

# Acumen Hypotension Prediction Index (HPI) Software

## Clinical Evidence Bibliography

### Algorithm performance

| # | Title, author, year, publication                                                                                                                                                                                                                       | Study design                         | n    | Patient population                                         | Main finding(s)                                                                                                                                                                                                                             |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Machine learning algorithm to predict hypotension based on high-fidelity arterial pressure waveform analysis<br><b>Hatib, Cannesson et al. 2018</b><br><i>Anesthesiology</i>                                                                           | Retrospective analysis               | 1334 | Cardiac and non-cardiac surgical and non-surgical patients | The results demonstrate that a machine-learning algorithm can be trained, with large data sets of high-fidelity arterial waveforms, to predict hypotension* in surgical patients' records.                                                  |
| 2 | Ability of an arterial waveform analysis- derived Hypotension Prediction Index to predict future hypotensive events in surgical patients<br><b>Davies, Scheeren et al. 2019</b><br><i>Anesthesia &amp; Analgesia</i>                                   | Retrospective analysis               | 255  | Abdominal, vascular, and off-pump CABG                     | Acumen HPI software provides an accurate real-time and continuous prediction of impending intraoperative hypotension* before its occurrence and has superior predictive ability over commonly measured perioperative hemodynamic variables. |
| 3 | Use of Hypotension Prediction Index during cardiac surgery<br><b>Shin et al. 2020</b> <i>Journal of Cardiothoracic and Vascular Anesthesia</i>                                                                                                         | Prospective cohort feasibility study | 37   | Cardiac surgery                                            | Acumen HPI software predicted hypotensive episodes* during cardiac surgeries with a high degree of sensitivity and specificity.                                                                                                             |
| 4 | Performance of a machine learning algorithm to predict hypotension in mechanically ventilated patients with COVID-19 admitted to the intensive care unit:<br>A cohort study<br><b>Van der Ven et al. 2021</b><br><i>Journal of Clinical Monitoring</i> | Prospective observational study      | 41   | Non-cardiac surgery in COVID-19 patients in the ICU        | Acumen HPI software correctly predicts hypotension* in mechanically ventilated COVID-19 patients in the ICU, and provides a basis for future studies to assess whether hypotension can be reduced in ICU patients using this algorithm.     |
| 5 | Performance of the Hypotension Prediction Index with noninvasive arterial pressure waveforms in awake cesarean delivery patients under spinal anesthesia<br><b>Frassanito et al. 2021</b><br><i>Anesthesia &amp; Analgesia</i>                         | Retrospective analysis               | 50   | Elective cesarian delivery patients                        | Acumen IQ cuff provides an accurate real-time and continuous prediction of impending intraoperative hypotension* (IOH) before its occurrence in awake patients undergoing cesarean delivery under spinal anesthesia.                        |

\* Hypotension, intraoperative hypotension, hypotensive event and hypotensive episodes are defined as MAP < 65 mmHg for a duration of at least one minute.

