2017 Emergency-Clinical Performance Registry (E-CPR)
Measure Specifications Manual

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E-CPR (Emergency – Clinical Performance Registry) Measure #2
Adopted from 2017 CMS Hospital Outpatient Measure #20 (NQF #0498) Specifications

Measure Title: Door to Diagnostic Evaluation by a Provider – Emergency Department (ED) Patients

Inverse Measure: Yes

Measure Description: Mean Time from ED Arrival to Provider Contact for ED Patients Evaluated by the Eligible Professional

National Quality Strategy Domain: Patient Safety

Type of Measure: Outcome

Number of Performance Rates: 3
1. Time (in minutes) from ED Arrival to Provider (MD/DO/PA/NP) Contact *(Overall rate; composite score of performance rates 2 and 3 below)*
2. Time (in minutes) from ED Arrival to Provider (MD/DO/PA/NP) Contact for Adult (≥ 18 years of age) ED Patients
3. Time (in minutes) from ED Arrival to Provider (MD/DO/PA/NP) Contact for Pediatric (< 18 years of age) ED Patients

Measure Scoring: Continuous

Risk Adjustment: Yes

Numerator: Time (in minutes) from ED Arrival to Provider (MD/DO/PA/NP) Contact for ED Patients
- Definition of Arrival Time: The earliest documented time the patient arrived at the ED
- Definition of Provider Contact Time: The time of the first direct, personal exchange between an ED patient and the Eligible Professional

Denominator: Any Patient Evaluated by the Eligible Professional (MD/DO/PA/NP) in the ED (E/M Codes 99281-99285 & 99291-99292 AND Place of Service Indicator: 23)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:
The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level demographic and clinical characteristics. Arrival to ED provider contact times are risk-adjusted as continuous variables after normalization.

Risk-adjustment derivation:

Model: A regression model with fixed-effects (patient age, sex, visit acuity, previous ED visits and presence of co-morbidities) as well as hospital-level effects (state and ED volume) is used. Normal distribution is ensured and then a linear regression performed. To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1)

the data will have a 90% truncation by dropping values below the 5th percentile or above the 95th percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).
Dataset: The most current National Hospital Ambulatory Medical Care Survey (NHAMCS) dataset is utilized. The derivation dataset will be a 75% random sample of the relevant dataset. The co-morbidities are derived in the NHAMCS dataset by mapping the ICD9 and ICD10 diagnoses to the Charlson comorbidity index.

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Door to Diagnostic Evaluation by a Provider Observed/Expected Ratio

Rationale: (Adopted from 2017 CMS Hospital Outpatient Measure #20 Specifications)
Reducing the time patients remain in the emergency department (ED) can improve access to treatment and increase quality of care. Reducing this time potentially improves access to care specific to the patient condition and increases the capability to provide additional treatment. In recent times, EDs have experienced significant overcrowding. Although once only a problem in large, urban, teaching hospitals, the phenomenon has spread to other suburban and rural healthcare organizations. According to a 2002 national U.S. survey, more than 90 percent of large hospitals report EDs operating "at" or "over" capacity. Overcrowding and heavy emergency resource demand have led to a number of problems, including ambulance refusals, prolonged patient waiting times, increased suffering for those who wait, rushed and unpleasant treatment environments, and potentially poor patient outcomes. Approximately one third of hospitals in the U.S. report increases in ambulance diversion in a given year, whereas up to half report crowded conditions in the ED. In a recent national survey, 40 percent of hospital leaders viewed ED crowding as a symptom of workforce shortages. ED crowding may result in delays in the administration of medication such as antibiotics for pneumonia and has been associated with perceptions of compromised emergency care. For patients with non-ST-segment-elevation myocardial infarction, long ED stays were associated with decreased use of guideline-recommended therapies and a higher risk of recurrent myocardial infarction. When EDs are overwhelmed, their ability to respond to community emergencies and disasters may be compromised.

Measures that differentiate between sub-populations of patients such as Adult and Pediatric patients allow Eligible Professionals to better recognize when opportunities for improvement exist within these sub-populations and allow them to further drive improvements.

Selected Rationale References:
(Adopted from 2017 CMS Hospital Outpatient Measure #20 Specifications)

- Diercks DB, et al. Prolonged emergency department stays of non-ST-segment-elevation myocardial infarction patients are associated with worse adherence to the American College of Cardiology/American Heart Association guidelines for management and increased adverse events. *Ann Emerg Med*. 2007; 50: 489-96.
- Derlet RW, Richards JR. Emergency department overcrowding in Florida, New York, and Texas. *South Med J*. 2002; 95:846-9.
- Derlet RW, Richards JR. Overcrowding in the nation's emergency departments: complex causes and disturbing effects. *Ann Emerg Med*. 2000; 35:63-8.
- Fatovich DM, Hirsch RL. Entry overload, emergency department overcrowding, and ambulance bypass. *Emerg Med J*. 2003; 20:406-9.
- Hwang U, Richardson LD, Sonuyi TO, Morrison RS. The effect of emergency department crowding on the management of pain in older adults with hip fracture. *J Am Geriatr Soc*. 2006; 54:270-5.
- Institute of Medicine of the National Academies. Future of emergency care: Hospital-based emergency care at the breaking point. *The National Academies Press* 2006.
- Kyriacou DN, Ricketts V, Dyne PL, McCollough MD, Talan DA. A 5-year time study analysis of emergency department patient care efficiency. *Ann Emerg Med*. 1999; 34:326-35.
- Pines JM, et al. ED crowding is associated with variable perceptions of care compromise. *Acad Emerg Med*. 2007; 14:1176-81
- Pines JM, et al. Emergency department crowding is associated with poor care for patients with severe pain. *Ann Emerg Med*. 2008; 51:6-7.
- Schull MJ, et al. Emergency department crowding and thrombolysis delays in acute myocardial infarction. *Ann Emerg Med.* 2004; 44:577-85.
- Siegel B, et al. Enhancing work flow to reduce crowding. *Jt Comm J Qual Patient Saf*. 2007; 33 (11 Suppl):57-67.
- Trzeciak S, Rivers EP. Emergency department overcrowding in the United States: an emerging threat to patient safety and public health. *Emerg Med J*. 2003; 20:402-5.
- Wilper AP, Woolhandler S, Lasser KE, McCormick D, Cutrona SL, Bor DH, Himmelstein DU. Waits to see an emergency department physician: U.S. trends and predictors, 1997-2004. *Health Aff* (Millwood). 2008; 27:w84-95.

