**National Quality Forum—Evidence (subcriterion 1a)**

**Measure Number** (*if previously endorsed*)**:** 3533e

**Measure Title**: Hospital Harm – Severe Hyperglycemia

**IF the measure is a component in a composite performance measure, provide the title of the Composite Measure here:** N/A

**Date of Submission**: 11/1/2019

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| **Instructions**  *Complete 1a.1 and 1a.2 for all measures. If instrument-based measure, complete 1a.3.*  *Complete* ***EITHER 1a.2, 1a.3 or 1a.4*** *as applicable for the type of measure and evidence.*  *For composite performance measures:*  *A separate evidence form is required for each component measure unless several components were studied together.*  *If a component measure is submitted as an individual performance measure, attach the evidence form to the individual measure submission.*   * All information needed to demonstrate meeting the evidence subcriterion (1a) must be in this form. An appendix of *supplemental* materials may be submitted, but there is no guarantee it will be reviewed. * If you are unable to check a box, please highlight or shade the box for your response. * Contact NQF staff regarding questions. Check for resources at [Submitting Standards webpage](http://www.qualityforum.org/Measuring_Performance/Submitting_Standards.aspx). |

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| **Note: The information provided in this form is intended to aid the Standing Committee and other stakeholders in understanding to what degree the evidence for this measure meets NQF’s evaluation criteria.**   1a. Evidence to Support the Measure Focus The measure focus is evidence-based, demonstrated as follows:   * Outcome: [**3**](#Note3) Empirical data demonstrate a relationship between the outcome and at least one healthcare structure, process, intervention, or service. If not available, wide variation in performance can be used as evidence, assuming the data are from a robust number of providers and results are not subject to systematic bias. * Intermediate clinical outcome: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4)that the measured intermediate clinical outcome leads to a desired health outcome. * Process: [**5**](#Note5) a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured process leads to a desired health outcome. * Structure: a systematic assessment and grading of the quantity, quality, and consistency of the body of evidence [**4**](#Note4) that the measured structure leads to a desired health outcome. * Efficiency: [**6**](#Note6) evidence not required for the resource use component. * For measures derived from patient reports, evidence should demonstrate that the target population values the measured outcome, process, or structure and finds it meaningful. * Process measures incorporating Appropriate Use Criteria: See NQF’s guidance for evidence for measures, in general; guidance for measures specifically based on clinical practice guidelines apply as well.   **Notes**  **3.** Generally, rare event outcomes do not provide adequate information for improvement or discrimination; however, serious reportable events that are compared to zero are appropriate outcomes for public reporting and quality improvement.  **4.** The preferred systems for grading the evidence are the Grading of Recommendations, Assessment, Development and Evaluation [(GRADE) guidelines](http://www.gradeworkinggroup.org) and/or modified GRADE.  **5.** Clinical care processes typically include multiple steps: assess → identify problem/potential problem → choose/plan intervention (with patient input) → provide intervention → evaluate impact on health status. If the measure focus is one step in such a multistep process, the step with the strongest evidence for the link to the desired outcome should be selected as the focus of measurement. Note: A measure focused only on collecting PROM data is not a PRO-PM.  **6.** Measures of efficiency combine the concepts of resource use and quality (see NQF’s [Measurement Framework: Evaluating Efficiency Across Episodes of Care](http://www.qualityforum.org/Publications/2010/01/Measurement_Framework__Evaluating_Efficiency_Across_Patient-Focused_Episodes_of_Care.aspx); [AQA Principles of Efficiency Measures](http://www.aqaalliance.org/files/PrinciplesofEfficiencyMeasurementApril2006.doc)). |

**1a.1.This is a measure of**: (*should be consistent with type of measure entered in De.1*)

Outcome

Outcome: Severe Hyperglycemia

Patient-reported outcome (PRO): Click here to name the PRO

*PROs include HRQoL/functional status, symptom/symptom burden, experience with care, health-related behaviors.* (*A PRO-based performance measure is not a survey instrument. Data may be collected using a survey instrument to construct a PRO measure.)*

Intermediate clinical outcome (*e.g., lab value*): Click here to name the intermediate outcome

Process: Click here to name what is being measured

Appropriate use measure: Click here to name what is being measured

Structure: Click here to name the structure

Composite: Click here to name what is being measured

**1a.2** **LOGIC MODEL** Diagram or briefly describe the steps between the healthcare structures and processes (e.g., interventions, or services) and the patient’s health outcome(s). The relationships in the diagram should be easily understood by general, non-technical audiences. Indicate the structure, process or outcome being measured.

The goal of this electronic clinical quality measure (eCQM) is to improve patient safety and prevent severe hyperglycemia in patients who are at higher risk. The focus of this outcome eCQM is inpatient severe hyperglycemia. The purpose of measuring severe hyperglycemic events is to reduce the frequency of these patient outcomes and to improve hospitals’ practices for appropriate dosing of medication and adequate monitoring of patients with a diagnosis of diabetes mellitus, those receiving insulin or anti-diabetic medication(s), and those with an elevated glucose level during their hospital admission.

Severe hyperglycemia is significantly associated with a range of adverse consequences, including increased in-hospital mortality, infection rates, and hospital length of stay.1,2,3,4,5,6,7,8 Additionally, hyperglycemia affects a wide range of inpatients, including individuals with no prior history of diabetes. Hyperglycemia may be induced in at-risk individuals by medications such as steroids, parenteral (intravenous) or enteral (tube) feeding, or critical illness.