| #  | Title, author, year, publication                                                                                                                                                                                                                             | Study design                    | n     | Patient population                                                                                               | Main finding(s)                                                                                                                                                                                                                                  |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6  | Clinical performance of a machine-learning algorithm to predict intra-operative hypotension with noninvasive arterial pressure waveforms<br><b>Wijnberge et al. 2021</b><br><i>European Journal of Anaesthesiology</i>                                       | Observational cohort            | 507   | General surgical patients                                                                                        | The HPI algorithm with invasive and noninvasive blood pressure input had similar performance at 5, 10, and 15 minutes.                                                                                                                           |
| 7  | Hemodynamic and intestinal microcirculatory changes in a phenylephrine corrected porcine model of hemorrhage<br><b>Davies and Mythen 2021</b><br><i>Anesthesia &amp; Analgesia</i>                                                                           | Prospective observational study | 8     | Yorkshire cross breed pigs                                                                                       | Intestinal microcirculation is disrupted early in hemorrhage, and this disruption is not reflected in clinically significant changes in the commonly measured intraoperative parameters, with the exception of HPI parameter.                    |
| 8  | Hypotension Prediction Index with non-invasive continuous arterial pressure waveforms (ClearSight): Clinical performance in gynaecologic oncologic surgery<br><b>Frassnito et al. 2021</b><br><i>Journal of Clinical Monitoring and Computing</i>            | Retrospective analysis          | 31    | Gynecologic oncologic surgery (GOS)                                                                              | Acumen IQ cuff provides real-time and accurate prediction of impending IOH* before its occurrence in patients undergoing GOS.                                                                                                                    |
| 9  | Hypotension Prediction Index is equally effective in predicting intraoperative hypotension during noncardiac surgery compared to a mean arterial pressure threshold: A prospective observational study<br><b>Mulder et al. 2024</b><br><i>Anesthesiology</i> | Prospective observational       | 100   | Non-cardiac surgery                                                                                              | HPI parameter and concurrent MAP values are highly correlated, their respective alarms and thresholds show strong agreement and interchangeable performance in predicting intraoperative hypotension.                                            |
| 10 | Comparison of differences in cohort (forward) and case control (backward) methodologic approaches for validation of the Hypotension Prediction Index<br><b>Davies et al. 2024</b><br><i>Anesthesiology</i>                                                   | Retrospective analysis          | 2,022 | Cardiac and non-cardiac surgery, non-surgical patients, and non-cardiac surgical in COVID-19 patients in the ICU | Using an updated methodology, HPI algorithm's ability to predict future hypotensive events* is high, with an area under the receiver operating characteristics curve like that of the original validation method.                                |
| 11 | Performance of a machine learning algorithm to predict hypotension in spontaneously breathing non-ventilated post-anesthesia and ICU Patients<br><b>Tol JTM et al. 2024</b><br><i>Journal of Personalized Medicine</i>                                       | Prospective validation          | 282   | Non-ventilated PACU and ICU patients                                                                             | Physiologic changes due to the absence of positive pressure ventilation do not negatively affect HPI algorithm's ability to predict hypotension. HPI algorithm reliably predicted hypotension*, in the mixed non-ventilated PACU and ICU cohort. |

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## Clinical studies

| #  | Title, author, year, publication                                                                                                                                                                                                                                                                                                      | Study design                                  | n                                 | Patient population                        | Main finding(s)                                                                                                                                                                                                                                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12 | Hypotension Prediction Index based protocolized hemodynamic management reduces the incidence and duration of intraoperative hypotension in primary total hip arthroplasty: A single center feasibility randomized blinded prospective interventional trial<br><b>Schneck et al. 2019 Journal of Clinical Monitoring and Computing</b> | RCT-single center                             | 49 (RCT), 50 (historical control) | Non-cardiac surgery (Ortho)               | The HPI parameter combined with a protocolized treatment was able to reduce the incidence and duration of hypotensive events* in patients undergoing primary hip arthroplasty.                                                                                                              |
| 13 | Hypotension Prediction Index for prevention of hypotension during moderate-to-high-risk noncardiac surgery<br><b>Maheshwari et al. 2020 Anesthesiology</b>                                                                                                                                                                            | RCT                                           | 214                               | Moderate to high-risk non-cardiac surgery | Acumen HPI software predicted hypotension, but the lack of use of HPI parameter failed to reduce hypotension. When analysis was restricted to episodes in which clinicians used HPI parameter and intervened, hypotension was halved, and suggesting that prompt treatment may have helped. |
| 14 | Effect of machine learning derived early warning system for intraoperative hypotension vs standard care on depth and duration: The HYPE randomized clinical trial<br><b>Wijnberge, Geerts et al. 2020 JAMA</b>                                                                                                                        | RCT-single center                             | 60                                | Non-cardiac surgery (oncology GI)         | The use of a machine learning-derived early warning system for pending hypotension integrated into a treatment protocol, compared with standard care, resulted in less intraoperative hypotension.*                                                                                         |
| 15 | Hemodynamic monitoring with Hypotension Prediction Index versus arterial waveform analysis alone and incidence of perioperative hypotension<br><b>Grundmann et al. 2021 Acta Anesthesiologica Scandinavica</b>                                                                                                                        | Retrospective observational RCT-single center | 100                               | Non-cardiac surgery                       | Application of Acumen HPI software combined with a personalized treatment protocol can reduce incidence and duration of hypotension* when compared to arterial waveform analysis alone.                                                                                                     |
| 16 | The use of Hypotension Prediction Index integrated in an algorithm of goal directed hemodynamic treatment during moderate and high-risk surgery<br><b>Tsoumpa et al. 2021 Journal of Clinical Medicine</b>                                                                                                                            | RCT-single center                             | 99                                | Non-cardiac surgery                       | Use of Acumen HPI software integrated in a hemodynamic protocol is useful in predicting and preventing IOH*. Patients undergoing moderate to high-risk non-cardiac surgery had a significant decrease in TWA of IOH.                                                                        |

