2020 INTERNAL IMPROVEMENT MEASURES
Anesthesia Quality Institute

Date: November 12, 2019
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† The efforts and contributions of the American Society of Regional Anesthesia and Pain Medicine to develop and maintain this measure with the American Society of Anesthesiologists on an ongoing basis is acknowledged.

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†† The efforts and contributions of Anesthesia Business Group, ePREOP, MEDNAX and MiraMed to harmonize this Measure with other similar anesthesia quality measures and to update this Measure on an ongoing basis is acknowledged.

The following applies to each Measure that contains the (‡) symbol within its title:

‡ The efforts and contributions of ePREOP, MEDNAX and MiraMed to harmonize this Measure with other similar anesthesia quality measures and to update this Measure on an ongoing basis is acknowledged.

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‡‡ The efforts and contributions of ePREOP and MEDNAX to harmonize this Measure with other similar anesthesia quality measures and to update this Measure on an ongoing basis is acknowledged.

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Introduction

The Anesthesia Quality Institute’s National Anesthesia Clinical Outcomes Registry (AQI NACOR), established by the American Society of Anesthesiologists® (ASA), assists anesthesiologists in assessing and improving patient care.

Measures used in regulatory programs are altered or retired annually due to changing regulatory requirements and program objectives set out by The Centers for Medicare & Medicaid Services (CMS). AQI NACOR recognizes that retired measures or those not suitable for CMS programs may still be meaningful for anesthesiologists and other qualified anesthesia providers. Reporting these measures may aid a practice in benchmarking their performance, demonstrating their value and quality care to payers and facility administrations or as part of practice and quality improvement initiatives.

Measures in this book, identified as Internal Improvement Measures (IIM), are a collection of measures available for reporting to NACOR for internal improvement purposes only. These measures are optional for practices to report. CMS has not recognized and will not accept these measures as part of an anesthesiologist’s or practice’s participation in the Merit-based Incentive Payment System (MIPS) or as part of an Advanced Alternative Payment Model (APM). AQI NACOR will not send data gathered on these measures to CMS.

Participants in NACOR Basic and Quality Concierge® can report IIMs regardless of their participation in the MIPS or an APM. If MIPS-eligible or within an APM, NACOR participants can submit data to AQI NACOR on these IIMs in addition to reporting MIPS and QCDR measures through the Qualified Registry and Qualified Clinical Data Registry (QCDR).
IIM001: Assessment of Acute Postoperative Pain

Measure Description
Percentage of patients aged 18 years or older admitted to the postanesthesia care unit (PACU) following an anesthetic with an initial pain score < 7 out of 10.

Measure Type
Intermediate Outcome

Inverse Measure
No

Instructions
This measure is to be reported each time a patient is admitted to the PACU following a procedure that included an anesthetic during the reporting period.

Measure Reporting via NACOR
CPT codes, registry codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to identify the numerator.

Denominator
All patients age 18 years and older admitted to PACU who are assessed for pain.

**Denominator Criteria (Eligible Cases):**
- Patients age 18 years or older on date of encounter
- **AND**
  - Patient assessed for pain in the postanesthesia care unit: 11A02
  - **AND**
  - **Patient encounter during the reporting period (CPT):**
    - 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00330, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00556, 00558, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00778, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00946, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933, 01935, 01936, 01951, 01952, 01958, 01960, 01961, 01962, 01963, 01965, 01966, 01967, 01991, 01992

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Denominator Exclusions
- Organ Donors as designated by ASA Physical Status 6

Numerator
Patients with an initial pain score < 7 out of 10

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

*Performance Met:*
- 11A03 Patient has an initial pain score of < 7 out of 10

*OR*

*Performance Not Met:*
- 11A04 Patient has an initial pain score of ≥ 7 out of 10

Rationale
Alleviation of pain is a core responsibility of the anesthesia provider, and adequate postoperative pain control is an important component of patient satisfaction with anesthesia and surgery. Significant variability in outcomes exists at the practice, facility and individual provider level. Capture of this metric under a common definition will greatly enhance anesthesia quality management and lead directly to improvements in patient outcome.

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
IIM002: Patient Education on Safe Opioid Storage and Disposal†

Measure Description
Percentage patients prescribed opioid medications in an outpatient setting who were provided oral and written education on safe storage and disposal of opioid medications.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient is prescribed opioid medications in the outpatient setting. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

Denominator
All patients, regardless of age, who are prescribed opioid medications in an outpatient setting

Denominator Criteria (Eligible Cases):
All patients, regardless of age
AND
Patient encounter during the reporting period (CPT):
99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99217, 99218, 99219, 99220, 99224, 99225, 99226, 99241, 99242, 99243, 99245, 99281, 99282, 99283, 99284, 99285
AND
Opioid prescribed during visit: 10A32

Denominator Exclusions
• None

Numerator
Patients who were provided oral and written education on safe storage and disposal of opioid medications.

Numerator Note: To meet this measure, the prescribing provider, or other member of the care team under the direction of the prescribing provider, must provide both oral and written education. Provision of written educational materials alone is not sufficient. Education can be documented by provider in an encounter note, visit summary, or discharge instructions.

The content of written educational materials will vary depending on location. Some examples of written educational materials are included below for reference:


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The prescription opioid epidemic continues to grapple the nation. Most adolescents and adults reporting nonmedical use of opioid medications obtain these medications through their family or friends. Recent literature suggests that current practices related to sharing, storing, and disposing of opioid medications, as well as communication of information on these topics, are suboptimal. There is literature to support that educating patients on safe opioid use, storage, and disposal improves outcomes. Patients who received educational material were:

1. More likely to keep their medication hidden or locked in a safe place
2. Less likely to have unused medication at home
3. More aware of the proper opioid disposal methods
4. More likely to be aware of the potential danger of their opioids being taken by others
5. Significantly less likely to share their opioids with someone else
6. Less likely to practice unsafe use of opioids, defined as sharing or losing their opioids

This underscores the importance of including safe opioid storage and disposal education at every instance in which patients are prescribed opioids for their pain.

Clinical Recommendation Statements

**2016 CDC Guideline for Prescribing Opioids for Chronic Pain-United States**
“Discuss risks to household members and other individuals if opioids are intentionally or unintentionally shared with others for whom they are not prescribed, including the possibility that others might experience overdose at the same or at lower dosage than prescribed for the patient and that young children are susceptible to unintentional ingestion. Discuss storage of opioids in a secure, preferably locked location and options for safe disposal of unused opioids.”

**2017 VA/DoD Clinical Practice Guideline for Opioid Therapy for Chronic Pain**
“When prescribing opioids, provide in-depth and patient-specific education on medication (e.g., side effects, dosing, administration, storage, safety, disposal, take back programs) during medical visits in conjunction with distributing or otherwise enabling access to educational materials.”

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)
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<th>Value</th>
</tr>
</thead>
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</tr>
<tr>
<td>Continuous Measure Scoring:</td>
<td>No</td>
</tr>
<tr>
<td>Risk Adjustment:</td>
<td>No</td>
</tr>
</tbody>
</table>
### IIM003: Perioperative Cardiac Arrest

**Measure Description**
Percentage of patients, regardless of age, who undergo a procedure* under anesthesia who experience an unanticipated cardiac arrest under the care of a qualified anesthesia provider prior to anesthesia end time.**

**Measure Type**
Outcome

**Inverse Measure**
Yes

**Instructions**
This measure is to be reported each time a patient undergoes a surgical, therapeutic or diagnostic procedure under anesthesia that does not include planned cardiac arrest. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

**Measure Reporting via NACOR**
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry Codes are used to report the numerator of the measure.

**Denominator**
All patients, regardless of age, who undergo a procedure* under anesthesia.

**Definition:** *Any procedure including surgical, therapeutic or diagnostic

**Denominator Criteria (Eligible Cases):**
All patients, regardless of age

**AND**
Patient encounter during the reporting period (CPT):

00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00146, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00566, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933,
Cardiac arrest in the perioperative period is an unplanned event where the actions of an anesthesiologist or other qualified anesthesia provider are essential to preventing patient harm and, should cardiac arrest occur, to effectively treat cardiac arrest and prevent further complications. Prevention of cardiac arrest is a core goal of anesthesia providers as they are the clinicians responsible for cardiopulmonary function of the patient and in ensuring proper airway management.

The Perioperative Cardiac Arrest measure reflects the performance of qualified anesthesia providers in preventing perioperative cardiac arrest. A number of recent studies have identified the central role anesthesiologists play in preventing cardiac arrest of patients. Approximately 23-28% of perioperative cardiac arrests are directly attributable to complications from anesthesia. One study found that 54% of cardiac arrests under neuraxial anesthesia were directly related to the anesthetic. Overall, airway management and medication factors were the most common causes of anesthesia-related cardiac arrests, with airway management issues accounting for 64% of anesthesia-related cardiac arrests. Studies found mortality resulting from cardiac arrest cases directly related to anesthesia was approximately 30%.

These findings suggest anesthetic complications may occur in part due to physician decision-making related to airway management and other factors, which can significantly influence and affect patient outcomes, including mortality. With about 25% of perioperative cardiac arrests attributable to anesthesia-related causes, this measure addresses a serious medical event often related to the decisions of the qualified anesthesia providers in the perioperative period.

**Definitions:** *Cardiac arrest is the unplanned cessation of the mechanical activity of the heart as confirmed by the absence of signs of effective circulation. Cardiac compression and/or defibrillation may be required for treatment.***

**Anesthesia End (Finish) Time** is the time at which the anesthesiologist turns over care of the patient to a post anesthesia care team (either PACU or ICU). This time ends when the anesthesia team is no longer furnishing anesthesia services to the patient, that is when the patient may be placed safely under postoperative care and when the anesthesia team has completed transfer of patient care.***

**Numerical Quality-Data Coding Options for Reporting Satisfactorily**

**Performance Met:**
- 10A28 Patient experienced an unanticipated cardiac arrest

**OR**

**Performance Not Met:**
- 10A29 Patient did not experience unanticipated cardiac arrest
Moreover, it is the responsibility of the qualified anesthesia providers to manage perioperative cardiac arrest, including resuscitating and treating the patient as well investigating the etiology of the cardiac arrest regardless of its cause. Although several providers impact patient safety and outcomes, qualified anesthesia providers play a leading role in ensuring patient safety in the perioperative period. One study examining closed claims of anesthesia malpractice found delays in recognition and treatment of hemorrhage and communication breakdowns including between the anesthesiologist and surgeon contributed to adverse patient outcomes.

Evidence supports the integral position of anesthesiologists and other qualified anesthesia providers during the perioperative period, and demonstrates how anesthesiology practice can influence patient outcomes, including perioperative cardiac arrest.

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
IIM004: Perioperative Care: Timing of Prophylactic Antibiotic – Administering Physician

Measure Description
Percentage of surgical patients aged 18 years and older who receive an anesthetic when undergoing procedures with the indications for prophylactic parenteral antibiotics for whom administration of a prophylactic parenteral antibiotic ordered has been initiated within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required)

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time an anesthesia service in the denominator is provided for surgical patients during the reporting period. There is no diagnosis associated with this measure. It is anticipated that clinicians who provide anesthesia services, as specified in the denominator coding*, will submit this measure - reporting on the timeliness of parenteral antibiotic administration. The clinician providing anesthesia services does not need to be the clinician who ordered the prophylactic parenteral antibiotic.

*The anesthesia services included in the denominator are associated with some surgical procedures for which prophylactic parenteral antibiotics may not be indicated. As a result, clinicians should report 4047F-8P for those instances in which anesthesia services are provided but not associated with surgical procedures for which prophylactic parenteral antibiotics are indicated.

If the clinician providing anesthesia services orders AND administers the prophylactic parenteral antibiotic within the appropriate timeframe, report quality-data code CPT II 4048F. Report CPT II 4048F with the 1P modifier in circumstances where the prophylactic parenteral antibiotic was not given for medical reasons (e.g., contraindicated, patient already receiving antibiotics).

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure’s denominator. The listed numerator options are used to report the numerator of the measure.

The quality-data codes listed do not need to be submitted for registry-based submissions; however, these codes may be submitted for those registries that utilize claims data.

Denominator
All surgical patients aged 18 years and older who receive an anesthetic when undergoing procedures* with the indications for prophylactic parenteral antibiotics

Denominator Note: Anesthesia services included in denominator are associated with some surgical procedures for which prophylactic parenteral antibiotics may not be indicated. Clinicians should report 4047F-8P for those instances in which anesthesia services are provided but not associated with surgical procedures for which prophylactic parenteral antibiotics are indicated.

Denominator Criteria (Eligible Cases):
Patients aged ≥ 18 years on date of encounter

AND

Patient encounter during the reporting period (CPT): Anesthesia codes for which prophylactic parenteral antibiotics are commonly indicated for associated surgical procedure(s):

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00100, 00102, 00103, 00120, 00140, 00147, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00450, 00454, 00470, 00472, 00474, 00500, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00561, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00670, 00700, 00730, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00820, 00830, 00832, 00840, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 01120, 01140, 01140, 01140, 01150, 01150, 01173, 01202, 01210, 01212, 01214, 01215, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01360, 01382, 01392, 01400, 01402, 01404, 01430, 01432, 01440, 01442, 01444, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01500, 01502, 01520, 01522, 01560, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01710, 01712, 01714, 01716, 01718, 01732, 01750, 01754, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01924, 01925, 01926, 01951, 01952, 01954, 01961, 01962, 01963, 01965, 01966

**Denominator Exclusions**

- None

**Numerator**

Surgical patients for whom administration of a prophylactic parenteral antibiotic ordered has been initiated within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required)

**Numerator Instructions:** This measure seeks to identify the timely administration of prophylactic parenteral antibiotic. This administration should begin within one hour (if fluoroquinolone or vancomycin, two hours) prior to surgical incision.

**Numerator Quality-Data Coding Options for Reporting Satisfactorily:**

The antimicrobial drugs listed below are considered prophylactic parenteral antibiotics for the purposes of this measure. 4048F-8P should be reported when antibiotics from this table were not ordered.

