapid response team calls:** Reduced from 4.3% to 3.1% (P=0.02)





Source: Eddahchouri Y, Peelen RV, Koeneman M, Touw HRW, van Goor H, Bredie SJH. Effect of continuous wireless vital sign monitoring on unplanned ICU admissions and rapid response team calls: a before-and-after study. British Journal of Anaesthesia. 2022;128:857–863.

Study 15: Zubrinic et al. (2023)

Study Design: Retrospective quality improvement study (before-and-after analysis). University Health Network, Toronto, Canada - 5 hospital sites , 1’953 patients.

Key Findings:

- **Code blue and mortality rates:** Decreased from 7% to 1% in remote monitoring study
- **Avoided Nursing Bedside Visits:** 8,427 nurse visits avoided (managed by technicians via audio redirection alone)

Source: Zubrinic M, Vrbanic L, Keshavjee S. Remote telemonitoring is associated with improved patient safety and decreased workload of nurses. JTCVS Open. 2023;16:493–497.

5. The Corsano CardioWatch Solution

Corsano Health has developed the CardioWatch 287-2 System, a next-generation continuous monitoring platform that addresses the critical gaps in general ward surveillance while delivering the economic and clinical benefits demonstrated in the evidence base.

5.1 Medical-Grade Certification

- **CE-MDR Medical Certification** (European Medical Device Regulation)
- **FDA 510(k) Cleared** for US market
- **Validated algorithms** for all vital sign measurements
- **Proven in 200+ clinical trials** across cardiovascular, oncology, and stress research

kiwa MDR 2017/745 kiwa EN-ISO 13485:2016

CardioWatch 287-2 is FDA 510(k) cleared and CE certified as per Medical Device Regulation (EU) 2017/745

5.2 Comprehensive Vital Sign Monitoring

The CardioWatch 287-2 System provides continuous monitoring of Pulse Rate (PR), Oxygen Saturation (SpO_2), Respiratory Rate (RR), Cuffless Blood Pressure, Core Body Temperature, Single-Lead ECG, Heart Rate Variability, Activity/Steps, Sleep and Body Temperature.

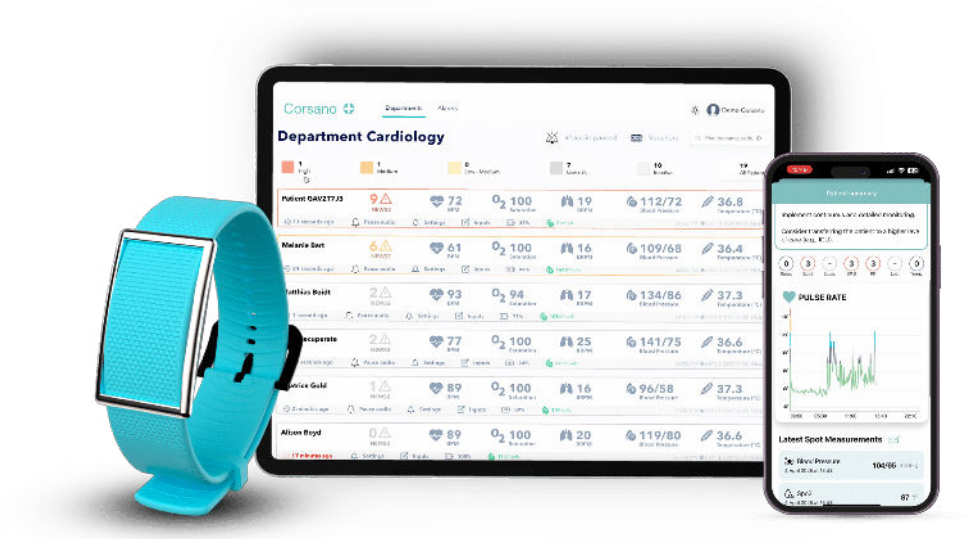


Figure 1 – *Left*: The Corsano CardioWatch 287-2. *Middle*: A tablet computer that showcases the Corsano Portal. Healthcare professionals can use it to access patient data from the ward or home. Note: The Corsano solution can be integrated to any platform via APIs and can directly communicate with hospital electronic health record systems. *Right*: A smartphone with the Corsano app installed which collects and displays trends of vital signs.

5.3 Patient-Centric Design

- **Smallest and lightest** medical patient bracelet in the world
- **7-day battery life** reducing charging burden
- **Waterproof design** allowing showering and bathing
- **Proven with 15,000+ patients** including senior population and children

6. Conclusion and Recommendations

The evidence reviewed in this white paper demonstrates a compelling case for continuous patient monitoring technology in general hospital wards. The synthesis of peer-reviewed studies shows consistent benefits across all four critical dimensions evaluated.

Dimension	Key Evidence
Cost Reduction	Continuous vital-sign monitoring delivers **up to $6.8M annual savings per average US hospital** and is repeatedly shown to be **cost-saving or dominant** versus intermittent monitoring.
Readmission Reduction	Post-discharge telemonitoring reduces **30-day readmission or death by ~23%**, **with all systematic-review evidence showing lower all-cause readmissions**.
Clinical Outcomes	Intermittent monitoring is associated with **~3× higher odds of ICU admission or in-hospital mortality** compared with continuous wireless monitoring on general wards.
HCP Burden	Remote monitoring can reduce **code blue/mortality events from 7% to 1%** and **eliminate 4.3 bedside visits per patient**, substantially lowering workload.

The convergence of clinical evidence, technological capability, and economic pressures creates a compelling mandate for action. Hospitals that implement continuous monitoring solutions position themselves to deliver safer, more efficient care while generating measurable returns on investment.

Contact Corsano Health

Website: www.corsano.com

Contact: corsano.com/contact-us

Please feel free to request a demonstration to see how CardioWatch can transform patient monitoring at your hospital.

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