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| #  | Title, author, year, publication                                                                                                                                                                                                                                                       | Study design                                     | n                                  | Patient population                      | Main finding(s)                                                                                                                                                                                                                                |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17 | Proactive management of intraoperative hypotension reduces biomarkers of organ Injury and oxidative stress during non-cardiac surgery: A pilot randomized controlled trial<br><b>Murabito et al. 2021</b><br><i>Journal of Clinical Medicine</i>                                       | RCT-single center                                | 40                                 | Non-cardiac surgery                     | The use of an early warning system ("HPI parameter") coupled with a hemodynamic algorithm compared to FloTrac sensor resulted in reduced IOH*, neuronal specific enolase (NSE) and oxidative stress.                                           |
| 18 | Real-world outcomes of the hypotension prediction index in the management of intraoperative hypotension during non-cardiac surgery: A retrospective clinical study<br><b>Solares et al. 2022</b><br><i>Journal of Clinical Monitoring and Computing</i>                                | Single-center retrospective study                | 104 (GDFT, n=52; GDFT + HPI, n=52) | Non-cardiac surgery                     | Personalized institutional GDFT protocol supported by Acumen HPI software may reduce the depth and duration ( $TWA_{MAP<65}$ ) of IOH during non-cardiac surgery along with a lower prevalence of postoperative complications and shorter LOS. |
| 19 | Effect of Hypotension Prediction Index in the prevention of intraoperative hypotension during noncardiac surgery: A systematic review<br><b>Li et al. 2022</b><br><i>Journal of Clinical Anesthesia</i>                                                                                | Systematic review of RCTs                        | 461                                | Non-cardiac surgery                     | Acumen HPI software-guided intraoperative hemodynamic management with proper adherence to a protocol leads to lower occurrence, duration, and severity of IOH during non-cardiac surgery compared to standard care.                            |
| 20 | Noninvasive hypotension prediction index versus blood pressure monitoring and intraoperative hypotension<br><b>Frassanito et al. 2022</b><br><i>Minerva Anestesiologica</i>                                                                                                            | Retrospective analysis                           | 44                                 | Gynecologic oncologic surgical patients | Acumen IQ finger cuff when combined with a treatment protocol resulted in a significant reduction of IOH compared to GDT guided using ClearSight finger cuff.                                                                                  |
| 21 | Clinical implication of the Acumen Hypotension Prediction Index for reducing intraoperative haemorrhage in patients undergoing lumbar spinal fusion surgery: A prospective randomised controlled single-blinded trial<br><b>Koo et al. 2022</b><br><i>Journal of Clinical Medicine</i> | Prospective RCT                                  | 76                                 | Lumbar spinal fusion surgery            | Intraoperative blood loss was significantly lower in the HPI parameter group compared to the non-HPI parameter group.                                                                                                                          |
| 22 | Intraoperative hypotension when using Hypotension Prediction Index software during major noncardiac surgery: A European multicentre prospective observational registry (EU HYPROTECT)<br><b>Kouz et al. 2023</b><br><i>BJA Open</i>                                                    | Multicenter, prospective, observational registry | 702                                | Major non-cardiac surgery               | The median time-weighted average MAP <65 mm Hg was very low in patients in this registry. Using Acumen HPI software monitoring may help reduce the duration and severity of intraoperative hypotension in patients having non-cardiac surgery. |