- Ampicillin/sulbactam
- Aztreonam
- Cefazolin
- Cefmetazole
- Cefotetan
- Cefoxitin
- Cefuroxime
- Ciprofloxacin
- Clindamycin
- Ertapenem
- Erythromycin base
- Fluoroquinolone
- Gentamicin
- Levofloxacin
- Metronidazole
- Moxifloxacin
- Neomycin
- Vancomycin

**Numerator Note:** “Ordered” includes instances in which the prophylactic parenteral antibiotic is ordered by the clinician performing the surgical procedure OR is ordered by the clinician providing the anesthesia services.

**Documentation that Prophylactic Parenteral Antibiotic was Administered Within Specified Timeframe**

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CPT II 4048F: Documentation that administration of prophylactic parenteral antibiotic was initiated within one hour (if fluoroquinolone or vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required) as ordered

OR

Prophylactic Parenteral Antibiotic not Administered for Medical Reasons (eg, contraindicated, patient already receiving antibiotics)
Append a modifier (1P) to CPT Category II code 4048F to report documented circumstances that appropriately exclude patients from the denominator.

4048F with 1P: Documentation of medical reason(s) for not initiating administration of prophylactic parenteral antibiotics as specified (eg, contraindicated, patient already receiving antibiotics)

OR

If patient is not eligible for this measure because prophylactic parenteral antibiotic not ordered, report:
Prophylactic Parenteral Antibiotic not Ordered
Append a reporting modifier (8P) to CPT Category II code 4047F to report circumstances when the patient is not eligible for the measure.

4047F with 8P: No documentation of order for prophylactic parenteral antibiotics to be given within one hour (if fluoroquinolone or vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required)

OR

Prophylactic Parenteral Antibiotic Ordered but not Initiated Within One Hour, Reason not Otherwise Specified
Append a reporting modifier (8P) to CPT Category II code 4048F to report circumstances when the action described in the numerator is not performed and the reason is not otherwise specified.

4048F with 8P: Administration of prophylactic parenteral antibiotic was not initiated within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required), reason not otherwise specified

Rationale
The appropriate timing of administration of prophylactic parenteral antibiotics has been demonstrated to reduce the incidence of surgical wound infections. Available evidence suggests that although most surgical patients receive a prophylactic antibiotic, many do not receive the drug within one hour before incision as recommended.

Clinical Recommendation Statements
Overall, administration of the first dose of antimicrobial beginning within 60 minutes before surgical incision is recommended. Administration of vancomycin and fluoroquinolones should begin within 120 minutes before surgical incision because of the prolonged infusion times required for these drugs. (ASHP, 2013)

Infusion of the first antimicrobial dose should begin within 60 minutes before incision. However, when a fluoroquinolone or vancomycin is indicated, the infusion should begin within 120 minutes before incision to prevent antibiotic-associated reactions. Although research has demonstrated that administration of the antimicrobial at the time of anesthesia induction is safe and results in adequate serum and tissue drug levels at the time of incision, there was no consensus that the infusion must be completed before incision. (SIPGWW, 2004)

Data Source: Claims/Paper Medical Record, Registry

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Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
Measure Description
Percentage of patients, regardless of age, who undergo a procedure* under anesthesia and who experience mortality under the care of an anesthesia provider prior to anesthesia end time.**

Measure Type
Outcome

Inverse Measure
Yes

Instructions:
This measure is to be reported each time a patient undergoes a surgical, therapeutic or diagnostic procedure under anesthesia. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to report the numerator of the measure.

Denominator
All patients, regardless of age, who undergo a procedure* under anesthesia.

Definition: *Any procedure including surgical, therapeutic or diagnostic

Denominator Criteria (Eligible Cases):
All patients, regardless of age

AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00552, 00561, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01122, 01124, 01126, 01128, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933, 01935, 01936, 01951, 01952, 01958, 01960, 01961, 01962, 01963, 01965, 01966, 01967, 01991, 01992

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Denominator Exclusions
- Organ Donors as designated by ASA Physical Status 6

Numerator
Patients who experience mortality* under the care of an anesthesia provider prior to anesthesia end time**.

Definitions: * Death or mortality is defined as the irreversible cessation of all vital functions as indicated by permanent stoppage of the heart, respiration and brain activity; the end of life.\(^v\)

** Anesthesia End (Finish) Time is the time at which the anesthesiologist turns over care of the patient to a post anesthesia care team (either PACU or ICU). This time ends when the anesthesia team is no longer furnishing anesthesia services to the patient, that is when the patient may be placed safely under postoperative care and when the anesthesia team has completed transfer of patient care.\(^vi\)

Numerator Quality-Data Coding Options for Reporting Satisfactorily

** Performance Met:**
10A30  Patient experienced mortality under the care of a qualified anesthesia provider prior to anesthesia end time.

** OR **

** Performance Not Met:**
10A31  Patient did not experience mortality under the care of a qualified anesthesia provider prior to anesthesia end time.

Rationale
Anesthesiologists and qualified anesthesia providers provide a multi-faceted approach to ensuring patient safety during a procedure and in the postanesthesia care unit. Among other responsibilities, anesthesiologists and qualified anesthesia providers are responsible for the cardiopulmonary management of the patient.\(^x\) The mortality rate reflects deaths that occur while a patient is undergoing a procedure under the care of an anesthesia provider during the perioperative period. The measure extends beyond the intraoperative component of care (within the operating room) since a significant number of complications develop during the recovery phase (after leaving the operating room).\(^xii\)

Patient mortality is a primary concern for anesthesiologists and qualified anesthesia providers, patients and the families and caregivers of the patients. Immediate perioperative death either in the operating room or postanesthesia care unit is a catastrophic event that should rarely occur. All deaths should trigger an investigation into the causes and events that led to the death with subsequent new procedures or training put in place to prevent such deaths from happening in the future.

Capturing this data in a uniform fashion allows for an assessment of variability across practices and identify outliers at the individual physician level.

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

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Continuous Measure Scoring:    No
Risk Adjustment:                No
**Measure Description**
Percentage of patients, regardless of age, who received general anesthesia for a procedure via endotracheal tube who were extubated in the operating room or the postanesthesia care unit (PACU) and required re-intubation prior to PACU discharge.

**Measure Type**
Intermediate Outcome

**Inverse Measure**
Yes

**Instructions**
This measure is to be reported each time a patient, regardless of age, undergoes a procedure under the care of an anesthesia provider under general anesthesia via endotracheal tube who was extubated in the operating room or the postanesthesia care unit (PACU). It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

**Measure Reporting via NACOR**
CPT codes, registry codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to report the numerator of this measure.

**Denominator**
All patients, regardless of age, who received general anesthesia for a procedure via endotracheal tube who were extubated in the operating room or postanesthesia care unit.

**Denominator Criteria (Eligible Cases):**
All patients, regardless of age

AND
Patient received general anesthesia that includes an endotracheal tube: 10A15

AND
Patient was extubated in the operating room or postanesthesia care unit (PACU): 10A33

AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00230, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00550, 00560, 00561, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00860, 00860, 00864, 00864, 00865, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 00952, 01112, 01120, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01460, 01464, 01470, 01472, 01474, 01480, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01660, 01710, 01712, 01714, 01716, 01730, 01732,
measuring individual anesthesiologists and transferring to the Intensive Care Unit (ICU) during the perioperative period. Reintubation refers to the need to insert an endotracheal tube for the inability to sustain adequate spontaneous breathing occurring after the removal of an artificial airway.

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

**Performance Met:**
- 10A35: Patient required reintubation in the postanesthesia care unit

**Performance Not Met:**
- 10A36: Patient did not require reintubation in the postanesthesia care unit

**Rationale**

Anesthesiologists and qualified anesthesia providers are responsible for safe and appropriate airway management of patients undergoing a procedure under the care of an anesthesia provider during the perioperative period. The need for early repeat airway management of surgical patients is strongly associated with subsequent serious adverse outcomes including, but not limited to, prolonged hospital stays, transfer to the Intensive Care Unit (ICU) and increased costs of care. Assessment of this measure under a unified definition is an important tool for benchmarking the performance of anesthesia practices and individual anesthesiologists and qualified anesthesia providers.

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No

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IIM007: Postdural Puncture Headache after Epidural Anesthesia/Analgesia

Measure Description
Percentage of patients, regardless of age, who undergo an obstetric procedure using epidural anesthesia or analgesia who experience a postdural puncture headache.

Measure Type
Outcome

Inverse Measure
Yes

Instructions
This measure is to be reported each time a patient undergoes an obstetric procedure using epidural anesthesia or analgesia during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

Denominator
All patients, regardless of age, who undergo an obstetric procedure using epidural anesthesia

Denominator Criteria (Eligible Cases):
All patients, regardless of age
AND
Anesthesia Type: Epidural
AND
Obstetric Procedure (CPT): 01958, 01960, 01961, 01962, 01963, 01965, 01966, 01967

Denominator Exclusions / Exceptions
• None

Numerator
Patients who experienced a postdural puncture headache.

Definition: Postdural Puncture Headache: The new onset of pain in various parts of the head, not confined to the area of distribution of any nerve, usually occurring within 72 hours of an intended or unintended dural puncture. Signs and symptoms include the headache worsening in the sitting or upright position, usually relieved when the patient is supine, may be accompanied by visual or auditory changes, and may occur more frequently in younger patients when the dura has been punctured. A clinical scenario in which a postdural puncture headache may present may be following placement of an epidural or spinal anesthetic or sometimes following a nerve block in close proximity to the neuraxis (e.g. paravertebral or interscalene block).

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met:
10A64 Patient experienced a postdural puncture headache
OR
Performance Not Met:
10A65 Patient did not experience a postdural puncture headache

Rationale
Postdural puncture headache is a significant and painful complication of anesthesia care, most often associated with obstetric patients following labor and delivery. While 30% of obstetric patients present with headache following birth for various reasons such as caffeine withdrawal or lack of sleep, postdural puncture headaches differ in that they are a direct result of dura puncture during administration of spinal anesthesia. Research suggests that 20,000 to 50,000 patients experience postdural puncture headache each year.\textsuperscript{xiii}

Postdural puncture headaches can leave patients debilitated for days, slowing recovery and reducing ambulation and mother-to-child interaction during the first few days following birth. Although an adverse outcome on its own, postdural puncture headache can also be a precursor to other serious conditions such as chronic headache, subdural hematoma, cerebral herniation and even death\textsuperscript{xiv} There is a range of activities that a provider can take to reduce the likelihood of a postdural puncture headache, including needle selection and anesthesia technique. As administrators of anesthesia, physician anesthesiologists and other qualified anesthesia providers are able to influence behaviors and practices that may contribute directly to postdural puncture headaches. With an abundance of research supporting the use of pencil-point needles for spinal anesthesia and the prevalence of postdural puncture headaches, anesthesiologists are well suited to address this significant gap in care.\textsuperscript{xx}

Clinical Recommendation Statement

\textit{2016 ASA/SOAP Practice Guidelines for Obstetric Anesthesia}\textsuperscript{xvi}

“Use pencil-point spinal needles instead of cutting-bevel spinal needles to minimize the risk of postdural puncture headache.” (Category A1-B evidence)

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not Applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
IIM008: Pre-Procedural Timeout Checklist†

Measure Description
Percentage of patients, regardless of age, that undergo an interventional pain procedure or other procedure under regional anesthesia and that have documentation that all applicable safety checks from the ASRA Checklist for Performing Regional Nerve Blocks were performed prior to the administration of anesthesia/analgesia.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient undergoes an interventional pain procedure or procedure under regional anesthesia during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Anesthesia type used and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

Denominator
All patients, regardless of age, who undergo an acute or chronic interventional pain procedure or other procedure under regional anesthesia

Denominator Criteria (Eligible Cases):
All patients regardless of age
AND
Anesthesia type: Neuraxial or Peripheral Nerve Block
AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00552, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925,
Denominator Exclusions
- Peripheral Nerve Block not associated with invasive procedure: 10A75

Numerator
Patients who have documentation that all applicable safety checks from the ASRA Checklist for Performing Regional Nerve Blocks were performed prior to the administration of anesthesia/analgesia

Definition: The ASRA Checklist for Performing Regional Nerve Blocks includes the following items:
- Patient identification (2 criteria)
- Allergies and anticoagulation status, including anticoagulation medications, reviewed
- Surgical procedure/consent confirmed
- Block plan confirmed; site marked by proceduralist; separately from surgical marking
- Necessary equipment present; drugs/solutions labeled
- Resuscitation equipment immediately available (e.g., airway devices, suction, vasoactive drugs, lipid emulsion)
- Appropriate ASA monitors applied; IV access, sedation, and supplemental oxygen provided if indicated
- Aseptic technique used: hand cleansing performed; mask and sterile gloves used
- “Time Out” performed before needle insertion for each new block site if position changed or separated in time or performed by another team

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met:
10A76 All applicable safety checks from the ASRA Checklist for Performing Regional Nerve Blocks were performed prior to the administration of anesthesia/analgesia

OR

Performance Not Met:
10A77 All applicable safety checks from the ASRA Checklist for Performing Regional Nerve Blocks were NOT performed prior to the administration of anesthesia/analgesia

Rationale
In 2010, Cohen et al. examined the incidence and root cause analysis of wrong site pain management procedures.

In 2010, Cohen et al. examined the incidence and root cause analysis of wrong site pain management procedures. Records were evaluated during the two-year period from four civilian academic teaching hospitals, three military treatment facilities, and three private practices. 13 cases were identified (incidence 0.027%). Only one case followed the universal protocol. The authors concluded that there should be
adaptation of the universal protocol to nerve blocks and strict adherence to guidelines in order to prevent wrong site interventional pain procedures.

Clinical Recommendation Statements

2017 The Joint Commission Hospital National Patient Safety Goals: Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery

“1. Conduct a time-out immediately before starting the invasive procedure or making the incision.

2. The time-out has the following characteristics:
   – It is standardized, as defined by the hospital.
   – It is initiated by a designated member of the team.
   – It involves the immediate members of the procedure team, including the individual performing the procedure, the anesthesia providers, the circulating nurse, the operating room technician, and other active participants who will be participating in the procedure from the beginning.