E-CPR (Emergency – Clinical Performance Registry) Measure #5
Adopted from 2017 CMS Hospital Outpatient Measure #18 (NQF #0496) Specifications

Measure Title: Mean Time from Emergency Department (ED) Arrival to ED Departure for Discharged Lower Acuity ED Patients

Inverse Measure: Yes

Measure Description: Mean Time from ED Arrival to Time of Departure from the ED for Lower Acuity Patients Discharged from the ED

National Quality Strategy Domain: Person and Caregiver-Centered Experience and Outcomes

Type of Measure: Outcome

Number of Performance Rates: 1

Measure Scoring: Continuous

Risk Adjustment: Yes

Numerator: Time (in minutes) from ED arrival to ED departure for Lower Acuity Patients Discharged from the ED

- Definition of Arrival Time: The earliest documented time the patient arrived at the ED
- Definition of Departure Time: The time the patient departed from the ED

Denominator:

- Any Lower Acuity Patient Evaluated by the Eligible Professional in the ED (E/M Codes 99281-99283 AND Place of Service Indicator: 23) PLUS
- Disposition of Discharged (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:
The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level demographic and clinical characteristics. ED length of stay times are risk-adjusted as continuous variables after normalization.

Risk-adjustment derivation:

Model: A regression model with fixed-effects (patient age, sex, visit acuity, previous ED visits and presence of co-morbidities) as well as hospital-level effects (state and ED volume) is used. Normal distribution is ensured and then a linear regression performed. To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1) the data will have a 90% truncation by dropping values below the 5^{th} percentile or above the 95^{th} percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After

the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).
Dataset: The most current National Hospital Ambulatory Medical Care Survey (NHAMCS) dataset is utilized. The derivation dataset will be a 75% random sample of the relevant dataset. The co-morbidities are derived in the NHAMCS dataset by mapping the ICD9 and ICD10 diagnoses to the Charleston comorbidity index.

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Time from ED arrival to time of departure from the ED observed/expected ratio

Rationale: (Adopted from 2017 CMS Hospital Outpatient Measure #18 Specifications)
Reducing the time patients remain in the emergency department (ED) can improve access to treatment and increase quality of care. Reducing this time potentially improves access to care specific to the patient condition and increases the capability to provide additional treatment. In recent times, EDs have experienced significant overcrowding. Although once only a problem in large, urban, teaching hospitals, the phenomenon has spread to other suburban and rural healthcare organizations. According to a 2002 national U.S. survey, more than 90 percent of large hospitals report EDs operating "at" or "over" capacity. Overcrowding and heavy emergency resource demand have led to a number of problems, including ambulance refusals, prolonged patient waiting times, increased suffering for those who wait, rushed and unpleasant treatment environments, and potentially poor patient outcomes. Approximately one third of hospitals in the U.S. report increases in ambulance diversion in a given year, whereas up to half report crowded conditions in the ED. In a recent national survey, 40 percent of hospital leaders viewed ED crowding as a symptom of workforce shortages. ED crowding may result in delays in the administration of medication such as antibiotics for pneumonia and has been associated with perceptions of compromised emergency care. For patients with non-ST-segment-elevation myocardial infarction, long ED stays were associated with decreased use of guideline-recommended therapies and a higher risk of recurrent myocardial infarction. When EDs are overwhelmed, their ability to respond to community emergencies and disasters may be compromised.

Selected References:
(Adopted from 2017 CMS Hospital Outpatient Measure #18 Specifications)

- Diercks DB, et al. Prolonged emergency department stays of non-ST-segment-elevation myocardial infarction patients are associated with worse adherence to the American College of Cardiology/American Heart Association guidelines for management and increased adverse events. *Ann Emerg Med*. 2007; 50:489-96.
- Derlet RW, Richards JR. Emergency department overcrowding in Florida, New York, and Texas. *South Med J*. 2002; 95:846-9.
- Derlet RW, Richards JR. Overcrowding in the nation's emergency departments: complex

causes and disturbing effects. *Ann Emerg Med*. 2000; 35:63-8.
- Fatovich DM, Hirsch RL. Entry overload, emergency department overcrowding, and ambulance bypass. *Emerg Med J*. 2003; 20:406-9.
- Hwang U, Richardson LD, Sonuyi TO, Morrison RS. The effect of emergency department crowding on the management of pain in older adults with hip fracture. *J Am Geriatr Soc*. 2006; 54:270-5.
- Institute of Medicine of the National Academies. Future of emergency care: Hospital-based emergency care at the breaking point. *The National Academies Press* 2006.
- Kyriacou DN, Ricketts V, Dyne PL, McCollough MD, Talan DA. A 5-year time study analysis of emergency department patient care efficiency. *Ann Emerg Med*. 1999; 34:326-35.
- Pines JM, et al. ED crowding is associated with variable perceptions of care compromise. *Acad Emerg Med*. 2007; 14:1176-81.
- Pines JM, et al. Emergency department crowding is associated with poor care for patients with severe pain. *Ann Emerg Med*. 2008; 51:6-7.
- Schull MJ, et al. Emergency department crowding and thrombolysis delays in acute myocardial infarction. *Ann Emerg Med.* 2004; 44:577-85.
- Siegel B, et al. Enhancing work flow to reduce crowding. *Jt Comm J Qual Patient Saf*. 2007; 33 (11 Suppl):57-67.
- Trzeciak S, Rivers EP. Emergency department overcrowding in the United States: an emerging threat to patient safety and public health. *Emerg Med J*. 2003; 20:402-5.
- Wilper AP, Woolhandler S, Lasser KE, McCormick D, Cutrona SL, Bor DH, Himmelstein DU. Waits to see an emergency department physician: U.S. trends and predictors, 1997-2004. *Health Aff* (Millwood). 2008; 27:w84-95.

E-CPR (Emergency – Clinical Performance Registry) Measure #6
Adopted from 2017 CMS Hospital Outpatient Measure #18 (NQF #0496) Specifications

Measure Title: Mean Time from Emergency Department (ED) Arrival to ED Departure for Discharged Higher Acuity ED Patients

Inverse Measure: Yes

Measure Description: Mean Time from ED Arrival to Time of Departure from the ED for Higher Acuity Patients Discharged from the ED

National Quality Strategy Domain: Person and Caregiver-Centered Experience and Outcomes

Type of Measure: Outcome

Number of Performance Rates: 1

Measure Scoring: Continuous

Risk Adjustment: Yes

Numerator: Time (in minutes) from ED arrival to ED departure for Higher Acuity Patients Discharged from the ED

- Definition of Arrival Time: The earliest documented time the patient arrived at the ED
- Definition of Departure Time: The time the patient departed from the ED

Denominator:

- Any Higher Acuity Patient Evaluated by the Eligible Professional in the ED (E/M Codes 99284-99285 AND Place of Service Indicator: 23) PLUS
- Disposition of Discharged (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:
The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level demographic and clinical characteristics. ED length of stay times are risk-adjusted as continuous variables after normalization.

Risk-adjustment derivation:

Model: A regression model with fixed-effects (patient age, sex, visit acuity, previous ED visits and presence of co-morbidities) as well as hospital-level effects (state and ED volume) is used. Normal distribution is ensured and then a linear regression performed. To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1) the data will have a 90% truncation by dropping values below the 5^{th} percentile or above the 95^{th} percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After

the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).
Dataset: The most current National Hospital Ambulatory Medical Care Survey (NHAMCS) dataset is utilized. The derivation dataset will be a 75% random sample of the relevant dataset. The co-morbidities are derived in the NHAMCS dataset by mapping the ICD9 and ICD10 diagnoses to the Charleston comorbidity index.

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Time from ED arrival to time of departure from the ED observed/expected ratio

Rationale: (Adopted from 2017 CMS Hospital Outpatient Measure #18 Specifications) Reducing the time patients remain in the emergency department (ED) can improve access to treatment and increase quality of care. Reducing this time potentially improves access to care specific to the patient condition and increases the capability to provide additional treatment. In recent times, EDs have experienced significant overcrowding. Although once only a problem in large, urban, teaching hospitals, the phenomenon has spread to other suburban and rural healthcare organizations. According to a 2002 national U.S. survey, more than 90 percent of large hospitals report EDs operating "at" or "over" capacity. Overcrowding and heavy emergency resource demand have led to a number of problems, including ambulance refusals, prolonged patient waiting times, increased suffering for those who wait, rushed and unpleasant treatment environments, and potentially poor patient outcomes. Approximately one third of hospitals in the U.S. report increases in ambulance diversion in a given year, whereas up to half report crowded conditions in the ED. In a recent national survey, 40 percent of hospital leaders viewed ED crowding as a symptom of workforce shortages. ED crowding may result in delays in the administration of medication such as antibiotics for pneumonia and has been associated with perceptions of compromised emergency care. For patients with non-ST-segment-elevation myocardial infarction, long ED stays were associated with decreased use of guideline-recommended therapies and a higher risk of recurrent myocardial infarction. When EDs are overwhelmed, their ability to respond to community emergencies and disasters may be compromised.

Measures that differentiate between sub-populations of patients such as lower acuity and higher acuity patients allow Eligible Professionals to better recognize when opportunities for improvement exist within these sub-populations and allow them to further drive improvements.

Selected References:

(Adopted from 2017 CMS Hospital Outpatient Measure #18 Specifications)

- Diercks DB, et al. Prolonged emergency department stays of non-ST-segment-elevation myocardial infarction patients are associated with worse adherence to the American College of Cardiology/American Heart Association guidelines for management and

increased adverse events. *Ann Emerg Med*. 2007; 50:489-96.
- Derlet RW, Richards JR. Emergency department overcrowding in Florida, New York, and Texas. *South Med J*. 2002; 95:846-9.
- Derlet RW, Richards JR. Overcrowding in the nation's emergency departments: complex causes and disturbing effects. *Ann Emerg Med*. 2000; 35:63-8.
- Fatovich DM, Hirsch RL. Entry overload, emergency department overcrowding, and ambulance bypass. *Emerg Med J*. 2003; 20:406-9.
- Hwang U, Richardson LD, Sonuyi TO, Morrison RS. The effect of emergency department crowding on the management of pain in older adults with hip fracture. *J Am Geriatr Soc*. 2006; 54:270-5.
- Institute of Medicine of the National Academies. Future of emergency care: Hospital-based emergency care at the breaking point. *The National Academies Press* 2006.
- Kyriacou DN, Ricketts V, Dyne PL, McCollough MD, Talan DA. A 5-year time study analysis of emergency department patient care efficiency. *Ann Emerg Med*. 1999; 34:326-35.
- Pines JM, et al. ED crowding is associated with variable perceptions of care compromise. *Acad Emerg Med*. 2007; 14:1176-81.
- Pines JM, et al. Emergency department crowding is associated with poor care for patients with severe pain. *Ann Emerg Med*. 2008; 51:6-7.
- Schull MJ, et al. Emergency department crowding and thrombolysis delays in acute myocardial infarction. *Ann Emerg Med.* 2004; 44:577-85.
- Siegel B, et al. Enhancing work flow to reduce crowding. *Jt Comm J Qual Patient Saf*. 2007; 33 (11 Suppl):57-67.
- Trzeciak S, Rivers EP. Emergency department overcrowding in the United States: an emerging threat to patient safety and public health. *Emerg Med J*. 2003; 20:402-5.
- Wilper AP, Woolhandler S, Lasser KE, McCormick D, Cutrona SL, Bor DH, Himmelstein DU. Waits to see an emergency department physician: U.S. trends and predictors, 1997-2004. *Health Aff* (Millwood). 2008; 27:w84-95.

E-CPR (Emergency – Clinical Performance Registry) Measure #11
Adopted from numerous emergency departments and hospital systems across the United States

Measure Title: Three Day All Cause Return ED Visit Rate

Inverse Measure: Yes

Measure Description: Percentage of the Eligible Professional's ED Discharged Patients that Returned to the Same Emergency Department (ED) within Three Calendar Days of Prior ED Visit Date of Service

National Quality Strategy Domain: Communication and Care Coordination

Type of Measure: Outcome

Number of Performance Rates: 3
1. Number of Eligible Professional's ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service *(Overall rate; composite score of performance rates 2 and 3 below)*
2. Number of Eligible Professional's Adult (≥ 18 years of age) ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service
3. Number of Eligible Professional's Pediatric (< 18 years of age) ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service

Measure Scoring: Proportion

Risk Adjustment: Yes

Numerator: Number of Eligible Professional's ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service

Denominator:
- Any Patient Evaluated by the Eligible Professional in the ED (E/M Codes 99281-99285 & 99291-99292 AND Place of Service Indicator: 23) PLUS
- Disposition of Discharged on initial ED visit (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:
The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level demographic and clinical characteristics. Three day return ED visits are risk-adjusted for the overall and subgroups as a binary outcome.