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| #  | Title, author, year, publication                                                                                                                                                                                                                                                     | Study design                                     | n    | Patient population                              | Main finding(s)                                                                                                                                                                                                                                                                         |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | Intraoperative hemodynamic optimization using the Hypotension Prediction Index vs. goal-directed hemodynamic therapy during elective major abdominal surgery: The Predict-H multicenter randomized controlled trial<br><b>Lorente et al. 2023 <i>Frontiers in Anesthesiology</i></b> | Parallel arm double blinded RCT-multi-center     | 80   | Elective major abdominal surgery                | Use of an Acumen HPI software based therapeutic protocol reduced intraoperative hypotension compared with a standard GDHT protocol.                                                                                                                                                     |
| 24 | Advanced AI-guided hemodynamic management within cardiac ERAS pathways: A multi-institution quality improvement project review [AceQip]<br><b>Reddy et al. 2023 <i>JTCVS Open</i></b>                                                                                                | Multicenter, prospective, observational registry | 1404 | Cardiac surgery patients                        | Acumen HPI software use post-cardiac surgery resulted in a reduction in duration of mechanical ventilation, ICU length of stay and overall variability in care.                                                                                                                         |
| 25 | Hypotension Prediction Index guided versus conventional goal directed therapy to reduce intraoperative hypotension during thoracic surgery: A randomized trial<br><b>Šribar et al. 2023 <i>BMC Anesthesiology</i></b>                                                                | Prospective, RCT-single center                   | 34   | Esophageal and lung resection surgical patients | Hemodynamic optimization guided by Acumen HPI software leads to a significant decrease in number and duration of hypotensive events compared to traditional goal-directed therapy using pulse-contour analysis hemodynamic monitoring in patients undergoing major thoracic procedures. |
| 26 | Impact of clinicians' behavior, an educational intervention with mandated blood pressure and the Hypotension Prediction Index software on intraoperative hypotension: A mixed methods study<br><b>De Keijzer et al. 2023 <i>Journal of Clinical Monitoring and Computing</i></b>     | Prospective cohort                               | 150  | Non-cardiac surgery                             | IOH was not reduced in the educational cohort with a mandated blood pressure target. Only patients treated in the Acumen HPI software cohort had a reduced number of hypotensive events along with the duration and TWA of IOH compared to baseline.                                    |
| 27 | Effect of using Hypotension Prediction Index versus conventional goal-directed haemodynamic management to reduce intraoperative hypotension in non-cardiac surgery: A randomised controlled trial<br><b>Yoshikawa et al. 2023 <i>Journal of Clinical Anesthesia</i></b>              | Single-center, RCT                               | 64   | Non-cardiac surgery                             | Patients in the Acumen HPI software group had fewer hypotension events, reduced total duration of hypotension events, and fewer hypotension events dropping below 50 mmHg per patient compared to the FloTrac sensor group.                                                             |
| 28 | Hypotension Prediction Index and incidence of perioperative hypotension: A single-center propensity-score-matched analysis<br><b>Runge et al. 2023 <i>Journal of Clinical Medicine</i></b>                                                                                           | Retrospective, propensity matched, cohort        | 272  | Non-cardiac surgery                             | Patients monitored with Acumen HPI software showed a significant reduction in incidence and duration as well as in the severity of IOH compared to those treated with arterial waveform analysis alone.                                                                                 |

\* Hypotension, intraoperative hypotension, hypotensive event and hypotensive episodes are defined as MAP < 65 mmHg for a duration of at least one minute.

| #  | Title, author, year, publication                                                                                                                                                                                                                                                          | Study design                                | n   | Patient population                                 | Main finding(s)                                                                                                                                                                                                                                              |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-----|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29 | Hypotension Prediction Index guided goal directed therapy and the amount of hypotension during major gynaecologic oncologic surgery: A randomized controlled clinical trial<br><b>Frassanito et al. 2023 Journal of Clinical Monitoring and Computing</b>                                 | RCT                                         | 60  | Gynecologic oncologic surgery                      | Application of Acumen HPI software in combination with a pre-defined GDT hemodynamic protocol reduced IOH* and hypotension following induction of anesthesia in patients undergoing major gynecologic oncologic surgery compared to standard GDT management. |
| 30 | The incidence of perioperative hypotension in patients undergoing major abdominal surgery with the use of arterial waveform analysis and the Hypotension Prediction Index hemodynamic monitoring – a retrospective analysis<br><b>Szrama et al. 2024 Journal of Personalized Medicine</b> | Single-center retrospective study           | 123 | Major abdominal surgery                            | Applying an Acumen HPI software-guided algorithm showed a significant reduction in the duration and severity of hypotension below 65 mmHg and below 50 mmHg in patients undergoing major abdominal surgery in comparison to FloTrac sensor.                  |
| 31 | Acumen HPI guidance for prevention & treatment of hypotension in noncardiac surgery<br><b>Bao et al. 2024 Perioperative Medicine</b>                                                                                                                                                      | Multicenter prospective                     | 406 | Moderate-high risk non-cardiac surgery             | The use of Acumen HPI software for blood pressure management was associated with a clinically meaningful reduction in the duration of intraoperative hypotension.*                                                                                           |
| 32 | Hypotension Prediction Index for prevention of intraoperative hypotension in patients undergoing general anesthesia: A randomized controlled trial<br><b>Lai et al. 2024 Perioperative Medicine</b>                                                                                       | RCT                                         | 60  | Non-cardiac surgery                                | Using Acumen HPI software guidance for hemodynamic management in patients undergoing general anesthesia resulted in a statistically significant reduction in the duration and severity of IOH*.                                                              |
| 33 | Impact of predictive hemodynamic monitoring on intra-operative hypotension and postoperative complications in multi-level spinal fusion surgery<br><b>Carreon et al. 2024 Spine</b>                                                                                                       | Prospective longitudinal comparative cohort | 117 | Multi-level posterior thoracolumbar fusion surgery | Patients monitored with the Acumen HPI software experienced shorter durations of IOH*, reduced surgical site infections, less postoperative nausea and vomiting, decreased cognitive dysfunction, and shorter hospital stays.                                |

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## Clinical evidence on systolic slope (dP/dt)

| #  | Title, author, year, publication                                                                                                                                                                                                                     | Study design                                                              | n                                         | Patient population                      | Main finding(s)                                                                                                                                                                                                                                                                                            |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 34 | Non-invasive radial pulse wave assessment for the evaluation of left ventricular systolic performance in heart failure<br><b>Tartiere et al. 2007</b><br><b>The European Journal of Heart Failure</b>                                                | Prospective observational study (Sub-studies: Validation and feasibility) | 50 (Validation Cohort), 310 (Feasibility) | Cardiac failure                         | The maximal dP/dt of the radial pulse is a valuable and reproducible peripheral criterion of left ventricular (LV) systolic performance.                                                                                                                                                                   |
| 35 | Performance comparison of ventricular and arterial dP/dt <sub>max</sub> for assessing left ventricular systolic function during different experimental loading and contractile conditions<br><b>Monge Garcia et al. 2018</b><br><b>Critical Care</b> | Prospective observational study                                           | 10                                        | Yorkshire cross breed pigs              | Although arterial dP/dt <sub>max</sub> is a complex function of central and peripheral arterial factors, dP/dt <sub>max</sub> allowed reasonably good tracking of LV contractility changes as loading and inotropic conditions varied.                                                                     |
| 36 | Continual measurement of arterial dP/dt <sub>max</sub> enables minimally invasive monitoring of left ventricular contractility in patients with acute heart failure<br><b>Ostadal et al. 2019</b><br><b>Critical Care</b>                            | Prospective observational study                                           | 48                                        | Cardiac surgery                         | In patients with acute heart failure requiring intensive care with an arterial line, continuous calculation of arterial dP/dt <sub>max</sub> may be used for monitoring LV contractility, especially in those with higher SVR, lower CO, and lower SV, such as in patients experiencing cardiogenic shock. |
| 37 | Indicators of haemodynamic instability and left ventricular function in a porcine model of esmolol induced negative inotropy<br><b>Davies et al. 2023</b><br><b>Journal of Clinical Monitoring and Computing</b>                                     | Prospective observational study                                           | 8                                         | Yorkshire cross breed pigs              | Hemodynamic instability induced by negative inotropy was detected earliest by the HPI algorithm.<br><br>Changes in peripheral dP/dt correlates with measurements of LV function such as LVEF and LVSWI.                                                                                                    |
| 38 | A retrospective study of the effects of a vasopressor bolus on systolic slope (dP/dt) and dynamic arterial elastance (Ea <sub>dyn</sub> )<br><b>Abdallah et al. 2024</b><br><b>BMC Anesthesiology</b>                                                | Retrospective analysis                                                    | 101                                       | Cardiac surgery and non-cardiac surgery | dP/dt demonstrates potential for predicting the inotropic response to phenylephrine or ephedrine, providing guidance for the most effective vasopressor when treating hypotension.                                                                                                                         |