3. When two or more procedures are being performed on the same patient, and the person performing the procedure changes, perform a time-out before each procedure is initiated.

4. During the time-out, the team members agree, at a minimum, on the following:
   – Correct patient identity
   – The correct site
   – The procedure to be done

5. Document the completion of the time-out.
   Note: the hospital determines the amount and type of documentation.”

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA)

Number of Multiple Performance Rates: Not Applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
Measure Description
Percentage of patients, regardless of age, who underwent a central venous cannulation insertion and did not experience a central line placement injury.

Measure Type
Intermediate Outcome

Inverse Measure
No

Instructions
This measure is to be reported each time a central venous cannulation is attempted during the reporting period and the appropriate denominator criteria were recorded. It is anticipated that clinicians who attempt central venous cannulation insertions will submit this measure.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. CPT Category codes are used to report the numerator of the measure.

Denominator
All patients, regardless of age, who undergo central venous cannulation insertion.

Denominator Criteria (Eligible Cases):
All patients, regardless of age
AND
Patient encounter during the reporting period (CPT): 36555, 36556, 36557, 36558, 36560, 36561, 36563, 36565, 36566, 36568, 36569, 36570, 36571, 36578, 36580, 36581, 36582, 36583, 36584, 36585, 93503

Denominator Exclusions
- Organ Donors as designated by ASA Physical Status 6

Numerator
Patients who did not experience a central line placement injury.

Definition: A Central Line Placement Injury includes a pneumothorax, hemothorax or thoracic duct, cardiac or vascular injury that results from an attempted or completed insertion of a central venous catheter.\textsuperscript{11}

Numerator Note: The measure should be reported as “Performance Not Met” for patients whom central venous catheter (CVC) with documented arterial injury (from the medical record or PSI code) or pneumothorax (ICD-10-CM: J93.83, J93.9) requiring thoracostomy placement. For this indicator, the trauma can only be attributed to the attempted placement of central venous line by the anesthesia team and cannot be attributed to other causes.

Numerator Quality-Data Coding Options for Reporting Satisfactorily
Performance Met: 10A40 Patient did not experience a central line placement injury
OR
Performance Not Met
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Rationale
A number of patients undergoing anesthesia for various surgical procedures require a more precise and sophisticated level of cardiovascular monitoring than can be obtained from standard, noninvasive techniques. Placement of an arterial catheter, central venous catheter and/or flow directed pulmonary artery catheter may be required to obtain additional and more precise information necessary for safe and effective anesthesia and life support in the perioperative period.

Anesthesiologists and qualified anesthesia providers are often responsible for placing arterial catheters, central venous catheters and pulmonary artery catheters. Anesthesiologists and qualified anesthesia providers protect patient safety and are responsible for preventing injuries that may occur because of central line placement. Scientific literature has documented that the risk for these complications can be reduced through evidence-based practices that address placement and management of central venous catheters and the reduction of infections, mechanical, thrombotic and other adverse outcomes associated with central venous catheterization.

Practice guidelines in support of this measure also address how clinicians can improve the management of arterial trauma or injury arising from central venous catheterization. Central line placement injuries may result in adverse events and contribute to patient discomfort. Arterial injury and pneumothorax each require additional treatment that adds to health care cost and increases patient discomfort as well. Capturing this data in a uniform fashion allows for an assessment of variability across practices and identify outliers at the individual physician level.

Data Source: Claims/Paper Medical Record, Registry
Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)
Number of Multiple Performance Rates: Not applicable
Proportion Measure Scoring: Yes
Continuous Measure Scoring: No
Risk Adjustment: No
IIM010: Surgical Safety Checklist – Applicable Safety Checks Completed before Induction of Anesthesia

Measure Description
Percentage of patients, regardless of age, who undergo a surgical procedure under general anesthesia who have documentation that all applicable safety checks from the World Health Organization (WHO) Surgical Safety Checklist (or other surgical checklist that includes the applicable safety checks for the specific procedure) were performed before induction of general anesthesia.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient undergoes a surgical procedure under general anesthesia. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
For this measure, report the appropriate registry codes for each patient for whom all applicable safety checks of the WHO Surgical Safety Checklist (or other surgical checklist that includes the safety checks for specific procedure) were performed before induction of general anesthesia.

Denominator
All patients, regardless of age, who undergo a surgical procedure under general anesthesia.

Denominator Criteria (Eligible Cases):
All patients, regardless of age

AND
Patient underwent a surgical procedure under general anesthesia: 10A42

AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00561, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01632, 01634, 01636,
Denominator Exclusions
- Organ Donors as designated by ASA Physical Status 6

Numerator
Patients who have documentation that all applicable safety checks of the WHO Surgical Safety Checklist (or other surgical checklist that includes the safety checks for specific procedure) were performed before induction of general anesthesia.

Definition: The WHO Surgical Safety Checklist includes the following items:

Before Induction of Anesthesia
- Has the patient confirmed his/her identity, site, procedure and consent?
- Is the site marked?
- Is the anesthesia machine and medication check complete?
- Is the pulse oximeter on the Patient And Functioning?
- Does the Patient have a:
  - Known Allergy?
  - Difficult Airway/Aspiration Risk?
  - Risk of >500 ml Blood Loss (7ml/kg in children)?

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met:
10A43 All applicable safety checks of the WHO Surgical Safety Checklist (or other surgical checklist that includes the safety checks for specific procedure) performed before induction of anesthesia

OR

Performance Not Met:
10A44 All applicable safety checks of the WHO Surgical Safety Checklist (or other surgical checklist that includes the safety checks for specific procedure) NOT performed before induction of anesthesia

Rationale
In 2009, the World Health Organization (WHO) Safe Surgery Saves Lives Study Group published a study showing that utilization of a surgical safety checklist resulted in reduced perioperative mortality and complication rates. Since then, surgical safety checklists have been widely implemented around the world. Further studies confirm the WHO findings that implementation of the surgical safety checklist improves communication among members of the surgical team and reduces perioperative morbidity and mortality.

While the number of surgery-related sentinel events has decreased over the past several years, operative care still remains one of the top ten root causes for sentinel events. To address patient safety concerns in the operating room, surgical safety checklists have been widely implemented in recent years. However, compliance with surgical safety checklists and safety checklist protocols has been shown to vary widely. The level of checklist compliance has been shown to vary depending on the implementation strategy.

WHO Guidelines for Safe Surgery

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The World Health Organization’s Guidelines for Safe Surgery and accompanying Surgical Safety Checklist reinforce established safety practices and ensures beneficial preoperative, intraoperative and postoperative steps are undertaken in a timely and efficient way.\textsuperscript{xxi}

Introducing key safety elements into the operating routine, teams could maximize the likelihood of the best outcome for all surgical patients without placing an undue burden on the system or the providers.

WHO Surgical Safety Checklist is available at http://www.who.int/patientsafety/safesurgery/en/

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
IIM011: Treatment of Hyperglycemia with Insulin

Measure Description
The percentage of patients aged 18 years and older, who undergo elective inpatient surgery and who have a blood glucose level of > 180 mg/dL after anesthesia start time and who receive insulin during anesthesia or PACU care.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient undergoes elective inpatient surgery during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics, place of service indicators, CPT codes, G-codes and Registry codes are used to identify patients who are included in the measure’s denominator. Registry codes are used to report the numerator of the measure.

Denominator
Patients, aged 18 years and older, who undergo elective inpatient surgery under anesthesia and have a blood glucose level > 180 mg/dL after anesthesia start time and prior to anesthesia end time.

Definitions: Anesthesia Start Time is the time when the anesthesia team assumes continuous care of the patient and begins preparing the patient for anesthetic services in the operating room or an equivalent area.

Anesthesia End (Finish) Time is the time at which the anesthesiologist turns over care of the patient to a post anesthesia care team (either PACU or ICU). This time ends when the anesthesia team is no longer furnishing anesthesia services to the patient, that is when the patient may be placed safely under postoperative care and when the anesthesia team has completed transfer of patient care.\textsuperscript{vi}

Denominator Criteria (Eligible Cases):
Patient aged 18 years or older on date of encounter
\textbf{AND}
Elective surgery: G9643
\textbf{AND}
Place of Service Code: 21 (Inpatient)
\textbf{AND}
Patient experienced a blood glucose level > 200 mg/dL after anesthesia start time and prior to anesthesia end time: \textbf{10A45}
\textbf{AND}
Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528,

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Denominator Exclusions
- None

Numerator
Patients who are administered insulin during anesthesia or PACU care after having a blood glucose level > 180 mg/dL

Numerator Quality-Data Coding Options for Reporting Satisfactorily
Performance Met:
10A46 Patient received insulin during anesthesia or PACU care after having a blood glucose level >180 mg/dL.

OR
Denominator Exception:
10A47 Patient did not receive insulin because of previous history of adverse reaction or documented allergy to insulin.

OR
Performance Not Met:
10A48 Patient did not receive insulin during anesthesia or PACU care after having a blood glucose level >180 mg/dL.

Rationale
Perioperative hyperglycemia is associated with significant morbidity. Target values for perioperative glucose management in practice guidelines and in outcome studies vary, but usual target blood glucose levels vary from 140 mg/dL to 200 mg/dL. Anesthesiologists and qualified anesthesia providers can foster high quality care and improve clinical outcomes by ensuring that hyperglycemia is treated appropriately. The Anesthesia Quality Institute Outcomes Glossary 2016 defines hyperglycemia as an abnormally high concentration of glucose (greater than 200 mg/dl or 11.1 mmol/l) in the circulating blood. As a minimal indicator of appropriate perioperative management of hyperglycemia during anesthesia care, this measure determines the proportion of patients in whom a blood glucose level of >200 mg/dL obtained during anesthesia care is treated with insulin. It is intended to apply to adult inpatients undergoing surgery.

One retrospective study of 995 patients who had undergone major general and vascular surgery investigated the association of perioperative acute hyperglycemia and risk of 30-day postoperative infection (POI) over an 18-month period. Postoperative hyperglycemia increased the risk of POI by 30% with every 40-point increase from normoglycemia (<110 mg/dL). xxi

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In both mastectomy and major vascular surgery, glucose level > 150 mg/dL was associated with an increased risk of surgical site infection.\textsuperscript{xxiii,xxiv}

In one study of 55,408 patients with diabetes undergoing a variety of noncardiac operations, elevated 24-hour postoperative glucose concentrations were independently associated with postoperative infection: Adjusted incidence rate ratio for glucose 150-250 mg/dL = 1.22; for >250 mg/dL, adjusted incidence rate ratio = 1.43.\textsuperscript{xxv}

The Endocrine Society states that postoperative blood glucose values greater than 200 mg/dL are associated with prolonged hospital length of stay and an increased risk of postoperative complications, including wound infections and cardiac arrhythmias. As a glycemic target, The Endocrine Society recommends random blood glucose level of less than 180 mg/dl for the majority of hospitalized patients with non-critical illness, and this threshold is also recommended for ambulatory surgical patients and most cardiac surgical patients.\textsuperscript{xxvi}

Cardiac surgical patients with blood glucose > 200 mg/dL within 48 hours of surgery was associated with an increased incidence of surgical site infections.\textsuperscript{xxvii}

**Data Source:** Claims/Paper Medical Record, Registry  
**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable  
**Proportion Measure Scoring:** Yes  
**Continuous Measure Scoring:** No  
**Risk Adjustment:** No
IIM012: Unplanned Transfer or Admission to Hospital

Measure Description
Percentage of patients, regardless of age, scheduled for outpatient surgery with plans to be discharged the same day as surgery who have an unplanned hospital transfer or hospital admission within 48 hours of anesthesia start time.

Measure Type
Outcome

Inverse Measure
No

Instructions
This measure is to be reported each time a patient, regardless of age, undergoes an elective outpatient procedure under anesthesia. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
CPT codes, registry codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to report the numerator of this measure.

Denominator
All patients, regardless of age, who undergo an outpatient, elective surgical procedure, regardless of facility, under anesthesia who did not have a planned stay documented prior to procedure.

Definition: A planned stay includes inpatient admission or observational stay.

Denominator Note: “Day of surgery” includes all patients in which the expected duration of services does not exceed 24 hours.

Denominator Criteria (Eligible Cases):
All patients, regardless of age
AND
POS Code: 11, 19, 22 or 24
AND
Elective surgery: G9643
AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00561, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260,
valuation and testing. This represents a potentially preventable burden on patients. A high rate of admission following ambulatory surgery may indicate poor quality care to include inadequate preoperative risk stratification and medical optimization. The goal for hospital admission following ambulatory surgery may indicate a lack of appropriate risk stratification or suboptimal preoperative evaluation and testing. This represents a potentially preventable burden on hospital resources and healthcare system finances. While it is not always possible to predict who will require hospital admission following ambulatory surgery, a high rate of admission may indicate poor quality care to include inadequate preoperative risk stratification and medical optimization. The goal for outpatient surgery should be zero hospital admissions. Any outpatient admission to a hospital should be captured and reviewed.

Denominator Exclusions
- Organ Donors as designated by ASA Physical Status 6

Numerator
Patients who have an unplanned hospital transfer or admission within 48 hours anesthesia start time who were scheduled to be discharged from the facility on the same day as surgical procedure is performed.

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met: 11A07
Patient who was scheduled to be discharged from the facility on the same day as surgical procedure was performed experienced an unplanned hospital transfer or admission within 48 hours of anesthesia start time.

OR
Performance Not Met: 11A08
Patient did not experience an unplanned hospital transfer or admission within 48 hours anesthesia start time.

Rationale
Adverse events that result in an unplanned transfer or admission to the hospital may cause patients and their caregivers financial and social distress as well as significantly increase the cost of care. The need for hospital admission following ambulatory surgery may indicate a lack of appropriate risk stratification or suboptimal preoperative evaluation and testing. This represents a potentially preventable burden on hospital resources and healthcare system finances. While it is not always possible to predict who will require hospital admission following ambulatory surgery, a high rate of admission may indicate poor quality care to include inadequate preoperative risk stratification and medical optimization. The goal for outpatient surgery should be zero hospital admissions. Any outpatient admission to a hospital should be captured and reviewed.

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No

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IIM013: Post-Anesthetic Transfer of Care Measure: Procedure Room to a Post Anesthesia Care Unit (PACU)

Measure Description
Percentage of patients, regardless of age, who are under the care of an anesthesia practitioner and are admitted to a PACU or other non-ICU location in which a post-anesthetic formal transfer of care protocol or checklist which includes the key transfer of care elements is utilized

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be submitted each time a procedure including surgical, therapeutic or diagnostic is performed under anesthesia during the performance period and patients are admitted to a PACU or other non-ICU location. There is no diagnosis associated with this measure. It is anticipated that eligible clinicians who provide the listed anesthesia services as specified in the denominator coding will submit this measure

Measure Reporting via NACOR
The listed denominator criteria are used to identify the intended patient population. The numerator options included in this specification are used to submit the quality actions allowed by the measure.

Denominator
All patients, regardless of age, who are cared for by an anesthesia practitioner and transferred directly from the anesthetizing location to PACU or other non-ICU location.

Denominator Note: In order to meet the denominator criteria of the measure, a patient would need to be directly transferred from the anesthetizing location to PACU or other non-ICU location after the procedure where a transfer of care occurs. A patient that does not transfer directly to these locations is not included within the denominator.

Denominator Criteria (Eligible Cases):
All patients, regardless of age

AND
Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00552, 00553, 00558, 00560, 00562, 00564, 00566, 00568, 00570, 00572, 00574, 00576, 00578, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00852, 00854, 00856, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00946, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472,
Denominator Exclusions
- None

Numerator
Patients transferred directly from the procedure room to post-anesthesia care unit (PACU) for post-procedure care for whom a checklist or protocol which includes the key transfer of care elements is utilized

Definitions: Checklist or Protocol: The key handoff elements that must be included in the transition of care include:
1. Identification of patient
2. Identification of responsible practitioner (PACU nurse or advanced practitioner)
3. Discussion of pertinent medical history
4. Discussion of the surgical/procedure course (procedure, reason for surgery, procedure performed)
5. Intraoperative anesthetic management and issues/concerns.
6. Expectations/Plans for the early post-procedure period.
7. Opportunity for questions and acknowledgement of understanding of report from the receiving PACU team

Identification of patient: In the instance the identity of the patient is unable to be confirmed, identification provided by the clinical facility would suffice toward meeting performance of the measure

Performance Met: G9655 A transfer of care protocol or handoff tool/checklist that includes the required key handoff elements is used

OR

Performance Not Met: G9658 A transfer of care protocol or handoff tool/checklist that includes the required key handoff elements is not used

Rationale
Hand-offs are a vulnerable moment for patient safety but required in any 24/7 healthcare system. Anesthesia providers routinely transfer patients from the operating room (OR) to the PACU, and are responsible for transmitting knowledge about patient history, a summary of intra-operative events, and future plans for hemodynamic and pain management to the new care team. Evidence demonstrates that this process can be facilitated by use of a standardized checklist to ensure completion of all key components of the transfer and is seen as an emerging best practice in anesthesia care. The Agency for Healthcare Research and Quality found that current signout mechanisms are generally ad-hoc, varying from hospital to hospital and unit to unit. (Link to PS Net Handoffs and Signouts Article [accessed June 30, 2015]). According to data published by the Joint Commission, communication errors were indicated in 59% of reported sentinel events in 2012 and in 54% of operative/post-operative complications between 2004 and 2012. A 2006 survey among residents at Massachusetts General Hospital found that 59% of respondents reported one or more patients experiencing harm as a result of ineffective patient handoff practices during their most recent clinical rotation.
Clinical Recommendation Statements

Standards for Postanesthesia Care; American Society of Anesthesiologists, 2014
Upon arrival in the PACU, the patient shall be re-evaluated and a verbal report provided to the responsible PACU nurse by the member of the Anesthesia Care Team who accompanies the patient.
   1. The patient’s status on arrival in the PACU shall be documented.
   2. Information concerning the preoperative condition and the surgical/anesthetic course shall be transmitted to the PACU nurse.
   3. The member of the Anesthesia Care Team shall remain in the PACU until the PACU nurse accepts responsibility for the nursing care of the patient.

2014 Institute for Clinical Systems Improvement Perioperative Protocol
To increase efficiency and consistency in the exchange of information, it is recommended that a standard format be developed for giving “report” from one health care clinician to another. This includes, but is not limited to, patient name, procedure, medications given and to be given, pertinent problems, allergies, fluid status, cardiorespiratory status, and laboratory values received or pending. The receiving health care clinician must be given the opportunity to ask questions and receive answers. It is STRONGLY recommended that this information be given verbally person to person, e.g., for transfer of the patient from the operating/procedure room or post-anesthesia care unit to the intensive care unit, physician-to-physician personal communication is optimal rather than information given through one or more intermediaries.

A structured hand-off is a standardized method of communication to ensure a complete exchange of information occurs when the patient is transitioned from health care clinician to health care clinician whether or not that transition includes a geographic change. It is recommended that a safety checklist be used to note information needed to be handed off to the next caregiver. The kind of information that should be provided during the transition includes the following:
   - Patient name
   - Type of procedure to be performed, being performed, or performed
   - Critical test results
   - Patient status
   - Recent/anticipated changes in patient condition
   - Plan of care/goals
   - What to watch for in next interval of care

Data Source: Claims/Paper Medical Record, Registry
Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)
Number of Multiple Performance Rates: Not applicable
Proportion Measure Scoring: Yes
Continuous Measure Scoring: No
Risk Adjustment: No
Measure Description
Percentage of patients, regardless of age, who undergo a procedure under anesthesia and are admitted to an Intensive Care Unit (ICU) directly from the anesthetizing location, who have a documented use of a checklist or protocol for the transfer of care from the responsible anesthesia practitioner to the responsible ICU team or team member.

Inverse Measure
No

Instructions
This measure is to be submitted each time a procedure including surgical, therapeutic or diagnostic is performed under anesthesia during the performance period and are admitted to an ICU directly from anesthetizing location. There is no diagnosis associated with this measure. It is anticipated that eligible clinicians who provide the listed anesthesia services as specified in the denominator coding will submit this measure.

Measure Reporting via NACOR
The listed denominator criteria are used to identify the intended patient population. The numerator options included in this specification are used to submit the quality actions allowed by the measure.

Denominator
All patients, regardless of age, who undergo a surgical, therapeutic or diagnostic procedure under anesthesia and are admitted to an ICU directly from the anesthetizing location.

Denominator Note: In order to meet the denominator criteria of the measure, a patient must be directly transferred from the anesthetizing location to an ICU. A patient that does not transfer directly to the ICU post-surgery is not included within in the denominator.

Denominator Criteria (Eligible Cases):
All patients, regardless of age
AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00561, 00562, 00563, 00564, 00565, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00850, 00860, 00864, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01322, 01340, 01340, 01380, 01380, 01390, 01392, 01400, 01402, 01404.
Patient transferred directly from anesthetizing location to critical care unit: 0581F

Denominator Exclusions
- None

Numerator
Patients who have a documented use of a checklist or protocol for the transfer of care from the responsible anesthesia practitioner to the responsible ICU team or team member

Numerator Definitions:
Checklist or Protocol - The key handoff elements that must be included in the transfer of care protocol or checklist include:
1) Identification of patient, key family member(s) or patient surrogate
2) Identification of responsible practitioner (primary service)
3) Discussion of pertinent/attainable medical history
4) Discussion of the surgical/procedure course (procedure, reason for surgery, procedure performed)
5) Intraoperative anesthetic management and issue/concerns to include things such as airway, hemodynamic, narcotic, sedation level and paralytic management and intravenous fluids/blood products and urine output during the procedure
6) Expectations/Plans for the early post-procedure period to include things such as the anticipated course (anticipatory guidance), complications, need for laboratory or ECG and medication administration
7) Opportunity for questions and acknowledgement of understanding of report from the receiving ICU team

Identification of patient – In the instance the identity of the patient is unable to be confirmed, identification provided by the clinical facility would suffice toward meeting performance of the measure

Numerator Quality-Data Coding Options for Reporting Satisfactorily
Performance Met:
0583F Transfer of care checklist used

OR

Performance Not Met:
0583F with 8P Transfer of care checklist not used

Rationale
The Agency for Healthcare Research and Quality found that “current signout mechanisms are generally ad-hoc, varying from hospital to hospital and unit to unit.” (Link to Patient Safety Network - Handoffs and Signouts Article [accessed June 30, 2015]). According to data published by the Joint Commission, communication errors were indicated in 59% of reported sentinel events in 2012 and in 54% of operative/post-operative complications between 2004 and 2012. A 2006 survey among residents at © 2020 Anesthesia Quality Institute. All rights reserved. Please contact Anesthesia Quality Institute at askaqi@asahq.org for permission to use any of the information in this document.
Massachusetts General Hospital found that 59% of respondents reported one or more patients experiencing harm as a result of ineffective patient handoff practices during their most recent clinical rotation. Therefore, a standardized transfer of care protocol or handoff tool/checklist that is utilized for all patients directly admitted to the ICU after undergoing a procedure under the care of an anesthesia practitioner will facilitate effective communications between the medical practitioner who provided anesthesia during the procedure and the care practitioner in the ICU who is responsible for post-procedural care. This should minimize errors and oversights in medical care of ICU patients after procedures.

Clinical Recommendations Statements

2014 Institute for Clinical Systems Improvement Perioperative Protocol
To increase efficiency and consistency in the exchange of information, it is recommended that a standard format be developed for giving “report” from one health care clinician to another. This includes, but is not limited to, patient name, procedure, medications given and to be given, pertinent problems, allergies, fluid status, cardiorespiratory status, and laboratory values received or pending. The receiving health care clinician must be given the opportunity to ask questions and receive answers. It is STRONGLY recommended that this information be given verbally person to person, e.g., for transfer of the patient from the operating/procedure room or post-anesthesia care unit to the intensive care unit, physician-to-physician personal communication is optimal rather than information given through one or more intermediaries.

A structured hand-off is a standardized method of communication to ensure a complete exchange of information occurs when the patient is transitioned from health care clinician to health care clinician whether or not that transition includes a geographic change. It is recommended that a safety checklist be used to note information needed to be handed off to the next caregiver. The kind of information that should be provided during the transition includes the following:

- Patient name
- Type of procedure to be performed, being performed, or performed
- Critical test results
- Patient status
- Recent/anticipated changes in patient condition
- Plan of care/goals
- What to watch for in next interval of care

Data Source: Claims/Paper Medical Record, Registry
Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)
Number of Multiple Performance Rates: Not applicable
Proportion Measure Scoring: Yes
Continuous Measure Scoring: No
Risk Adjustment: No
IIM015: Coronary Artery Bypass Graft (CABG): Stroke – Inverse Measure

Measure Description
Percentage of patients aged 18 years and older undergoing isolated CABG surgery who have a *postoperative* stroke

Measure Type
Outcome

Inverse Measure
Yes

Instructions
This measure is to be reported each time an isolated CABG procedure is performed during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide services, identified by CPT Codes listed below, for isolated CABG will submit this measure. This measure is intended to reflect the quality of surgical services provided for isolated CABG or isolated reoperation CABG patients. Isolated CABG refers to CABG using arterial and/or venous grafts only.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. The measure must capture both the surgical and related anesthesia code. G-codes are used to report the numerator of the measure. Note that a lower calculated performance rate for this measure indicates better clinical care or control.

Denominator
All patients, aged 18 years and older, undergoing isolated CABG Surgery

  Definition: Isolated CABG refers to CABG using arterial and/or venous grafts only

Denominator Criteria (Eligible Cases):
Patient aged 18 years or older on date of encounter
  AND
  Patient encounter during the reporting period (CPT): 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33523, 33533, 33534, 33535, 33536
    AND
    00566, 00567
  OR
  Patient encounter during the reporting period (CPT): 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33523, 33533, 33534, 33535, 33536
    AND
    Patient encounter during the reporting period (CPT): 33530
    AND
    00562

Denominator Exclusions
- Organ donors as designated by ASA Physical Status 6

Numerator
Patients who have a postoperative stroke
Definition: A stroke is the sudden death of neurons in a localized area of brain due to inadequate blood flow that produces motor, sensory, or cognitive dysfunction (e.g., hemiplegia, hemiparesis, aphasia, sensory deficit, impaired memory) that persists for more than 24 hours.

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

**Performance Met:**
G8573 Stroke following isolated CABG surgery

**OR**

**Performance Not Met:**
G8574 No stroke following isolated CABG surgery

**Rationale**

Stroke is a devastating complication that can occur after coronary bypass surgery. A standardized definition of stroke for physician anesthesiologists and other qualified anesthesia providers will allow for comparing stroke incidence and evaluating management strategies for reducing this devastating complication. The Anesthesia Quality Institute (AQI) defines stroke as the sudden death of neurons in a localized area of brain due to inadequate blood flow that produces motor, sensory, or cognitive dysfunction (e.g., hemiplegia, hemiparesis, aphasia, sensory deficit, impaired memory) that persists for more than 24 hours.

Research demonstrates the incidence of stroke increases with patient age and is often associated with increased length of hospital stay and morbidity and mortality. Outcomes are better when patient age is younger and with beating-heart surgery rather than on-pump surgery. Research demonstrates varying incidence of stroke following CABG surgery, ranging from 1.1% - 5.7%. Predictors of post-CABG stroke include, advanced age, prior cardiovascular complications and prolonged intraoperative cardiopulmonary bypass time. Qualified anesthesia providers assume a unique and critical role during the perioperative period as they can provide safe and appropriate anestheisa care for patients, in relation to the aforementioned predictors of stroke. The expertise and decision-making of qualified anesthesia providers can greatly influence patient outcomes, including stroke.

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
IIM016: Coronary Artery Bypass Graft (CABG): Post-Operative Renal Failure—Inverse Measure

Measure Description
Percentage of patients aged 18 years and older undergoing isolated CABG surgery who develop postoperative renal failure or require dialysis.

Measure Type
Outcome

Inverse Measure
Yes

Instructions
This measure is to be reported each time an isolated CABG procedure is performed during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide services, identified by CPT Codes listed below, for isolated CABG will submit this measure. This measure is intended to reflect the quality of surgical services provided for isolated CABG or isolated reoperation CABG patients.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure’s denominator. The measure must capture both the surgical and related anesthesia code. G-codes are used to report the numerator of the measure. Note that a lower calculated performance rate for this measure indicates better clinical care or control.

Denominator
All patients, aged 18 years and older, undergoing isolated CABG surgery

Definition: Isolated CABG refers to CABG using arterial and/or venous grafts only

Denominator Criteria (Eligible Cases):
Patient aged 18 years or older on date of encounter

AND
Patient encounter during the reporting period (CPT): 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33523, 33533, 33534, 33535, 33536
AND
00566, 00567

OR
Patient encounter during the reporting period (CPT): 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33523, 33533, 33534, 33535, 33536
AND
Patient encounter during the reporting period (CPT): 33530
AND
00562

Denominator Exclusions
- Organ donors as designated by ASA Physical Status 6
- Documented history of renal failure or baseline serum creatinine ≥4.0 mg/dL; renal transplant recipients are not considered to have preoperative renal failure, unless, since transplantation the Cr has been or is 4.0 or higher G9722

Numerator
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Patients who develop postoperative renal failure or require dialysis.

Definition: Kidney failure is defined as either: (1) a level of GFR to <15 mL/min/1.73 m2, which is accompanied in most cases by signs and symptoms of uremia, or (2) a need for initiation of kidney replacement therapy (dialysis or transplantation) for treatment for complications of decreased GFR, which would otherwise increase the risk of mortality and morbidity.iii

Numerator Quality-Data Coding Options for Reporting Satisfactorily

**Performance Met:**

G8575 Developed postoperative renal failure or required dialysis

**OR**

**Performance Not Met:**

G8576 No postoperative renal failure/dialysis not required

Rationale

Coronary artery bypass graft (CABG) surgeries are among the most frequently performed cardiac surgeries each year.xxxvii Literature suggests the development of renal failure following coronary artery bypass graft (CABG) surgery is associated with poor patient outcomes, including a higher risk for mortality.xxxvii Incidence of renal failure following CABG surgery ranges from 1.1% to 11%, with the incidence of acute kidney injury which can lead to renal failure is much higher, with reported incidence approximately 20%.xxxv There has been a substantial increase in postoperative morbidity, mortality, and cost associated with this relatively common complication, regardless of whether incidence varies between providers.

Qualified anesthesia providers play an integral role in managing patient organ function during surgery, including kidney function. Changing patient population trends require anesthesiologists, surgeons and other members of the perioperative team to use their unique expertise to adjust care and effectively and appropriately manage patients throughout the perioperative period.xxxii A retrospective study examining elective CABG surgery outcomes found development of renal failure following surgery led to increased mortality and morbidity, as well as increased length of stay and use of resources. Another study found that minimal increases in creatinine following CABG surgery increased mortality risk significantly. xxxiii Analysis of recent trends in patient characteristics reveals the growing complexity of comorbidities an average CABG patient may have including, diabetes and hypertension.

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
Measure Description
Percentage of patients aged 12 years and older, who undergo a procedure under general anesthesia that includes an endotracheal tube who had a median exhaled tidal volume less than 10 mL/kg of ideal body weight during positive pressure ventilation (PPV).

Measure Type
Intermediate Outcome

Inverse Measure
No

Instructions
This measure is to be reported each time a patient receives general anesthesia for a procedure via endotracheal tube during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics, CPT codes and CPT Category codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

Denominator
Patients aged 12 years and older, who undergo general anesthesia care that includes an endotracheal tube.

Denominator Criteria (Eligible Cases):
Patient aged 12 years or older on date of encounter
AND
Patient received general anesthesia care that includes an endotracheal tube: 10A15
AND
Patient encounter during the reporting period (CPT):
00100, 00102, 00103, 00104, 00120, 00124, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00502, 00504, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00710, 00712, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00940, 00942, 00944, 00946, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01682, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840,
Denominator Exclusions
- ASA Physical Status 5 or 6
- Patients continuously receiving inhaled medications (i.e., inhaled epoprostenol or nitric oxide): 10A16
- Patients with a diagnosis of pulmonary hypertension: ICD-10-CM I27.0, I27.2
- Patients who require hyperventilation for therapeutic reasons (e.g. elevated intracranial pressure, malignant hyperthermia, or thyroid storm): 10A17
- Patient was mechanically ventilated for <45 cumulative minutes 10A99
- Single-lung ventilation procedure 11A00

Numerator
Patients who had a median exhaled tidal volume less than 10 mL/kg of ideal body weight during positive pressure ventilation (PPV).

Numerator Note: Positive pressure ventilation strategies include conservative tidal volume, lower peak airway pressures, positive end-expiratory pressure (PEEP) and lung-recruitment interventions to prevent atelectasis.

Numerator Quality-Data Coding Options for Reporting Satisfactorily
Performance Met:
10A18 Patient had a median exhaled tidal volume less than or equal to 10 mL/kg of predicted-body-weight (PBW) during positive pressure ventilation (PPV)

OR
Performance Not Met:
10A19 Patient did not have a median exhaled tidal volume less than or equal to 10 mL/kg of predicted-body-weight (PBW) during positive pressure ventilation (PPV)

Rationale
Anesthesia providers prescribe and implement ventilator settings and monitor tidal volume for patients under general anesthesia. These decisions are aimed at preventing lung injury while maintaining adequate oxygenation and ventilation. Several studies have reported that patients who maintained tidal volumes less than 10 ml per kg of ideal body weight experienced better outcomes than those ventilated with higher volumes. It is thought that higher tidal volumes expose the lungs to the potential for injury either due to over-expansion or pressure. AHRQ NQMC-8459 (Acute respiratory failure: percentage of patients with acute lung injury (ALI)/acute respiratory distress syndrome receiving lung-protective ventilation) recognizes that mechanical ventilation with tidal volumes (TV) of 6-8 ml/kg is associated with fewer pulmonary complications.

There is growing evidence that intraoperative lung-protective mechanical ventilation prevents postoperative pulmonary complications (PPCs). Such complications are associated with longer lengths of hospital stay, often requiring ICU admission. xxxvi, xxxvii, xxxviii, xxxix While half of the risk factors for pulmonary complications are attributable to patient comorbidities, approximately 50% of PPCs are attributable to the surgical procedure and the anesthetic management itself. xli The number of PPCs is associated with postoperative length of stay

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Approximately 5% of patients undergoing general surgery will develop a PPC and one in five patients who develop a PPC will die within 30 days of surgery. The estimated costs of postoperative pulmonary complications has not been specifically estimated, but likely contributes to significant morbidity, suffering, and economic cost.

Wanderer, et al. demonstrated a current gap, noting of 295,540 cases analyzed, 43,934 (14.9%) had a median tidal volume of > 10 mL per kg of PBW. This measure is applicable to all adult patients because it is impossible to predict who may develop PPCs and become critically ill. Additionally, by improving ventilation management for all patients, anesthesia providers will improve the likelihood that critically ill patients are managed appropriately when they come to the operating room.

There are times when the established measure threshold may be exceeded appropriately for a brief period of time (<10 minutes) to verify placement of the endotracheal tube or to reduce atelectasis by recruiting alveoli. As a result, short periods of increased ventilation are excluded. Furthermore, it must be recognized that much of the clinical literature that supports the use of lower tidal volumes also incorporated measures to minimize atelectasis, such and the introduction of PEEP and recruitment maneuvers. Anesthesiologists and qualified anesthesia providers should be cautioned against adopting only reduced tidal volumes without also incorporating measures to minimize atelectasis.

The definition of ideal body weight (IBW) is provided by table and calculation. The method for calculating median TV during PPV will vary depending on the specific software employed for the electronic anesthesia record.

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
IIM018: New Corneal Injury Not Diagnosed Prior to Discharge

Measure Description
Percentage of patients aged 18 years or older, who undergo anesthesia care and did not have a new diagnosis of corneal injury prior to facility discharge.

Measure Type
Outcome

Inverse Measure
No

Instructions
This measure is to be reported each time a patient underwent a procedure with anesthesia not involving patients with pre-existing eye trauma or those patients undergoing ophthalmologic surgery. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to report the measure numerator.

Denominator
All patients aged 18 and older, who undergo anesthesia care*

**Definition:** *Anesthesia care includes general, regional and monitored anesthesia care.*

*Denominator Note:* Measure not applicable to anesthesia care described by code 00300 when the underlying surgical procedure is described by CPT Codes: 67800, 67801, 67805, 67808, 67810, 67840, 67850, 67875, 67900, or 67938.

Denominator Criteria (Eligible Cases):
Patient aged 18 years or older on date of encounter

**AND**
Patient encounter during the reporting period (CPT):
00100, 00102, 00104, 00120, 00124, 00126, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01561, 01600, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810,

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Denominator Exclusions

- Patient undergoes ophthalmologic surgery or has a diagnosis of either eye trauma or corneal injury before anesthesia care: 10A22
- Patient has a co-occurring condition that limits ability to communicate at the time of facility discharge (e.g. severe dementia, developmental delay or mechanical ventilation): 10A49

**Denominator Note:** Measure not applicable to anesthesia care described by code 00300 when the underlying surgical procedure is described by CPT Codes: 67800, 67801, 67805, 67808, 67810, 67840, 67850, 67875, 67900, or 67938.

Numerator

Patients who do not have a new diagnosis of corneal injury prior to facility discharge.

**Definition:** A corneal injury is either a corneal abrasion (a scratch or scrape on the cornea, the clear front window of the eye that transmits and focuses light into the eye) or exposure keratitis (inflammation of the cornea from drying of the corneal tear film). Includes both exposure keratitis and corneal abrasion. For the purposes of this measure, the distinction does not need to be made with fluorescein examination of the cornea under ultraviolet light; however, it can be diagnosed in this manner. Corneal injury also includes any new symptom of eye pain treated with topical antibiotic (e.g., erythromycin) while in the post-anesthesia care unit/recovery area. Other causes of eye pain (e.g. acute angle-closure glaucoma) can be excluded by instilling one drop of local anesthetic (e.g., proparacaine) into the eye. If the pain is immediately and completely relieved, corneal injury is confirmed, and acute angle-closure glaucoma is excluded.

**Numerator Note:** Facility refers to the location in which the procedure was performed, including but not limited to inpatient hospital or ambulatory surgical center.

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

**Performance Met:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A50</td>
<td>Patient was NOT newly diagnosed with exposure keratitis or corneal abrasion at time of facility discharge.</td>
</tr>
</tbody>
</table>

**OR**

**Performance Not Met:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A51</td>
<td>Patient was diagnosed with new exposure keratitis or corneal abrasion at time of facility discharge.</td>
</tr>
</tbody>
</table>

Rationale

Corneal abrasion/injury is the most common ophthalmologic complication that occurs during general anesthesia.
anesthesia for non-ocular surgery. These injuries are not only painful for the patient but can lead to significant microbial keratitis with possibility of permanent scarring. There is no standardized method for protecting the eyes during an anesthetic for non-ocular surgery, however, adhesive tape, individual, single, sterile packaged eye covers, small bio-occlusive dressings, used with or without eye ointment are some of the options used. Some practitioners may simply observe closed, non-taped eyes. Methods described in the literature are not entirely effective at preventing corneal injury and some are associated with unwanted side effects. Physician anesthesiologists administering general anesthesia are responsible for maintaining eye health and safety during surgery.

Measuring the incidence of corneal injury will give practices the data they need to assess performance, compare to national benchmarks, and if gaps are identified, encourage anesthesiologists to undertake techniques that can significantly improve eye protection for patients and reduce corneal injuries.

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No

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IIM019: Geriatric Cognitive Assessment

Measure Description
Percentage of patients aged 75 years or older who undergo an inpatient procedure under general or neuraxial anesthesia who undergo a cognitive assessment prior to the administration of anesthesia.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient underwent a procedure with anesthesia not involving patients with pre-existing eye trauma or those patients undergoing ophthalmologic surgery. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
CPT codes and patient demographics are used to identify patients who are included in the measure's denominator. Registry codes are used to report the measure numerator.

Denominator
All patients aged 75 years or older who undergo an inpatient procedure under general or neuraxial anesthesia

Denominator Criteria (Eligible Cases):
Patient aged 75 years or older on date of encounter
AND
Place of Service: 21
AND
Anesthesia Type: General OR Neuraxial
AND
Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00326, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00561, 00562, 00563, 00565, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00834, 00836, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844,
Denominator Exclusions
- Emergent Cases
- Observation Status: 11A38

Observation status is defined as when a therapeutic or diagnostic procedure is performed in a healthcare facility without a physician's admission order. The patient stays in an in-patient facility overnight (at least one midnight) but does not have a physician's order for admission. A patient who is in the hospital (without admission orders) with an expected stay of one midnight is an observation patient and an outpatient.

Numerator
Patients who undergo a cognitive assessment prior to the administration of anesthesia

Numerator Note: A cognitive assessment can be conducted using a standardized tool such as the Mini-cog, clock-in-the-box, three-word recall, or equivalent tool.

Numerator Quality-Data Coding Options for Reporting Satisfactorily

**Performance Met:**
- 11A39 Patient underwent a cognitive assessment prior to administration of anesthesia

**OR**
- **Performance Not Met:**
  - 11A40 Patient did not undergo a cognitive assessment prior to administration of anesthesia

Rationale
A geriatric patient’s preoperative cognitive status should be evaluated and carefully documented in order to establish a baseline status and allow for better evaluation of postoperative function. Evidence indicates that the preoperative cognitive status is an important risk factor for postoperative complications such as delirium, cognitive decline, and dysfunction as well as postoperative mortality. Despite its importance as a risk factor, preoperative cognitive impairment often goes unrecognized due to a lack of widespread formal screening. Better identification of preoperative cognitive impairment can help anesthesia tailor perioperative care to the needs of individual patients and to better plan for optimal post-operative care.

Clinical Recommendation Statements


“Health care professionals caring for surgical patients should perform an assessment of delirium risk factors, including age >65 years, chronic cognitive decline or dementia, poor vision or hearing, severe illness (for example, ICU admission), and presence of infection”

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

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<table>
<thead>
<tr>
<th>Measure Scoring</th>
<th>Yes</th>
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<td>Continuous Measure Scoring</td>
<td>No</td>
</tr>
<tr>
<td>Risk Adjustment</td>
<td>No</td>
</tr>
</tbody>
</table>
IIM020: Ambulatory Point-of-Care Glucose Testing

Measure Description: Percentage of patients, regardless of age, with a diagnosis of diabetes receiving anesthesia services in an ambulatory setting whose glucose was tested prior to the start of anesthesia.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a diabetic patient undergoes a procedure in an ambulatory setting with anesthesia services during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics, Place of Service codes, Diagnosis (ICD) codes and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator.

Denominator
All patients, regardless of age, with a current diagnosis for diabetes mellitus who receive anesthesia services in an ambulatory setting.

Denominator Criteria (Eligible Cases):
- Patients aged 18 years and older
- Diagnosis of diabetes mellitus: 11A41 OR ICD-10 CM code *(See Appendix A for a list of applicable ICD-10 diagnosis codes)*
- Place of Service code: 19, 22, 24

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Denominator Exclusions

- None

Numerator
Patients who received a glucose test in the ambulatory setting prior to the start of anesthesia

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

*Performance Met:*

11A42

Patient received a glucose test prior to start of anesthesia

*OR*

*Performance Not Met:*

11A43

Patient did NOT receive a glucose test prior to start of anesthesia

Rationale

Diabetes has been shown to be an important risk factor for surgical site infection and other surgical complications. With increasingly complex procedures being performed in an ambulatory setting, perioperative glucose management is an important aspect of ambulatory anesthesia care. For diabetic patients, preoperative testing of blood glucose levels can provide an important indicator for their intraoperative insulin and care management needs. Despite the importance of glucose testing, evidence shows that it is not consistently performed in the ambulatory setting. Improved preoperative glucose testing can help anesthesia providers better anticipate and manage the needs of their diabetic patients throughout the perioperative period.

Clinical Recommendation Statements

2010 SAMBA Consensus Statement on Perioperative Blood Glucose Management in Diabetic Patients Undergoing Ambulatory Surgery

“Ambulatory surgical facilities taking care of diabetic patients must have glucose monitoring capabilities such as point-of-care monitors. Adequate monitoring of blood glucose levels is critical in maintaining patient safety and should facilitate insulin titration to achieve optimal blood glucose levels as well as allow for early detection of hypoglycemia. It has been suggested that blood glucose levels should be checked on the patient’s arrival to the facility before surgery and before discharge home (LoE category 2A).”

Data Source: Claims/Paper Medical Record, Registry

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Measure Steward: American Society of Anesthesiologists (ASA)/Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
IIM021: Ambulatory Hyperglycemia Control

Measure Description
Percentage of patients, aged 18 years and older, with a diagnosis of diabetes mellitus receiving anesthesia services in an ambulatory setting who experienced a blood glucose level >180 mg/dL (10.0 mmol/L) who received insulin prior to anesthesia end time AND had a follow-up glucose check prior to discharge.

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a diabetic patient undergoes a procedure in an ambulatory setting with anesthesia services during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics, Place of Service codes, Diagnosis (ICD) codes and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator.

Denominator
Patients aged 18 and older, with a diagnosis of diabetes mellitus who receive anesthesia services in an ambulatory setting and have a blood glucose level >180 mg/dL (10.0 mmol/L) prior to anesthesia end time.

Definition: Anesthesia End (Finish) Time is the time at which the anesthesiologist turns over care of the patient to a post anesthesia care team (either PACU or ICU). This time ends when the anesthesia team is no longer furnishing anesthesia services to the patient, that is when the patient may be placed safely under postoperative care and when the anesthesia team has completed transfer of patient care.

Denominator Note: A blood glucose level >180 mg/dL that occurs at any point during the perioperative encounter prior to anesthesia end time should be included in the measure

Denominator Criteria (Eligible Cases):
Patients aged 18 years and older
AND
Diagnosis of diabetes mellitus: 11A41 OR ICD-10 CM code (See Appendix A for a list of applicable ICD-10 diagnosis codes)
AND
Place of Service code: 19, 22, 24
AND
Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00552, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802,
Denominator Exclusions/Exceptions

- Procedure duration <30 minutes: 11A45

Numerator

Patients who were administered insulin prior to anesthesia end time AND had a follow-up glucose check prior to discharge

Numerator Note: The administration of insulin should occur after the initial blood glucose level >180 mg/dL and prior to the follow-up glucose check.

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met: 11A46

Patient was administered insulin prior to anesthesia end time AND had a follow-up glucose check prior to discharge

OR

Performance Not Met: 11A47

Patient was NOT administered insulin prior to anesthesia end time and/or did NOT have a follow-up glucose check prior to discharge

Rationale

Perioperative hyperglycemia is associated with significant morbidity. Hyperglycemia in the short-term may cause dehydration and electrolyte imbalance; in the long-term it increases the incidence of surgical site infections. With increasingly complex procedures being performed in outpatient settings, perioperative glucose management is an essential aspect of quality ambulatory anesthesia care. It is imperative that

Blood glucose >180 mg/dL prior to anesthesia end time: 11A44

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diabetic patients’ glucose is closely monitored and managed perioperatively to ensure the patient is ready for discharge. While target glucose values and recommended management strategies vary among guidelines, there is consensus that close perioperative glucose monitoring and hyperglycemia management are important.

Clinical Recommendation Statements

2010 SAMBA Consensus Statement on Perioperative Blood Glucose Management in Diabetic Patients Undergoing Ambulatory Surgeryxlvi

“We suggest that in patients with well-controlled diabetes, intraoperative blood glucose levels be maintained <180 mg/dL (10.0 mmol/L) (LoE category 2A)”

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA)/Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring: Yes

Continuous Measure Scoring: No

Risk Adjustment: No
IIM022: Discharge to a Responsible Patient Escort

Measure Description
Percentage of patients, regardless of age, who receive anesthesia services for same-day surgery with documented patient escort prior to the start of anesthesia

Measure Type
Process

Inverse Measure
No

Instructions
This measure is to be reported each time a patient undergoes a procedure in an ambulatory setting with anesthesia services during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via NACOR
Patient demographics, Place of Service codes and CPT codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator.

Denominator
Patients regardless of age, who receive anesthesia services for outpatient surgery* in an ambulatory surgery center

Denominator Definition: Outpatient surgery is surgery performed on a patient, and the patient is then discharged home the day of surgery.

Denominator Criteria (Eligible Cases):
Patients regardless of age

AND
Place of Service code: 24

AND
Outpatient Surgery: 11A50

AND
Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00560, 00562, 00563, 00566, 00567, 00580, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470,

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01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01846, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933, 01935, 01936, 01951, 01952, 01958, 01960, 01961, 01962, 01963, 01965, 01966, 01967, 01991, 01992, 20526, 20550, 20551, 20552, 20553, 20600, 20604, 20605, 20606, 20610, 20611, 27096, 36555, 36556, 36570, 36571, 36578, 36580, 36581, 36582, 36584, 36585, 62263, 62264, 62270, 62272, 62273, 62280, 62281, 62282, 62320, 62321, 62322, 62323, 62324, 62325, 62326, 62327, 62328, 62329, 62350, 62355, 62360, 62361, 62362, 62365, 62370, 63360, 63661, 63662, 63663, 63664, 63665, 63688, 64400, 64405, 64408, 64415, 64416, 64417, 64418, 64420, 64425, 64430, 64435, 64445, 64446, 64447, 64448, 64449, 64450, 64451, 64454, 64461, 64463, 64479, 64483, 64486, 64487, 64488, 64489, 64490, 64493, 64505, 64510, 64517, 64520, 64530, 64600, 64605, 64610, 64620, 64624, 64625, 64630, 64633, 64635, 64640, 64680, 64681, 72275, 93503, 95990, 95991

Denominator Exclusions
- None

Numerator
Patients who have a documented patient escort prior to the start of anesthesia

Numerator Quality-Data Coding Options for Reporting Satisfactorily
Performance Met:
11A48 Patient escort is documented prior to start of anesthesia

Performance Not Met:
11A49 Patient escort is NOT documented prior to start of anesthesia

Rationale
Current CMS regulations require that patients who undergo ambulatory surgery must be discharged in the company of a responsible adult who will accompany the patient after the discharge. However, the regulation includes an allowance for physicians to exempt patients from requiring an escort on a case by case basis. With increasingly complex procedures being performed in the ambulatory setting, we believe that differences in the use of escort exemptions reflect differences in the quality of care provided.

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA) / Anesthesia Quality Institute (AQI)

Number of Multiple Performance Rates: Not applicable

Proportion Measure Scoring Yes

Continuous Measure Scoring: No

Risk Adjustment: No

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IIM023: Neuromuscular Blockade: Documented Assessment of Neuromuscular Function Prior to Extubation

Measure Description: Percentage of patients requiring anesthesia services with a documented assessment of neuromuscular blockade reversal after last dose of non-depolarizing neuromuscular blocker

NQS Domain / Meaningful Measures Area
Patient Safety / Preventable Healthcare Harm

Measure Type
Process

High Priority Status
Yes

Inverse Measure
No

Instructions
This measure is to be reported each time a patient undergoes a procedure with anesthesia services during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

Measure Reporting via the Qualified Clinical Data Registry
Patient demographics, CPT codes and Registry codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

Denominator
All patients requiring anesthesia services that have received, either by bolus or infusion, a non-depolarizing neuromuscular blocker (NMB) and were extubated post-operatively or in the PACU

Denominator Definition: For the purposes of this measure, qualifying neuromuscular blocker medications include:
- Atracurium
- Cisatracurium
- Pancuronium
- Rocuronium
- Vecuronium

Denominator Criteria (Eligible Cases):
Patient regardless of age
AND

Patient encounter during the reporting period (CPT): 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00324, 00350, 00352, 00354, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00526, 00528, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00566, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00704, 00706, 00710, 00712, 00714, 00716, 00718, 00720, 00722, 00724, 00726, 00728, 00730, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00804, 00806, 00811, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 00954, 00970, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01300, 01302, 01304, 01306, 01380, 01382, 01390, 01392, 01400, 01402,
Denominator Exclusions

- ASA Physical Status 5 or 6

Numerator

Cases with a documented assessment of neuromuscular blockade AFTER last dose or stopping of infusion of neuromuscular blocker and before earliest extubation

Numerator Definition: A documented assessment of neuromuscular blockade can include

- Train of Four Count (1, 2, 3, or 4). A Train of Four value of ‘0’ is accepted for cases in which sugammadex will be administered for reversal.
- Assessment for tetany
- TOF ratio provided by acceleromyography
- Double-burst stimulation

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met:

11A19 Patient had documented assessment of neuromuscular blockade AFTER last dose or stopping of infusion of neuromuscular blocker and before earliest extubation

OR

Performance Not Met:

11A20 Patient did not have documented assessment of neuromuscular blockade AFTER last dose or stopping of infusion of neuromuscular blocker and before earliest extubation

NQF Number: Not applicable

eCQM: Not applicable

Rationale

Postoperative residual neuromuscular blockade can lead to significant complications. Several studies have found associations between the use of neuromuscular blockade agents (NMBA) and residual neuromuscular blockade in the recovery room. Adverse postoperative respiratory outcomes are even more frequent when patients receive NMBA and reversal agents are not used. A mainstay of residual blockade prevention continues to be monitoring neuromuscular depth, to guide appropriate usage of reversal agents like neostigmine and sugammadex. Due to variability in duration of muscle relaxants, even in defasciculating doses, we recommend that TOF is monitored when any non-depolarizing neuromuscular blockers are administered.

This measure was developed as an adaptation from the Multicenter Perioperative Outcomes Group (MPOG) QCDR measure NMB01: Train of Four Taken. ASA worked with MPOG during the development of this measure to ensure the measures are aligned and harmonized.

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Clinical Recommendation Statements:

2013 ASA Practice Guidelines for Postanesthetic Care

“Assessment of neuromuscular function should be performed during emergence and recovery for patients who have received nondepolarizing neuromuscular blocking agents or who have medical conditions associated with neuromuscular dysfunction.”

Data Source: Claims/Paper Medical Record, Registry

Measure Steward: American Society of Anesthesiologists (ASA)/Anesthesia Quality Institute (AQI)

Number of Performance Rates: 1
Overall Performance Rate: 1
Proportion Measure Scoring: Yes
Continuous Measure Scoring: No
Risk Adjustment: No
IIM024: Neuromuscular Blockade: Reversal Administered

**Measure Description:** Percentage patients aged 12 years and older, requiring anesthesia services where non-depolarizing neuromuscular blockade is used and neostigmine, sugammadex, and/or edrophonium are administered prior to extubation

**NQS Domain / Meaningful Measures Area**
Patient Safety / Preventable Healthcare Harm

**Measure Type**
Process

**High Priority Status**
Yes

**Inverse Measure**
No

**Instructions**
This measure is to be reported each time a patient undergoes a procedure with anesthesia services during the reporting period. It is anticipated that qualified anesthesia providers and eligible clinicians who provide denominator-eligible services will submit this measure.

**Measure Reporting via the Qualified Clinical Data Registry**
Patient demographics, CPT codes and Registry codes are used to identify patients who are included in the measure denominator. Registry codes are used to report the numerator of the measure.

**Denominator**
All patients aged 12 years and older, requiring anesthesia services that have received, either by bolus or infusion, a non-depolarizing neuromuscular blocker (NMB) AND were extubated post-operatively or in the PACU

**Denominator Definition:** For the purposes of this measure, qualifying neuromuscular blocker medications include:
- Atracurium
- Cisatracurium
- Pancuronium
- Rocuronium
- Vecuronium

Mivacurium and Doxacurium are not included in this measure.