The rate of inpatient severe hyperglycemia events can be considered a marker for quality of hospital care, since inpatient severe hyperglycemia is largely avoidable with proper glycemic management. Studies indicate that use of evidence-based standardized protocols and insulin management protocols have been shown to improve glycemic control and safety outcomes.9,10 Moreover, the rate of severe hyperglycemia varies across hospitals, suggesting opportunities for improvement in care. Hyperglycemic rates have been reported from 32.2%11 to 46.0%12 of ICU patient-days, and 31.7%12 to 54.2%13 of non-ICU patient-days ( >180 mg/dL)

• Lower rates of severe hyperglycemic events.

• Fewer harms such as in-hospital mortality and infection rates.

* Fewer adverse consequences such as longer hospital length of stay.
* Appropriate dosing of insulin or antidiabetic medications.
* Appropriate timing of medications in relation to meals.
* Appropriate frequency and timing of glucose monitoring.
* Awareness of conditions and medications that increase risk of hyperglycemia.
* Modification and monitoring protocols when dosing as indicated.

References:

1. Pasquel FJ, Spiegelman R, McCauley M, et al. Hyperglycemia During Total Parenteral Nutrition: An Important Marker of Poor Outcome and Mortality in Hospitalized Patients. Diabetes Care. 2010;33(4):739-741

2. Rady MY, Johnson DJ, Patel BM, Larson JS, Helmers RA. Influence of Individual Characteristics on Outcome of Glycemic Control in Intensive Care Unit Patients With or Without Diabetes Mellitus. Mayo Clin Proc. 2005;80(12):1558-1567.

3. Umpierrez GE, Isaacs SD, Bazargan N, You X, Thaler LM, Kitabchi AE. Hyperglycemia: An Independent Marker of In-Hospital Mortality in Patients with Undiagnosed Diabetes. J Clin Endocrinol Metab. 2002;87(3):978-982.

4. Falciglia M, Freyberg RW, Almenoff PL, D'Alessio DA, Render ML. Hyperglycemia-Related Mortality in Critically Ill Patients Varies with Admission Diagnosis. Crit Care Med. 2009;37(12):3001-3009.

5. Lee LJ, Emons MF, Martin SA, et al. Association of Blood Glucose Levels with In-Hospital Mortality and 30-Day Readmission in Patients Undergoing Invasive Cardiovascular Surgery. Curr Med Res Opin. 2012;28(10):1657-1665.

6. King JT, Jr., Goulet JL, Perkal MF, Rosenthal RA. Glycemic Control and Infections in Patients with Diabetes Undergoing Noncardiac Surgery. Ann Surg. 2011;253(1):158-165.

7. Jackson RS, Amdur RL, White JC, Macsata RA. Hyperglycemia is Associated with Increased Risk of Morbidity and Mortality after Colectomy for Cancer. J Am Coll Surg. 2012;214(1):68-80.

8. Umpierrez GE, Hellman R, Korytkowski MT, et al. Management of Hyperglycemia in Hospitalized Patients in Non-Critical Care Setting: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab. 2012;97(1):16-38.

9. Maynard G, Kulasa K, Ramos P, et al. Impact of a Hypoglycemia Reduction Bundle and a Systems Approach to Inpatient Glycemic Management. Endocr Pract. 2015;21(4):355-367.

10. Donihi AC, DiNardo MM, DeVita MA, Korytkowski MT. Use of a Standardized Protocol to Decrease Medication Errors and Adverse Events Related to Sliding Scale Insulin. Qual Saf Health Care. 2006;15(2):89-91.

11. Swanson CM, Potter DJ, Kongable GL, Cook CB. Update on Inpatient Glycemic Control in Hospitals in the United States. Endocr Pract. 2011;17(6):853-861.

12. Cook CB, Kongable GL, Potter DJ, Abad VJ, Leija DE, Anderson M. Inpatient Glucose Control: A Glycemic Survey of 126 U.S. Hospitals. J Hosp Med. 2009;4(9):E7-E14.

13. Matheny ME, Shubina M, Kimmel ZM, Pendergrass ML, Turchin A. Treatment Intensification and Blood Glucose Control among Hospitalized Diabetic Patients. J Gen Intern Med. 2008;23(2):184-189.

**1a.3** **Value and Meaningfulness:**  **IF** this measure is derived from patient report, provide evidence that the target population values the measured ***outcome, process, or structure*** and finds it meaningful. (Describe how and from whom their input was obtained.)

N/A; this eCQM is not derived from patient report.

**\*\*RESPOND TO ONLY ONE SECTION BELOW -EITHER 1a.2, 1a.3 or 1a.4) \*\***

**1a.2** **FOR OUTCOME MEASURES including PATIENT REPORTED OUTCOMES - Provide empirical data demonstrating the relationship between the outcome (or PRO) to at least one healthcare structure, process, intervention, or service.**

The use of evidence-based standardized protocols and insulin management protocols have been shown to improve glycemic control and safety outcomes.14,15 This eCQM will improve inpatient glycemic control by promoting evidence-based interventions that optimize the care of patients with hyperglycemia and diabetes, which is one of 34 practices identified by NQF to reduce the occurrence of adverse healthcare events.16 In the long term, the Hospital Harm - Severe Hyperglycemia eCQM provides a path to directly engage hospital staff and executives on the importance of glycemic measurement, and will be a tool for quality improvement for staff to assess internal metrics. In addition, this eCQM provides CMS an instrument to assess the quality of care to patients at risk for severe hyperglycemia across all acute care hospitals.

References:

14. Maynard G, Kulasa K, Ramos P, et al. Impact of a Hypoglycemia Reduction Bundle and a Systems Approach to Inpatient Glycemic Management. Endocr Pract. 2015;21(4):355-367.

15. Donihi AC, DiNardo MM, DeVita MA, