



Measure Abbreviation: BP 01

Data Collection Method: This measure is calculated based on data extracted from the electronic medical record combined with administrative data sources such as professional fee and discharge diagnoses data. This measure is explicitly not based on provider self-attestation.

Description: Percentage of unique time intervals during a case that sustained intraoperative hypotension was avoided.

NQS Domain: Patient Safety

Measure Type: Process

Scope: Calculated on a per case, per staff basis.

Measure Summary: BP 01 measures the cumulative time of Mean Arterial Pressure (MAP) <55mmHG for a given case and provider. BP 01 includes non-invasive and invasive blood pressure monitoring captured using automated and manually entered physiologic data.

Rationale: Intraoperative hypotension is associated with compromised organ perfusion and puts patients at risk for post-operative mortality, cardiac adverse events (CAEs), acute kidney injury, and stroke. Multiple studies have demonstrated the association of a decreased mean arterial pressure and postoperative morbidity and mortality. One retrospective review included 33,000 non-cardiac surgical patients and determined that a mean arterial pressure less than 55mmHG predicted CAEs and adverse renal-related outcomes (Walsh, et al). This was confirmed by a distinct investigation of 5000 patients using invasive blood pressure measurement (Sun et al).

Inclusions:

All patients requiring general anesthesia or monitored anesthesia care (MAC).

Exclusions:

- Patients <18 years old
- ASA 5 and 6 cases
- Baseline MAP <60 mmHG
- Obstetric Non-Operative Procedures (CPT: 01958, 01960, 01967)
- Obstetric Non-Operative Procedure Rooms (Rooms tagged as OB-GYN – Labor and Delivery)
- Obstetric Non-Operative Procedures with procedure text: “Labor Epidural”
- Cardiac surgery with pump and <1 year old (CPT: 00561)
- Cardiac surgery with pump and > 1 year old (CPT: 00562)
- Cardiac surgery with hypothermic arrest (CPT: 00563)
- CABG with pump (CPT: 00567)
- Liver Transplant Surgery (CPT: 00796, 47135)
- Lung Transplant Surgery (CPT: 32851, 32852, 32853, 32855)

MPOG Concept IDs Required:

BP MPOG Concept IDs					
3011	BP Sys Invasive Unspecified Site 1	3027	BP Dias Invasive Unspecified Site 4	3043	BP Mean Invasive Unspecified Site 2
3012	BP Dias Invasive Unspecified Site 1	3028	BP Mean Invasive Unspecified Site 4	3046	BP Sys Invasive Unspecified Site 3
3013	BP Mean Invasive Unspecified Site 1	3030	BP Sys Arterial Line (Invasive, Peripheral)	3047	BP Dias Invasive Unspecified Site 3
3015	BP Sys Non-invasive	3035	BP Dias Arterial Line (Invasive, Peripheral)	3048	BP Mean Invasive Unspecified Site 3
3020	BP Dias Non-invasive	3040	BP Mean Arterial Line (Invasive, Peripheral)	3475	BP Sys Invasive Unspecified Site 5
3025	BP Mean Non- invasive	3041	BP Sys Invasive Unspecified Site 2	3476	BP Dias Invasive Unspecified Site 5
3026	BP Sys Invasive Unspecified Site 4	3042	BP Dias Invasive Unspecified Site 2	3477	BP Mean Invasive Unspecified Site 5

Data Diagnostics Affected:

- Percentage of Physiologic Observations with a Meaningful Type Mapping
- Percentage of Cases with Invasive Blood Pressure
- Percentage of Cases with Non-invasive Blood Pressure
- Percentage of Cases with Physiologic Observations
- Percentage of Physiologic Rows that are Machine Captured
- Percentage of Cases with any Staff Tracking
- Percentage of Anesthesia Provider Sign-Ins that are Timed

Collations Used:

- AnesthesiaEnd
- AnesthesiaStart
- AsaNotes
- DataCaptureEnd
- DataCaptureStart
- MpgCaselId
- PatientInRoom
- PatientOutOfRoom
- ProcedureText
- AgeinYears
- AnesthesiaLeftBound
- AnesthesiaRightBound
- Asa5or6
- BaselineBloodPressureMean
- ProcedureTypeMri

Other Measure Build Details:

- Instances where there are two blood pressure monitoring methods, the higher MAP will be used to determine measure compliance.
- Artifact readings will be identified and removed from final measurement calculation. Artifact processing: if systolic and diastolic blood pressures are present, the values must be at least 5 mmHg apart; otherwise the values will be excluded. MAP values less than 10 are excluded.
- Each incidence of MAP <55 will attribute the responsible provider for a max of 5 minutes
- To determine how many minutes the last BP documented accounts for, the difference between it the “Measure End Time” algorithm is used (see page 3). As with the duration of other BPs, this duration is also capped at 5 minutes.

Algorithm for determining Measure Start/End Times:

Measure Start Time:

First Blood Pressure Reading after the latest of these 3 times:

1. First documented Anesthesia Start time.
2. First documented Patient in Room time.
3. First documented Data Capture Start time.

Measure End Time:

1. Patient Out of Room. If not available,
2. Data Capture End. If not available,
3. Anesthesia End.

Success:

- MAP <55mmHG that does not exceed cumulative time of 20 minutes **OR**
- MAP >55mmHG throughout case length.

Threshold: 90%.

Responsible Provider: All providers for a given case whose individual cumulative MAP < 55mmHG exceeds the 20 minute timeframe.

Method for determining Responsible Provider: BP 01 is calculated on a per provider basis so there may be multiple failures per case. For example, if two anesthesiologists participated in a case and there were periods of hypotension when each provider was signed in, there would be two failures noted and the case will populate the institutional failed cases list twice.

Risk Adjustment (for outcome measures):

Not applicable.

References:

Bijker JB, Persoon S, Peelen LM, Moons KG, Kalkman CJ, Kappelle LJ, van Klei WA. Intraoperative hypotension and perioperative ischemic stroke after general surgery: a nested case-control study. *Anesthesiology*. 2012 Mar 116(3): 658-64. doi: 10.1097/ALN.0b013e3182472320. PMID: 22277949

Bijker JB, van Klei WA, Vergouwe Y, Eleveld DJ, van Wolfswinkel L, Moons KG, Kalkman CJ. Intraoperative hypotension and 1-year mortality after noncardiac surgery. *Anesthesiology*. 2009 Dec 111(6): 1217-26. doi: 10.1097/ALN.0b013e3181c14930. PMID: 19934864

Sun LY, Wijeyesundera DN, Tait GA, Beattie WS. Association of Intraoperative Hypotension with Acute Kidney Injury after Elective Noncardiac Surgery *Anesthesiology*. 2015 Sep123(3): 515-23. doi: 10.1097/ALN.0000000000000765. PMID: 26181335

Walsh M, Devereaux PJ, Garg AX, Kurz A, Turan A, Rodseth RN et al. Relationship between intraoperative mean arterial pressure and clinical outcomes after noncardiac surgery: Toward an empirical definition of hypotension. *Anesthesiology* 2013; 119:507-515. Doi: 10.1097/ALN.0b013e318a10e26. PMID: 23835589.