**Denominator Criteria (Eligible Cases):**
- Patient aged 12 years and older
- **AND**
  - **Patient encounter during the reporting period (CPT):** 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00324, 00350, 00352, 00400, 00402, 00404, 00406, 00410, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00528, 00529, 00530, 00532, 00534, 00537, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00556, 00600, 00604, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00731, 00732, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00811, 00812, 00813, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00872, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01130, 01140, 01140, 01150, 01160, 01170,

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01173, 01200, 01202, 01210, 01212, 01214, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01490, 01500, 01502, 01520, 01522, 01550, 01552, 01554, 01556, 01560, 01562, 01610, 01620, 01630, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01680, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933, 01935, 01936, 01951, 01952, 01958, 01960, 01961, 01962, 01963, 01965, 01966, 01967, 01991, 01992

AND
Received non-depolarizing neuromuscular blocker (NMB): 11A17

AND
Patient was extubated post-operatively or in the PACU: 11A18

Denominator Exclusions:
- ASA Physical Status 5 or 6
- Patient (age > 12 years) received defasciculating dose of: Vecuronium ≤1mg, Cisatracurium ≤2mg, Rocuronium ≤10mg: 11A21

Numerator
Cases with documentation of neostigmine, Sugammadex, and/or edrophonium administered before earliest extubation OR a period of >3 hours between last dose of non-depolarizing medication and extubation OR documentation of sufficient neuromuscular blockade reversal after last dose of NMB and before earliest extubation

Numerator Quality-Data Coding Options for Reporting Satisfactorily

Performance Met:
11A22 Documentation of neostigmine, Sugammadex, and/or edrophonium administered before earliest extubation

OR
Performance Met:
11A23 Period of >3 hours between last dose of non-depolarizing medication and extubation

OR
Performance Met:
11A24 Documentation of sufficient neuromuscular blockade reversal after last dose of NMB and before earliest extubation

OR

Performance Not Met:
11A25 No documentation of neostigmine, Sugammadex, and/or edrophonium administered or sufficient neuromuscular blockade reversal after last dose of NMB and before earliest extubation AND <3 hours between last dose of non-depolarizing medication and extubation

NQF Number: Not applicable

eCQM: Not applicable

Rationale
Postoperative residual neuromuscular blockade can lead to significant complications. Several studies have found associations between the use of neuromuscular blockade agents (NMBA) and residual neuromuscular blockade in the recovery room. Adverse postoperative respiratory outcomes are even more frequent when patients receive NMBA and reversal agents are not used. A mainstay of residual blockade prevention continues to be monitoring neuromuscular depth, to guide appropriate usage of reversal agents like neostigmine and sugammadex. Due to variability in duration

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of muscle relaxants, even in defasciculating doses, we recommend that TOF is monitored when any nondepolarizing neuromuscular blockers are administered.

This measure was developed as an adaptation from the Multicenter Perioperative Outcomes Group (MPOG) QCDR measure NMB02: Reversal Administered. ASA worked with MPOG during the development of this measure to ensure the measures are aligned and harmonized.

Clinical Recommendation Statements:

**2013 ASA Practice Guidelines for Postanesthetic Care**

“Specific antagonists should be administered for reversal of residual neuromuscular blockade when indicated.”

**Data Source:** Claims/Paper Medical Record, Registry

**Measure Steward:** American Society of Anesthesiologists (ASA)/Anesthesia Quality Institute (AQI)

**Number of Performance Rates:** 1

**Overall Performance Rate:** 1

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk Adjustment:** No
IIM025: ePreop 31: Intraoperative Hypotension among Non-Emergent Noncardiac Surgical Cases

**Measure Description:** Percentage of general anesthesia cases in which mean arterial pressure (MAP) fell below 65 mmHg for cumulative total of 15 minutes or more

**NQS Domain / Meaningful Measures Area**
Patient Safety / Preventable Healthcare Harm

**Measure Type**
Intermediate Outcome

**High Priority Status**
Yes

**Inverse Measure**
Yes - A lower score indicates better quality. Note that providers are not expected to receive a score of zero on the measure, because some patients could have a MAP that falls below 65 for reasons outside a provider’s control.

**Instructions**
This measure evaluates the proportion of cases in which the patient’s MAP is below 65 mmHg for 15 minutes or more, cumulatively over the course of the surgery. The numerator condition is met when MAP is below 65 mmHg for one continuous period lasting 15 minutes or more, or if the patient has several discrete periods with a MAP below 65 mmHg that collectively sum to 15 minutes or more. Note that this measure is not intended to substitute for the clinician’s judgement about managing IOH for any given patient, and for some patients the clinician may manage blood pressure using a higher or lower target MAP (e.g., a higher MAP target for patients with chronic hypertension).

To report the measure, the reporting clinician must submit data on the patient’s MAP over the course of the surgery as monitored by an anesthesia information management system (AIMS). The reporting clinician must submit intraoperative patient vitals extracted directly from an interface with the monitor. Reporting clinicians who track blood pressure manually are not eligible to report the measure. If the record for a given case includes both vitals pulled from the monitor and manually recorded vitals, only those from the monitor will be used to score the measure.

The first blood pressure reading is defined as the anesthesia start time. The measure end time is defined as the anesthesia end time. A given blood pressure reading will be attributed to the period that runs from the time the reading was recorded to the time of either the next reading or the measure end time. If the period between a given reading and either the next reading or the measure end time lasts for longer than five minutes, the reading will only be attributed for five minutes. If the reporting clinician monitors a patient using more than one method and there are two MAPs available at the same point in time, the measure uses the invasive value for scoring the measure. The measure attributes the full case to all reporting clinicians who provide care during any portion of the case from the beginning to the end of the measurement period.

The measure excludes patients with a baseline MAP below 65 mmHg. To determine the patient’s baseline MAP, the measure relies on the most recent reading taken from the preoperative holding area. If no such reading is available, the measure uses the most recent MAP taken in the operating room before induction of anesthesia.

If a clinician does not have MAP values available to report either for the baseline MAP or for measurements across the measurement period, the clinician may submit pairs of systolic and diastolic blood pressures (SBPs and DBPs) as a replacement for the MAP. The registry collecting the data will use these systolic and diastolic pressure values to calculate MAP values. Specifically, the registry will calculate MAP using the following formula: \( MAP = \frac{1}{3}(SBP) + \frac{2}{3}(DBP) \) (Sesso et al. 2000).

Non-emergency surgeries include both elective and urgent surgeries.

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Because longitudinal blood pressure data can contain artifactual values (for example, inaccurate readings caused by the surgeon’s leaning on the blood pressure cuff), the measure will drop MAP, SBP, and DBP readings that are likely to be artifacts. Specifically, the measure will drop individual MAP readings that meet any of the following criteria:

- Documented as an artifact by the clinician
- SBP ≥ 300 mmHg or ≤20 mmHg
- DBP ≤5 mmHg or DBP ≥ 225 mmHg
- SBP and DBP within 5 mmHg
- MAP ≤30 mmHg or ≥ 250 mmHg

**Measure Reporting via the Qualified Clinical Data Registry**

CPT codes, patient demographics and billing data are used to identify patients who are included in the measure’s denominator. Registry codes are used to report the numerator. Reporting clinicians who track information manually are not eligible to report the measure.

**Denominator**

- Unadjusted measure score: All cases in which adults (ages 18 and older) with noncardiac, non-emergency surgery require general anesthesia or monitored anesthesia care.
- Risk adjusted measure score: The expected number of cases in which patients have a MAP below 65 mmHg that exceeds the cumulative length of 15 minutes with noncardiac, non-emergency surgery requiring general anesthesia or monitored anesthesia care, based on the risk adjustment model.

**Denominator Criteria (Eligible Cases):**

- Patient aged 18 years and older
- **AND**
- **Anesthesia Types:** Monitored Anesthesia Care (MAC), General Anesthesia
- **AND**
- **Patient encounter during the reporting period (CPT):**
  - 00100, 00103, 00160, 00162, 00164, 00170, 00174, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 00218, 00220, 00222, 00300, 00320, 00322, 00350, 00352, 00400, 00402, 00404, 00406, 00450, 00454, 00470, 00472, 00474, 00500, 00520, 00522, 00524, 00526, 00528, 00530, 00532, 00534, 00539, 00540, 00541, 00542, 00546, 00548, 00550, 00600, 00602, 00604, 00620, 00622, 00624, 00625, 00626, 00630, 00632, 00634, 00635, 00640, 00642, 00644, 00650, 00652, 00654, 00656, 00658, 00660, 00662, 00664, 00666, 00668, 00670, 00700, 00702, 00730, 00732, 00750, 00752, 00756, 00770, 00790, 00792, 00794, 00796, 00800, 00802, 00820, 00830, 00832, 00840, 00842, 00844, 00846, 00848, 00850, 00860, 00862, 00864, 00866, 00868, 00870, 00872, 00874, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00916, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00950, 00952, 01112, 01120, 01140, 01150, 01152, 01160, 01170, 01173, 01200, 01202, 01210, 01212, 01214, 01215, 01220, 01230, 01232, 01234, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 01430, 01432, 01440, 01442, 01444, 01462, 01464, 01470, 01472, 01474, 01480, 01482, 01484, 01486, 01500, 01502, 01520, 01522, 01610, 01620, 01622, 01630, 01632, 01634, 01636, 01638, 01650, 01652, 01654, 01656, 01670, 01710, 01712, 01714, 01716, 01730, 01732, 01740, 01742, 01744, 01756, 01758, 01760, 01770, 01772, 01780, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01852, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01932, 01933, 01935, 01936, 01951, 01952, 01953

**Denominator Exclusions**

- The measure excludes patients with a baseline MAP below 65 mmHg: 99A16
- To determine the patient’s baseline MAP, the measure relies on the most recent reading taken from the preoperative holding area. If no such reading is available, the measure uses the most recent MAP taken in the operating room before induction of anesthesia.
If a clinician does not have MAP values available to report either for the baseline MAP or for measurements across the measurement period, the clinician may submit pairs of systolic and diastolic blood pressures (SBPs and DBPs) as a replacement for the MAP. The registry collecting the data will use these systolic and diastolic pressure values to calculate MAP values. Specifically, the registry will calculate MAP using the following formula: $MAP = \frac{1}{3} (SBP) + \frac{2}{3} (DBP)$ (Sesso et al. 2000).

- American Society of Anesthesiologists (ASA) Physical Status Classification of 5 and 6
- Emergency case

**Numerator**

Patients who have a MAP below 65 mmHg that exceeds the cumulative length of 15 minutes with noncardiac, non-emergency surgery requiring general anesthesia or monitored anesthesia care

**Numerator Quality-Data Coding Options for Reporting Satisfactorily**

**Performance Met:** 99A17  
MAP below 65 mmHg that exceeds the cumulative length of 15 minutes.

**Performance Not Met:** 99A18  
MAP does not fall below 65 mmHg for a cumulative length of 15 minutes.

**NQF Number:** Not applicable

**eCQM:** Not applicable

**Rationale**

MAP below 60–70 mmHg among adults having non-cardiac surgery is associated with increased risk of acute kidney injury (AKI), myocardial injury, and mortality, and the risk is a function of both hypotension severity and duration (Sessler et al. 2019). Noncardiac surgery patients are at increased risk of AKI when their cumulative time below a MAP of 65 mmHg reaches or exceeds 13 minutes. When patients fall even further below this threshold (for example, MAP below 55 mmHg), even shorter durations are associated with increased risk of AKI (Salmasi et al. 2017). Among adult noncardiac surgery patients, 31.3 percent have experienced MAP below 65 mmHg for 10 minutes or longer (Bijker et al. 2007). Different approaches for managing patients’ blood pressure during surgery are significantly associated with higher or lower risks of postoperative organ dysfunction, including renal dysfunction (Futier et al.2017).

**Data Source:** Claims, EHR (AIMS, patient record)

**Measure Steward:** ePreop Anesthesia Quality Registry/Cleveland Clinic

**Number of Multiple Performance Rates:** Not applicable

**Proportion Measure Scoring:** Yes

**Continuous Measure Scoring:** No

**Risk adjustment:** Variables incorporated into the risk adjustment model include the following:

- Age
- ASA physical status classification
- Body mass index
- Duration of surgery
- Gender
Steps for Calculating Unadjusted and Risk-Adjusted Measure Scores:

The measure is risk-adjusted to account for patient-level and case-level risk factors that affect the probability of IOH that are outside of an anesthesia provider’s control. The risk adjustment model calculates the likelihood that a given case would result in IOH based on patient factors; the risk-adjusted measure then scores a clinician by comparing observed instances of IOH to the expected number of IOH cases for that clinician, given the characteristics of their patient population. Clinicians with more observed cases of IOH than expected would receive a higher (worse) score than those with fewer observed cases of IOH than expected.

Use the following steps to calculate clinician-level unadjusted and risk-adjusted measure scores. Note that this measure is specified at the individual clinician-level, but those wishing to report this measure at the group level can follow the calculation steps below but perform those calculations at the group rather than clinician-level (e.g., identifying measure denominator cases associated with the provider group).