## Clinical evidence on dynamic arterial elastance ( $Ea_{dyn}$ )

| #  | Title, author, year, publication                                                                                                                                                                                                                                                   | Study design                    | n   | Patient population                                            | Main finding(s)                                                                                                                                                                                                                                                                                                               |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 39 | The use of pulse pressure variation and stroke volume variation in spontaneously breathing patients to assess dynamic arterial elastance and to predict arterial pressure response to fluid administration<br><b>Cecconi et al. 2015</b><br><b>Anesthesia &amp; Analgesia</b>      | Prospective observational study | 26  | Cardiac surgery (high-risk surgical patients)                 | Noninvasive $Ea_{dyn}$ , defined as the PPV to SVV ratio, predicted the arterial blood pressure increase to fluid administration in spontaneously breathing, preload-dependent patients.                                                                                                                                      |
| 40 | Dynamic arterial elastance predicts mean arterial pressure decrease associated with decreasing norepinephrine dosage in septic shock<br><b>Guinot et al. 2015</b><br><b>Critical Care</b>                                                                                          | Prospective observational study | 35  | Sepsis                                                        | In sepsis patients treated with norepinephrine (NE), $Ea_{dyn}$ may predict the decrease in arterial pressure in response to NE dose reduction; $Ea_{dyn}$ may constitute an easy-to-use functional approach to arterial-tone assessment, which may be helpful to identify patients likely to benefit from NE dose reduction. |
| 41 | Monitoring dynamic arterial elastance as a means of decreasing the duration of norepinephrine treatment in vasoplegic syndrome following cardiac surgery: A prospective, randomized trial<br><b>Guinot et al. 2017</b><br><b>Intensive Care Med</b>                                | RCT                             | 118 | Cardiac surgery                                               | A hemodynamic treatment algorithm based on dynamic arterial elastance was associated with a shorter duration of norepinephrine treatment and a shorter length of stay (LOS) in the ICU; use of the algorithm did not alter perfusion parameters or increase the volume of fluid infused.                                      |
| 42 | Dynamic arterial elastance measured by uncalibrated pulse contour analysis predicts arterial pressure response to a decrease in norepinephrine<br><b>Bar et al. 2019</b><br><b>British Journal of Anaesthesia</b>                                                                  | Prospective observational       | 35  | Vasoplegic shock                                              | $Ea_{dyn}$ can predict a mean arterial pressure response to a decrease in norepinephrine.                                                                                                                                                                                                                                     |
| 43 | Echocardiographic measure of dynamic arterial elastance predict pressure response during norepinephrine weaning: An observational study<br><b>Nguyen et al. 2021</b><br><b>Scientific Reports</b>                                                                                  | Prospective observational       | 39  | Vasoplegic shock                                              | $Ea_{dyn}$ calculated from the echocardiographic estimation of SVV and invasive arterial PPV could classify pressure response to a decrease in norepinephrine.                                                                                                                                                                |
| 44 | Predictive performance of dynamic arterial elastance for arterial pressure response to fluid expansion in mechanically ventilated hypotensive adults: A systematic review and meta-analysis of observational studies<br><b>Zhou et al. 2021</b><br><b>Annals of Intensive Care</b> | Meta-analysis                   | 323 | Non-cardiac patients (ICU patients on mechanical ventilation) | $Ea_{dyn}$ exhibits good performance for predicting MAP increases in response to fluid expansion in mechanically ventilated hypotensive adults, especially in the ICU setting.                                                                                                                                                |

| #  | Title, author, year, publication                                                                                                                                                                                                                                                           | Study design                                       | n   | Patient population       | Main finding(s)                                                                                                                                                                                                                   |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 45 | A norepinephrine weaning strategy using dynamic arterial elastance is associated with reduction of acute kidney injury in patients with vasoplegia after cardiac surgery:<br>A post-hoc analysis of the randomized SNEAD study<br><b>Guinot et al. 2023 Journal of Clinical Anesthesia</b> | Post-hoc analysis of monocentric RCT-single center | 118 | Cardiac surgery patients | Decreasing norepinephrine exposure by using a dynamic arterial elastance guided norepinephrine weaning strategy was associated with a reduced incidence of acute kidney injury in patients with vasoplegia after cardiac surgery. |
| 46 | Dynamic arterial elastance to predict mean arterial pressure decrease after reduction of vasopressor in septic shock patients<br><b>Persona et al. 2023 Life</b>                                                                                                                           | Prospective observational                          | 42  | Septic shock             | In a septic shock population $Ea_{dyn}$ correlates well with a decrease of MAP after a dose reduction of norepinephrine.                                                                                                          |
| 47 | Predictive value of dynamic arterial elastance for vasopressor withdrawal: A systematic review and meta-analysis<br><b>Alvarado-Sánchez et al. 2024 Annals of Intensive Care</b>                                                                                                           | Systematic review and meta-analysis                | 183 | Septic shock             | $Ea_{dyn}$ demonstrated good predictive ability for the discontinuation of vasopressor support in critically-ill patients.                                                                                                        |

\* Hypotension, intraoperative hypotension, hypotensive event and hypotensive episodes are defined as MAP < 65 mmHg for a duration of at least one minute.

**CABG:** Coronary artery bypass graft

**CO:** Cardiac output

**GI:** Gastrointestinal

**MAP:** Mean arterial pressure

**PPV:** Pulse pressure variation

**RCT:** Randomized controlled trial

**SV:** Stroke volume

**SVR:** Systemic vascular resistance

**SVV:** Stroke volume variation

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