Risk-adjustment derivation:

Model A regression model with fixed-effects (patient age, sex, visit acuity, previous ED visits and presence of co-morbidities) as well as hospital-level effects (state and ED volume) is used. Normal distribution is ensured and then a linear regression performed.

To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1) the data will have a 90% truncation by dropping values below the 5th percentile or above the 95th percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).

Dataset: The most current National Hospital Ambulatory Medical Care Survey (NHAMCS) dataset is utilized. The derivation dataset will be a 75% random sample of the relevant dataset. The co-morbidities are derived in the NHAMCS dataset by mapping the ICD9 and ICD10 diagnoses to the Charleston comorbidity index.

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Three Day All Cause Return ED Visit Rate Observed/Expected Ratio

Rationale:

Although not all 3 day return ED visits are avoidable, return ED visits may negatively affect patient safety, satisfaction, and overall medical cost. Studies have determined that some of the factors that cause patients to return are modifiable which may allow for the development of strategies to reduce unscheduled return visits. These factors may include primary care follow-up, medication compliance, medication selection, clarity of discharge instructions, and overall satisfaction with care. Monitoring 3 day return ED visits is a useful method to assist Eligible Professionals in improving their care of ED patients.

Selected References:

- Rising KL, Padrez KA, O'Brien M, Hollander JE, Car BG, Shea JA. Return Visits to the Emergency Department: The Patient Experience. *Ann Emerg Med.* 2014; Aug;22
- Sklar DP, Crandall CS, Loeliger E, Edmunds K, Paul I, Helitzer DL. Unaticipated death after discharge home from the emergency department. *Ann Emerg Med*. 2007; Jun 49(6) 735-45
- Sauvin G, Freund Y, Saidi K, Riou B, Hausfater P. Unscheduled return visits to the emergency department: consequences for triage. *Acad Emerg Med*. 2013 Jan;20(1): 33-9
- Gallagher RA, Porter S, Monuteaus MC, Stack AM. Unscheduled return visits to the emergency department: the impact of language. *Pediatr Emerg Care*. 2013 May;29(5):579-83
- Hu KW, Lu YH, Lin HJ, Guo HR, Foo NP. Unscheduled return visits with and without admission post emergency department discharge. *J Emerg Med*. 2012 Dec;43(6):1110-8
- Keith KD, Bocka JJ, Kobernick MS, Krome RL, Ross MA. Emergency department revisits. *Ann Emerg Med*. 1989; Sep;18(9):964-8

E-CPR (Emergency – Clinical Performance Registry) Measure #38
Adopted from numerous emergency departments and hospital systems across the United States

Measure Title: Three Day All Cause Return ED Visit Rate with Admission on Re-Visit

Inverse Measure: Yes

Measure Description: Percentage of the Eligible Professional's ED Discharged Patients that Returned to the Same Emergency Department (ED) within Three Calendar Days of Prior ED Visit Date of Service with Admission on Re-Visit

National Quality Strategy Domain: Communication and Care Coordination

Type of Measure: Outcome

Number of Performance Rates: 3

1. Number of Eligible Professional's ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service with Admission on Re-Visit (Disposition of Admitted) *(Overall rate; composite score of performance rates 2 and 3 below)*
2. Number of Eligible Professional's Adult (≥ 18 years of age) ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service with Admission on Re-Visit (Disposition of Admitted)
3. Number of Eligible Professional's Pediatric (< 18 years of age) ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service with Admission on Re-Visit (Disposition of Admitted)

Measure Scoring: Proportion

Risk Adjustment: Yes

Numerator: Number of Eligible Professional's ED Discharged Patients that Returned to the Same ED within Three Calendar Days of Prior ED Date of Service with Admission on Re-Visit (Disposition of Admitted)

Denominator:

- Any Patient Evaluated by the Eligible Professional in the ED (E/M Codes 99281-99285 & 99291-99292 AND Place of Service Indicator: 23) PLUS
- Disposition of Discharged on initial ED visit (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:
The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level demographic and clinical characteristics. Three day return ED visits are risk-adjusted for the overall and subgroups as a binary outcome.

Risk-adjustment derivation:

Model A regression model with fixed-effects (patient age, sex, visit acuity, previous ED visits and presence of co-morbidities) as well as hospital-level effects (state and ED volume) is used. Normal distribution is ensured and then a linear regression performed. To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1) the data will have a 90% truncation by dropping values below the 5th percentile or above the 95th percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).

Dataset: The most current National Hospital Ambulatory Medical Care Survey (NHAMCS) dataset is utilized. The derivation dataset will be a 75% random sample of the relevant dataset. The co-morbidities are derived in the NHAMCS dataset by mapping the ICD9 and ICD10 diagnoses to the Charleston comorbidity index.

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Three Day All Cause Return ED Visit Rate with Admission on Re-Visit Observed/Expected Ratio

Rationale:

Although not all 3 day return ED visits are avoidable, return ED visits may negatively affect patient safety, satisfaction, and overall medical cost. Studies have determined that some of the factors that cause patients to return are modifiable which may allow for the development of strategies to reduce unscheduled return visits. These factors may include primary care follow-up, medication compliance, medication selection, clarity of discharge instructions, and overall satisfaction with care. Monitoring 3 day return ED visits with need for further inpatient or observation care is a useful method to assist Eligible Professionals in improving their care of ED patients.

Selected References:

- Rising KL, Padrez KA, O'Brien M, Hollander JE, Car BG, Shea JA. Return Visits to the Emergency Department: The Patient Experience. *Ann Emerg Med.* 2014; Aug;22
- Sklar DP, Crandall CS, Loeliger E, Edmunds K, Paul I, Helitzer DL. Unaticipated death after discharge home from the emergency department. *Ann Emerg Med*. 2007; Jun 49(6) 735-45
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E-CPR (Emergency – Clinical Performance Registry) Measure #39
Referenced Choosing Wisely, Emergency Medicine Campaign Measure #6

Measure Title: Avoid Head CT for Patients with Uncomplicated Syncope

Inverse Measure: No

Measure Description: Percentage of Adult Syncope Patients Who Did Not Receive a Head CT Scan Ordered by the Provider

National Quality Strategy Domain: Efficiency and Cost Reduction

Type of Measure: Process

Number of Performance Rates: 1

Measure Scoring: Proportion

Risk Adjustment: No

Numerator: Syncope Patients Who Did Not Have a Head CT Ordered by the Provider
Numerator Options
- Performance Met: Patients who did not have a head CT ordered
- Medical Performance Exclusion: Patients who did have a head CT ordered for medical reason documented by the eligible professional (i.e. seizure, drug or alcohol intoxication, vomiting, altered mental status, or other documented medical reason)
- Performance Not Met: Patients who did have a head CT ordered, reason not given

Denominator:
- Any patient ≥18 years of age evaluated by the Eligible Professional in the Emergency Department or Urgent Care Clinic (E/M Codes 99201-99205, 99212-99215, 99281-99285, & 99291-99292 AND Place of Service Indicator: 11, 19, 20, 22 or 23) PLUS
- Diagnosis of Syncope: PLUS
  - **ICD-10:** R55
- Disposition of Admitted or Discharged (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Rationale:
(Referenced Choosing Wisely, Emergency Medicine Campaign Measure #6)
Syncope (passing out or fainting) or near syncope (lightheadedness or almost passing out) is a common reason for visiting an emergency department or urgent care clinic and most episodes are not serious. Many tests may be ordered to identify the cause of such episodes. However, some diagnostic tests for syncope should not be routinely ordered, and the decision to order any tests should be guided by information obtained from the patient's history or physical examination. CT scans of the brain are frequently ordered, but published research has confirmed that abnormalities are rarely found. CT scans are expensive, and may unnecessarily

expose patients to radiation. If a head injury is associated with a syncopal episode, then a CT scan of the brain may be indicated. In addition, if there were symptoms of a stroke (i.e., headache, garbled speech, weakness in one arm or leg, trouble walking or confusion) before or after a syncopal episode, a CT scan may be indicated. However, in the absence of head injury or signs of a stroke, a CT scan of the brain should not be routinely ordered.

"The 2009 ESC guidelines recommended neurologic referral in patients in whom transient loss of consciousness is suspected to be epilepsy rather than syncope. In addition, neurologic referral to evaluate the underlying disease is indicated when syncope is due to autonomic failure. An EEG or carotid Doppler ultrasound study, computed tomography, or magnetic resonance imaging is not recommended unless a non-syncopal cause of transient loss of consciousness is suspected."

"Neurologic tests, including electroencephalogram (EEG), brain computed tomography scan, brain magnetic resonance imaging, and carotid Doppler ultrasound, are frequently obtained in patients with syncope. In one review of 649 patients, 53 percent had at least one neurologic test. However, such testing was rarely useful."

Selected References:

- American College of Emergency Physicians (ACEP) and Choosing Wisely Campaign
- Task Force for the Diagnosis and Management of Syncope, European Society of Cardiology (ESC), European Heart Rhythm Association (EHRA), Heart Failure Association (HFA), Heart Rhythm Society (HRS), Moya A, et al. Guidelines for the diagnosis and management of syncope. *Eur Heart J.* 2009;30(21):2631
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E-CPR (Emergency – Clinical Performance Registry) Measure #40
Adopted from the Surviving Sepsis Campaign

Measure Title: Initiation of the Initial Sepsis Bundle

Inverse Measure: No

Measure Description: Percentage of Adult Emergency Department Patients Diagnosed with Severe Sepsis or Septic Shock That Have Initiation of the Initial Sepsis Bundle

National Quality Strategy Domain: Effective Clinical Care

Type of Measure: Process

Number of Performance Rates: 1

Measure Scoring: Proportion

Risk Adjustment: No

Numerator: Emergency Department Patients Diagnosed with Severe Sepsis or Septic Shock Who Have Initiation of the Initial Sepsis Bundle

Definition of initiation of initial sepsis bundle: Provider order for (or protocol resulting in order for) ALL of the following:

- Lactate (venous or arterial)
- Blood cultures
- IV antibiotics
- IV fluid bolus

Numerator Options

- Performance Met: Patients who did have initiation of initial sepsis bundle (must include all components)
- Medical Performance Exclusion: Patients who did not have initiation of the initial sepsis bundle for documented medical reason(s) (i.e. IV fluids not ordered given patient is in congestive heart failure, or other medical reason)
- Patient Performance Exclusion: Patients who did not have initiation of the initial sepsis bundle for documented patient reason(s) (i.e. blood cultures not ordered because patient refused or other patient reason)
- Performance Not Met: Patients who did not have initiation of the initial sepsis bundle, reason not given

Denominator:

- Any patient ≥ 18 years of age evaluated by the Eligible Professional in the Emergency Department (E/M Codes 99281-99285 & 99291-99292 AND Place of Service Indicator: 23) PLUS
- ED diagnosis of either of below: PLUS
  - Severe Sepsis:
    - **ICD-10**: A41.9, R65.20
  - Septic Shock:

    - **ICD-10**: A41.9, R65.21
- Disposition of Admitted or Discharged from ED (does not include transferred, eloped or AMA patients)
- Patients with Advanced Directives indicating preference for limited intervention are excluded

Denominator Exclusions: None

Denominator Exceptions: None

Rationale:
There are more than 750,000 cases of severe sepsis and septic shock in the United States each year. Most patients who present with sepsis receive initial care in the emergency department, and the short-term mortality is 20% or more. In 2001, Rivers et al. reported that among patients with severe sepsis or septic shock, mortality was significantly lower among those who were treated according to a sepsis bundle with protocol than among those who were given standard therapy (30.5% vs. 46.5%). This premise predicates that usual care lacked aggressive, timely assessment and treatment. There have been many changes in the specific management of sepsis as to whether certain aspects of a protocol are necessary (e.g. blood transfusion parameters, vasoactive agent initiation, mandated central line placement). Overall, there is strong evidence that an initial order bundle involving IVF bolus, Blood cultures, IV antibiotics, and lactate to support its broad applicability.

Selected References:

- Surviving Sepsis Campaign
- Angus DC, Linde-Zwirble WT, Lidicker J, Clermont G, Carcillo J, Pinsky MR. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome, and associated costs of care. *Crit Care Med*. 2001;29:1303-10.
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E-CPR (Emergency – Clinical Performance Registry) Measure #43
Referenced American College of Emergency Physician Measure #21

Measure Title: Coagulation Studies in Patients Presenting with Chest Pain with No Coagulopathy or Bleeding

Inverse Measure: Yes

Measure Description: Percentage of Patients Aged 18 Years and Older with a Diagnosis of Chest Pain Where the Provider Ordered Coagulation Studies (PT, PTT, or INR)

National Quality Strategy Domain: Efficiency and Cost Reduction

Type of Measure: Process

Number of Performance Rates: 2

1. Emergency Department (ED) Performance Rate = the performance rate for ED discharges (*Overall Reporting Rate*)
2. Urgent Care Performance Rate = the performance rate for urgent care discharges

Measure Scoring: Proportion

Risk Adjustment: No

Numerator: Patients Aged 18 Years and Older with a Diagnosis of Chest Pain Where the Provider Ordered Coagulation Studies (PT, PTT, or INR)

Numerator Options

- Performance Met: Patients who did have coagulation studies ordered, reason not given
- Performance Not Met: Patients who did not have coagulation studies ordered

Denominator:

- Any patient ≥ 18 years of age evaluated by the Eligible Professional in the Emergency Department or Urgent Care Clinic (E/M Codes 99201-99205, 99212-99215, 99281-99285, & 99291-99292 AND Place of Service Indicator: 11, 19, 20, 22, or 23) PLUS
- Diagnosis of Non-traumatic Chest Pain: PLUS
  - **ICD-10**: I20.1, I20.8, I20.9, I25.111, I25.118, I25.119, I25.701, I25.708, I25.709, I25.711, I25.718, I25.719, I25.721, I25.728, I25.729, I25.731, I25.738, I25.739, I25.751, I25.758, I25.759, I25.761, I25.768, I25.769, I25.791, I25.798, I25.799, R07.1, R07.2, R07.81, R07.82, R07.89, R07.9
- Disposition of Discharged (does not include admitted, transferred, eloped or AMA patients)

Denominator Exclusions:

- Patients with trauma, end stage liver disease, coagulopathy, thrombocytopenia, atrial fibrillation, pulmonary/GI hemorrhage, pregnancy, or for whom medical history is unable to be obtained OR
- Patients taking any of the following anticoagulation therapies:
  - Apixaban
  - Argatroban
  - Bivalirudin

- Dalteparin
- Dateparin
- Desirudin
- Enoxaparin
- Fondaparinux
- Heparin
- Lepirudin
- Rivaroxaban
- Tinzaparin
- Warfarin

Denominator Exceptions: None

Rationale:
(Referenced American College of Emergency Physicians Measure #21)
Coagulation studies are often ordered out of habit as part of a blood panel with little value added to the patient. Ensuring that clinicians are purposefully ordering these studies may lead to significant reduction in resource utilization without any decrease in value of healthcare provided to the patient.

Analyses have suggested that, in addition to the financial cost of performing unnecessary coagulation testing, there are other undesirable outcomes of unnecessary coagulation testing. These outcomes include increased false-positive results in low prevalence populations, an increase in unnecessary follow-up procedures, and an increase in unnecessary hospital days.

In the United States, it is estimated that $114 million are spent annually on coagulation testing for patients presenting with chest pain and without any other indications in the Emergency Department. Across laboratory testing overall, between 15% and 56% of tests are considered to have been ordered inappropriately; in a study of coagulation studies specifically, it was found that 81% of coagulation tests were ordered inappropriately.

ACEP Guidelines for appropriate utilization of clinical laboratory and radiology studies note the following indications for ordering PT and PTT:
- Warfarin (Coumadin) use [PT indicated, PTT not indicated]
- IV Heparin therapy [PT not indicated, PTT indicated]
- Routine Hospital Admission [PT not indicated, PTT not indicated]
- Suspected Coagulopathy (DIC, hemophilia) [PT indicated, PTT indicated]
- Active bleeding with or without obvious cause [PT indicated, PTT indicated]
- Clinical evidence of liver disease [PT indicated, PTT indicated]
- History of abnormal, excessive, or spontaneous bleeding [PT indicated, PTT indicated]
- Routine preoperative testing [PT not indicated, PTT not indicated]
- History of coagulopathy [PT indicated, PTT indicated]
- Routine trauma patient [PT not indicated, PTT not indicated]
- Before initiation of heparin therapy [PT not indicated, PTT not indicated]
- Low-dose initiation of heparin therapy [PT not indicated, PTT not indicated]
- History of alcohol abuse, without clinical evidence of liver disease or coagulopathy [PT not indicated, PTT not indicated]
- Before surgery if liver disease, malnutrition, or malabsorption exists or clinical history is not available

Selected References:

Karas SJ, Cantrill SV, eds. Cost-Effective Diagnostic Testing in Emergency Medicine: Guidelines for Appropriate Utilization of Clinical Laboratory and Radiology Studies. 2nd ed. Dallas, Tex: American College of Emergency Physicians; 2000.

E-CPR (Emergency – Clinical Performance Registry) Measure #44

Measure Title: Door to Diagnostic Evaluation by a Provider – Urgent Care Patients

Inverse Measure: Yes

Measure Description: Mean Time from Urgent Care Clinic (UCC) Arrival to Provider Contact for Urgent Care Patients Evaluated by the Eligible Professional

National Quality Strategy Domain: Patient Safety

Type of Measure: Outcome

Number of Performance Rates: 3

1. Time (in minutes) from Urgent Care Clinic Arrival to Provider (MD/DO/PA/NP) Contact for Urgent Care Patients *(Overall rate; composite score of performance rates 2 and 3 below)*
2. Time (in minutes) from Urgent Care Clinic Arrival to Provider (MD/DO/PA/NP) Contact for Adult (≥ 18 years of age) Urgent Care Patients
3. Time (in minutes) from Urgent Care Clinic Arrival to Provider (MD/DO/PA/NP) Contact for Pediatric (< 18 years of age) Urgent Care Patients

Measure Scoring: Continuous

Risk Adjustment: Yes

Numerator: Time (in Minutes) from Urgent Care Clinic Arrival to Provider (MD/DO/PA/NP) Contact for Urgent Care Patients

- Definition of Arrival Time: The earliest documented time the patient arrived at the Urgent Care Clinic
- Definition of Provider Contact Time: The time of the first direct, personal exchange between an Urgent Care patient and the Eligible Professional

Denominator: Any Patient Evaluated by the Eligible Professional (MD/DO/PA/NP) in the Urgent Care Clinic (E/M Codes 99201-99205 & 99212-99215 AND Place of Service Indicator: 11, 19, 20 or 22)

Denominator Exclusions: None

Denominator Exceptions: None

Risk Adjustment:

The purpose of the risk-adjustment is to determine the provider and system level contributions to the outcome after adjusting for patient-level visit characteristics. Arrival to UCC provider contact times are risk-adjusted as continuous variables after normalization.

Risk-adjustment derivation:

Model: A regression model will be developed based on patient characteristics (type of visit, age, sex, and comorbidities where available), payer, and time of day (where available). Normal distribution is ensured and then a linear regression performed. Results will be benchmarked against a valid external dataset if one can be found;

otherwise, the performance will be compared to the internal data set mean. To ensure that only valid data are included and risk-adjustment models are created with stable coefficients, non-normal data will be normalized through a two-step process: 1) the data will have a 90% truncation by dropping values below the 5th percentile or above the 95th percentile. 2) Based on a graphical exploration of possible transformations and a chi-square-goodness-of-fit assessment of the transformation for normality, an appropriate transformation (such as a logarithm, square root, etc) will be applied. After the predictions are created, the measure will be returned to its natural scale through reversing the transformation process (taking the exponent of the prediction that was derived from the logarithm of the dependent variable).

Risk-adjustment validation: The results of the risk-adjustment derivation are used as a model with the relative patient level factors and a beta-coefficient weight for each of those factors. These coefficients are applied to the 25% validation sample to evaluate the discriminant value (c-statistic) and calibration (Hosmer-Lemeshow) of the risk-adjustment model.

Risk-adjustment application: The coefficient weights from the risk-adjustment model are applied to the performance data to provide an expected outcome for each patient. For each provider, the observed outcome over the expected outcome is summed to produce an observed/expected ratio.

Reporting Measure: Door to Diagnostic Evaluation by a Provider Observed/Expected Ratio

Rationale:

Reducing the time patients spend in the urgent care clinic setting can improve access to treatment and increase quality of care. Reducing this time potentially improves access to care tailored to patient needs, increases the capability to provide additional treatment or divert patients quickly to emergency departments (EDs) as necessary, and improves patient satisfaction. Timely access to urgent care is especially pertinent as EDs have continued to experience significant overcrowding and prolonged wait times in recent times, and an estimated 27% of ED visits could be treated in the urgent care setting. With the increased number of urgent care clinics in recent years, urgent care clinics have become an increasingly viable option for patients seeking immediate treatment, imaging and testing for lower-acuity conditions who have traditionally sought care at emergency departments.

Selected References:

- Weinick RM, Burns RM, Mehrotra A. Many Emergency Department Visits Could Be Managed At Urgent Care Centers And Retail Clinics. *Health Aff.* 2010; 29(9):1630-1636.
- Urgent Care Association of America. "2015 Urgent Care Benchmarking Survey Results." 2015.
- Derlet RW, Richards JR. Emergency department overcrowding in Florida, New York, and Texas. *South Med J*. 2002; 95:846-9.
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- Trzeciak S, Rivers EP. Emergency department overcrowding in the United States: an emerging threat to patient safety and public health. *Emerg Med J*. 2003; 20:402-5.

E-CPR (Emergency – Clinical Performance Registry) Measure #41

Measure Title: Rh Status Evaluation and Treatment of Pregnant Women at Risk of Fetal Blood Exposure

Inverse Measure: No

Measure Description: Percentage of Women Aged 14-50 Years at Risk of Fetal Blood Exposure Who Had Their Rh Status Evaluated in the Emergency Department (ED) and Received Rh-Immunoglobulin (Rhogam) if Rh-negative

National Quality Strategy Domain: Patient Safety

Type of Measure: Process

Number of Performance Rates: 1

Measure Scoring: Proportion

Risk Adjustment: No

Numerator: Women Aged 14-50 Years at Risk of Fetal Blood Exposure Who Had Their Rh Status Evaluated in the ED and Received Rh-Immunoglobulin (Rhogam) if Rh-negative

Numerator Options

- Performance Met: Patients who had their Rh status evaluated and were confirmed Rh-positive OR Patients who had Rh status evaluated AND received an order for Rh-Immunoglobulin (Rhogam) if Rh-negative
    - Definition of Rh status evaluated: Laboratory testing of Rh status or documented Rh status (e.g., "Patient known Rh+")
- Medical Performance Exclusion: Patients who did not have Rh status evaluated or did not receive an order of Rh-Immunoglobulin (Rhogam) if Rh-negative for documented medical reasons
- Patient Performance Exclusion: Patients who did not have Rh status evaluated or did not receive an order of Rh-Immunoglobulin (Rhogam) if Rh-negative for documented patient reason(s) (e.g., patient refused Rh testing or Rhogam)
- Performance not Met: Patients who did not have Rh status evaluated or did not receive Rh-Immunoglobulin (Rhogam) if Rh-negative, reason not given

Denominator:

- Any Female Patient ≥ 14 Years of Age and < 51 Years of Age Evaluated by the Eligible Professional in the ED (E/M Codes 99281-99285 & 99291-99292) PLUS
- ED Diagnosis of high risk pregnancy complication:
    - **ICD-10:** O00.8, O00.9, O02.1, O03.1, O03.6, O04.6, O07.1, O08.1, O20.0, O20.8, O20.9, O43.011, O43.019, O44.10, O44.11, O45.001, O45.009, O45.011, O45.019, O45.021, O45.029, O45.091, O45.099, O45.8X1, O45.8X9, O45.90, O45.91, O46.001, O46.011, O46.021, O46.8X1, O46.8X9, O46.90, O46.91
- Disposition of Admitted or Discharged (does not include transferred, eloped or AMA patients)

Denominator Exclusions: None

Denominator Exceptions: None

Rationale: (Referenced CMS PQRS Measure #255 Specifications)
The potential for maternal exposure to fetal blood is a concern among pregnant patients presenting to the emergency department with a number of common complaints or diagnoses including abdominal pain, blunt abdominal trauma, vaginal bleeding, ectopic pregnancy, threatened or spontaneous abortion, or pelvic instrumentation. This concern increases after the first trimester as fetal RBC mass increases.

Exposure to less than 0.1 ml of fetal blood of a different rhesus (Rh) antigenicity among Rh negative has been shown to increase the risk of maternal alloimmunization. Alloimmunization can result in hemolytic disease of the fetus or newborn including spontaneous abortion, fetal hemolytic anemia, hydrops fetalis and severe neonatal jaundice in subsequent pregnancies.

Administration of Rh-Immunoglobulin (Rhogam) is recommended by the American College of Obstetricians and Gynecologists (ACOG) as prophylaxis for alloimmunization.

E-CPR (Emergency – Clinical Performance Registry) Measure #42

Measure Title: Restrictive Use of Blood Transfusions

Inverse Measure: No

Measure Description: Percentage of Adult Patients with a Diagnosis of Anemia Who Did Not Receive a Blood Transfusion When Hgb > 8g/dL (Restrictive Transfusion Guidelines)

National Quality Strategy Domain: Efficiency and Cost Reduction

Type of Measure: Process

Number of Performance Rates: 1

Measures Scoring: Proportion

Risk Adjustment: No

Numerator: Patients Who Were Not Ordered a Transfusion of Packed Red Blood Cells (When Hgb>8g/dL)

Numerator Options:

- Performance Met: Patients who did not have a transfusion of packed red blood cells
- Medical Performance Exclusion: Patients who did have a transfusion of packed blood cells for medical reason(s) documented by the eligible professional [e.g., acute coronary syndrome (acute myocardial infarction, unstable angina), symptomatic patients, severe thrombocytopenia, chronic transfusion-dependent anemia, hemodynamic instability, severe hemorrhage, other documented medical reason]
  Performance Not Met: Patients who did have a transfusion of packed red blood cells, reason not specified

Denominator:

- Any patient aged 18 and older evaluated by the Eligible Professional (CPT Codes 00100, 00102, 00103, 00104, 00120, 00124, 00126, 00140, 00142, 00144, 00145, 00147, 00148, 00160, 00162, 00164, 00170, 00172, 00176, 00190, 00192, 00210, 00211, 00212, 00214, 00215, 00216, 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, 00620, 00625, 00626, 00630, 00632, 00635, 00640, 00670, 00700, 00702, 00730, 00740, 00750, 00752, 00754, 00756, 00770, 00790, 00792, 00794, 00796, 00797, 00800, 00802, 00810, 00820, 00830, 00834, 00836, 00840, 00844, 00846, 00848, 00851, 00860, 00862, 00864, 00865, 00866, 00868, 00870, 00873, 00880, 00882, 00902, 00904, 00906, 00908, 00910, 00912, 00914, 00918, 00920, 00921, 00922, 00924, 00926, 00928, 00930, 00932, 00934, 00936, 00938, 00940, 00942, 00944, 00948, 00952, 01112, 01120, 01130, 01140, 01150, 01160, 01170, 01173, 01180, 01190, 01200, 01202, 01210, 01212, 01214, 01215,

01220, 01230, 01232, 01250, 01260, 01270, 01272, 01274, 01320, 01340, 01360, 01380, 01382, 01390, 01392, 01400, 01402, 01404, 01420, 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, 01782, 01810, 01820, 01829, 01830, 01832, 01840, 01842, 01844, 01850, 01860, 01916, 01920, 01922, 01924, 01925, 01926, 01930, 01931, 01935, 01936, 01951, 01952, 01958, 01961, 01963, 01965, 01966, 01991, 01992 99217-99220, 99221-99223, 99224-99226, 99231-99233, 99238-99239, 99234-99236, 99281-99285, 99291-99292) PLUS

- Diagnosis of Anemia PLUS
  - **ICD-10:** D50.0, D50.1, D50.8, D50.9, D51.0, D51.1, D51.2, D51.3, D51.8, D51.9, D52.0, D52.1, D52.8, D52.9, D53.0, D53.1, D53.2, D53.8, D53.9, D55.0, D55.1, D55.2, D55.3, D55.8, D55.9, D58.0, D58.1, D58.2, D58.8, D58.9, D59.0, D59.1, D59.2, D59.3, D59.4, D59.5, D59.6, D59.8, D59.9, D61.01, D61.09, D61.1, D61.2, D61.3, D61.810, D61.811, D61.818, D61.82, D61.89, D61.9, D62, D63.0, D63.1, D63.8, D64.0, D64.1, D64.2, D64.3, D64.4, D64.81, D64.89, D64.9
- Laboratory result of Hgb>8g/dL documented in the medical record PLUS
- Disposition of Admitted or Discharged (does not include transferred, eloped or AMA patients)
- Trauma patients excluded

Denominator Exclusions: None

Denominator Exceptions: None

Rationale:
Blood transfusion is the standard of care for management of anemia. More than 100 million units of blood are collected worldwide each year and approximately 15 million units are transfused in the US every year.[1,4] The optimal hemoglobin threshold for use of blood transfusion is not clear; however, studies have demonstrated that transfusions are generally not indicated for Hgb >10 g/dL but are almost always indicated for Hgb < 6 d/L.[6] Current transfusion guidelines aim to avoid unnecessary transfusions and the associated costs and risks.

Multicenter randomized controlled trials (RCTs) have shown that using a restrictive hemoglobin strategy (7 to 8 g/dL) is associated with equivalent treatment benefit and better outcomes in many patient populations.[1,5] Additionally, a 2016 Cochrane systematic review of 31 RCTs has shown that more aggressive management of anemia with liberal transfusion strategies (Hgb 9 to 10 g/dL) does not improve mortality and morbidity when compared to restrictive transfusion strategies (Hgb 7 to 8 g/dL).[2]

The American Association of Blood Banks (AABB) recommends that a restrictive transfusion threshold of Hgb 7 to 8 g/dL is safe in most hemodynamically stable medical and surgical patients.[1,3] Evidence is insufficient to make this recommendation for symptomatic patients, patients with acute coronary syndrome, patients requiring massive transfusion, patients with

severe thrombocytopenia in hematology/oncology patients, and patients with chronic transfusion-dependent anemia.

Transfusions are not without risk. Potential complications include transfusion reaction, transmission of blood-borne pathogens, allergic reaction, acute hemolytic reaction, transfusion-associated acute lung injury (TRALI), transfusion-associated circulatory overload (TACO), and transfusion-associated graft versus host disease. Restrictive transfusion strategies reduce the total number of blood transfusions and consequently reduce the risk of transfusion complications.

Selected References:

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