1. First, clean the data to be used in calculating the measure scores. Check for missing or implausible values for key variables, and drop artefactual blood pressure readings from the longitudinal blood pressure data.
2. Apply the measure logic to all cases occurring during the measurement period to identify all cases meeting the denominator criteria, all cases excluded from the denominator, and all cases meeting the numerator criteria (i.e., cases with IOH).
3. Calculate a clinician-level unadjusted measure score. This score is a percentage, with the numerator defined as all numerator cases associated with the clinician, and the denominator defined as all denominator cases (minus excluded cases) associated with the clinician.
4. Apply the risk adjustment model to calculate the predicted probability that a given case would meet the numerator criteria (i.e., result in IOH). The model use logistic regression to calculate the log-odds that a given case will result in IOH based on patient- and case-level factors. Apply the model to all cases that meet the denominator criteria and that are not excluded from the denominator. Transform the case-level log-odds into case-level predicted probabilities. To do so, exponentiate the log-odds to first transform it to odds. Then transform the odds to probability by taking the odds divided by 1 plus the odds.
5. Calculate a clinician-level expected number of IOH cases. For a given clinician, take the sum of the predicted probabilities for all denominator cases associated with the clinician (minus exclusions). This sum represents the total number of cases for the clinician that are expected to result in IOH, given the risk level of his or her patients.
6. Calculate a risk-adjusted score for each clinician. The score is the ratio of the clinician’s total count of cases meeting the numerator criteria to the expected number of IOH cases, among cases that meet denominator criteria for that clinician.
7. (Optional) Transform the risk-adjusted score for each clinician into a percentage. Note that performing this transformation is not necessary to calculate the measure, but individual sites may find that representing the scores as a percentage may be helpful for communicating with providers about their measure score. To do so, multiply each clinician’s risk adjusted score from Step 6 (the observed to expected ratio) by the average unadjusted IOH measure score for the larger unit within which clinicians are being compared, for example, a group practice, hospital department, or national reporting program. This transformation may make the risk-adjusted score more easily interpretable, although it is not a true percentage generated from the ratio of numerator and denominator, and it can result in “percentages” greater than 100%.

The remainder of this document describes each of these steps in detail.

Step 1: Clean the data to be used in measure score calculation

This section described the recommended steps for cleaning the data to be included in the measure score calculation. It identifies checks to run on the data, but in most cases it does not proscribe a specific approach for cleaning the data, leaving that determination to each individual site.

1. Check for missing values of any of the risk adjustment variables (age, gender, ASA status, BMI, surgery length); the risk adjustment model requires that all covariates are non-missing for each case. Determine how best to address missing values (e.g., impute them, or drop the case if there are few cases with missing values).
2. Check for implausible values for the risk adjustment variables. Determine how best to address them (e.g., correct them if possible, or drop the case if there are few implausible values).
3. Check for implausible values for the timestamp variables. For example, anesthesia start time and induction time should always occur before anesthesia end time. Determine how best to address implausible timelines (e.g., correct them if possible, or drop the case if there are few implausible timelines).
4. Drop artefactual blood pressure readings from longitudinal blood pressure data. See Guidelines section above for details.

**Step 2: Apply measure logic to identify denominator cases, denominator exclusions, and numerator cases**

This section describes the steps used to apply the measure logic to each case included in the measure’s initial population. See specifications above and attached measure flow diagram for more detailed guidance on applying measure logic, including definitions of all key parameters.

1. Run the measure on all anesthesia cases during the measurement period, representing a full calendar year.
2. Apply the initial population criteria to each case (see Initial Population section above for definitions for key parameters), and remove cases from the population if any of the below scenarios applies:
   a. Patient is under 18 years of age
   b. Case is an emergency surgery
   c. Case does not include general anesthesia or monitored anesthesia care
3. Use the cases in the initial population as the denominator cases.
4. Apply denominator exclusion criteria to the denominator cases (see Denominator Exclusions section above for definitions of key parameters), and exclude cases if any of the below scenarios applies:
   a. Case has ASA Physical Status Classification of 5 or 6
   b. Patient has baseline MAP below 65 mmHg
   c. Case is a cardiac surgery
   d. Case is an obstetric non-operative procedure
   e. Case is a liver or lung transplant
   f. Case is a cataract surgery

For each denominator case not excluded from the measure, apply the numerator criteria. Calculate the cumulative duration in which the patient’s MAP was below 65 mmHg from anesthesia start time to anesthesia end. If this duration reaches or exceeds 15 minutes, assign the case to the numerator population. Otherwise, do not assign the case to the numerator population.

**Step 3: Calculate the clinician-level unadjusted measure score**

This section describes the steps for calculating each clinician’s unadjusted score on the IOH measure.

1. For a given clinician, identify all cases the clinician is associated with that are included in the measure denominator.
2. Calculate the clinician’s unadjusted score on the measures using the following equation:

\[
\text{IOH}_{\text{Unadjusted}} = \frac{\text{(Sum of numerator cases)}}{\text{(Sum of denominator cases)}} - \text{(Sum of denominator)}
\]

**Step 4: Apply risk adjustment model to calculate predicted probability of IOH**

After calculating the unadjusted score, the next step is to apply the risk adjustment logistic regression model to each denominator case to determine the case’s predicted probability of inclusion in the numerator population (i.e., of IOH occurring) given the case mix. The model includes five risk adjustment variables that may have an association with risk of IOH based on the clinical literature, input from experts during development of the measure, results from measure testing, or a combination of these factors. The risk adjustment variables include the patient’s age, the ASA Physical

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Status Classification for the case, the patient's body mass index (BMI), the duration of the surgery, and the patient's gender.

These variables were selected because they are associated with IOH but are outside the control of the clinician. In the model, these categorical variables with k categories are transformed into (k-1) variables with two levels.

1. Apply the risk adjustment model to each case that is part of the denominator population and that has not been excluded.
2. The risk adjustment model is a logistic regression model with the following form:

\[
\text{logit}(\text{IOH}) = \beta_0 + \beta_1 \times \text{Age} + \beta_2 \times \text{ASA}_1 + \beta_3 \times \text{ASA}_2 + \beta_4 \times \text{ASA}_4 + \beta_5 \times \text{BMI} + \beta_6 \times \text{Surg\_Length\_Cat\_60–119} \\
+ \beta_7 \times \text{Surg\_Length\_Cat\_120–179} + \beta_8 \times \text{Surg\_Length\_Cat\_180–239} + \beta_9 \times \text{Surg\_Length\_Cat\_240–299} \\
+ \beta_{10} \times \text{Female}_1
\]

Where:

- \(\beta_0\) = the intercept term of the logistic regression
- \(\beta_1\) = the coefficient for age
- \(\text{Age}\) = the age in years of the patient at the time of surgery (in years)
- \(\beta_2\) = the coefficient for ASA physical status classification being 1.
- \(\text{ASA}_1\) = a binary variable indicating whether the ASA physical status classification of the case is 1, with \(\text{ASA}_1=1\) for cases in which the ASA physical status classification is 1, and \(\text{ASA}_1=0\) for cases in which it is not 1.
- \(\beta_3\) = the coefficient for ASA physical status classification being 2.
- \(\text{ASA}_2\) = a binary variable indicating whether the ASA physical status classification of the case is 2, with \(\text{ASA}_2=1\) for cases in which the ASA physical status classification is 2, and \(\text{ASA}_2=0\) for cases in which it is not 2.
- \(\beta_4\) = the coefficient for ASA physical status classification being 4.
- \(\text{ASA}_4\) = a binary variable indicating whether the ASA physical status classification of the case is 4, with \(\text{ASA}_4=1\) for cases in which the ASA physical status classification is 4, and \(\text{ASA}_4=0\) for cases in which it is not 4.
- \(\beta_5\) = the coefficient for body mass index (BMI)
- \(\text{BMI}\) = the BMI of the patient at the time of surgery
- \(\beta_6\) = the coefficient for the duration of surgery being between 60 and 119 minutes
- \(\text{Surg\_Length\_Cat\_60–119}\) = a binary variable indicating whether the duration of surgery from anesthesia start time to anesthesia end time was between 60 and 119 minutes, with \(\text{Surg\_Length\_Cat\_60–119}=1\) for surgeries that met this criteria and \(\text{Surg\_Length\_Cat\_60–119}=0\) for surgeries that did not meet this criteria.
- \(\beta_7\) = the coefficient for the duration of surgery being between 120 and 179 minutes
- \(\text{Surg\_Length\_Cat\_120–179}\) = a binary variable indicating whether the duration of surgery from anesthesia start time to anesthesia end time was between 120 and 179 minutes, with \(\text{Surg\_Length\_Cat\_120–179}=1\) for surgeries that met this criteria and \(\text{Surg\_Length\_Cat\_120–179}=0\) for surgeries that did not meet this criteria.
- \(\beta_8\) = the coefficient for the duration of surgery being between 180 and 239 minutes
- \(\text{Surg\_Length\_Cat\_180–239}\) = a binary variable indicating whether the duration of surgery from anesthesia start time to anesthesia end time was between 180 and 239 minutes, with \(\text{Surg\_Length\_Cat\_180–239}=1\) for surgeries that met this criteria and \(\text{Surg\_Length\_Cat\_180–239}=0\) for surgeries that did not meet this criteria.
- \(\beta_9\) = the coefficient for the duration of surgery being between 240 and 299 minutes
- \(\text{Surg\_Length\_Cat\_240–299}\) = a binary variable indicating whether the duration of surgery from anesthesia start time to anesthesia end time was between 240 and 299 minutes.
minutes, with Surg_Length_Cat_240–299 = 1 for surgeries that met this criteria and Surg_Length_Cat_240–299 = 0 for surgeries that did not meet this criteria.

$\beta_{10}$ = the coefficient for the duration of surgery being 300 minutes or longer

$Surg\_Length\_Cat\_300$ = a binary variable indicating whether the duration of surgery from anesthesia start time to anesthesia end time was 300 minutes or longer, with $Surg\_Length\_Cat\_300$ = 1 for surgeries that met this criteria and $Surg\_Length\_Cat\_300$ = 0 for surgeries that did not meet this criteria.

$\beta_{11}$ = the coefficient for the gender of the patient

1 We used ASA physical status classification of 3 as the reference group for the ASA status variables.

$Female\_1$ = a binary variable indicating the gender of the patient, with $Female\_1$ = 1 for female and 0 for male.

See Table 1 for the values of the constant and the regression coefficients. See appendix for the constant and regression coefficients for an alternative specification of the IOH measure that uses a 20-minute duration threshold to define IOH.
Table 1: Parameters for risk adjustment model for the intraoperative hypotension quality measure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_0$: Constant/Intercept</td>
<td>-1.482</td>
</tr>
<tr>
<td>$\beta_1$: Coefficient 1: Age</td>
<td>-0.008</td>
</tr>
<tr>
<td>$\beta_2$: Coefficient 2: ASA_1</td>
<td>0.400</td>
</tr>
<tr>
<td>$\beta_3$: Coefficient 3: ASA_2</td>
<td>0.164</td>
</tr>
<tr>
<td>$\beta_4$: Coefficient 4: ASA_4</td>
<td>0.532</td>
</tr>
<tr>
<td>$\beta_5$: Coefficient 5: BMI</td>
<td>-0.018</td>
</tr>
<tr>
<td>$\beta_6$: Coefficient 6: Surg_Length_Cat_60–119</td>
<td>1.231</td>
</tr>
<tr>
<td>$\beta_7$: Coefficient 7: Surg_Length_Cat_120–179</td>
<td>1.664</td>
</tr>
<tr>
<td>$\beta_8$: Coefficient 8: Surg_Length_Cat_180–239</td>
<td>1.871</td>
</tr>
<tr>
<td>$\beta_9$: Coefficient 9: Surg_Length_Cat_240–299</td>
<td>2.128</td>
</tr>
<tr>
<td>$\beta_{10}$: Coefficient 10: Surg_Length_Cat_300–359</td>
<td>2.810</td>
</tr>
<tr>
<td>$\beta_{11}$: Coefficient 11: Female1</td>
<td>0.171</td>
</tr>
</tbody>
</table>

3. The model calculates the log-odds of each case developing IOH, given the risk factors for the given patient and case. Next, transform the case-level log-odds into case-level predicted probabilities. To do so, exponentiate the log-odds to first transform it to odds. Then transform the odds to probability by taking the odds divided by 1 plus the odds. Predicted probabilities can range from 0.00 to 1.00. Values closer to 1.00 represent a higher likelihood that the case would result in IOH. The predicted probability (denoted as $IOH_{expected}$) can be presented as:

$$IOH_{expected} = \frac{e^{\text{logit}(IOH)}}{1 + e^{\text{logit}(IOH)}}$$

Where, logit(IOH) is defined in Step 4.2.

Step 5: Calculate the clinician-level expected number of IOH cases

Next, determine each clinician’s expected number of IOH cases based on the risk-adjustment model by summing the case-level predicted probabilities.

1. For a given clinician, identify all cases the clinician is associated with that are included in the measure denominator and that have not been excluded.

2. Calculate the clinician’s expected number of IOH cases by summing all of the predicted probabilities of IOH for all of the denominator cases.

Step 6: Calculate the clinician-level risk-adjusted measure score

After computing an observed and expected number of IOH cases for each clinician, the measure uses those two values as inputs for the risk-adjusted score.

1. For a given clinician, use the observed and expected number of IOH cases to calculate the risk-adjusted score. The observed number of cases is the numerator from the equation in Step 3, and the expected number of cases is the sum calculated in Step 5. Calculate the risk-adjusted score as follows:

$$IOH_{\text{Adjusted}} = \frac{\text{Sum of numerator cases}}{\text{Sum of expected IOH cases}}$$
The resulting score will be a ratio. A score of 1 indicates the clinician had the number of IOH cases we would expect, based on their case mix. Scores less than 1 indicate the clinician had fewer IOH cases than predicted, meaning they are performing better than expected for their case mix. Scores greater than 1 indicate the clinician had more cases of IOH than predicted, meaning they are performing worse than expected given their case mix.

**Step 7 (optional): Transform risk-adjusted measure score into a percentage**

To make the risk-adjusted scores more easily interpretable, the clinician-level ratios calculated in Step 6 can be multiplied by the overall unadjusted performance rate on the measure to transform them into percentages. Note that performing this transformation is not necessary to calculate the measure, but individual sites may find that representing the scores as a percentage may be helpful for communicating with providers about their measure score. To do so, multiply each clinician’s risk adjusted score from Step 6 (the observed to expected ratio) by the average unadjusted IOH measure score for the larger unit within which clinicians are being compared, for example, a group practice, hospital department, or national reporting program. This transformation may make the risk-adjusted score more easily interpretable, although it is not a true percentage generated from the ratio of numerator and denominator, and it can result in “percentages” greater than 100%.

\[
\text{IOH}_{\text{adjusted}} = \frac{\text{Sum of numerator cases}}{\text{Sum of expected IOH cases}} \times \text{Overall rate}
\]

**References**


APPENDIX A: Denominator-Eligible Diabetes ICD-10 Codes for IIM 20 and 21


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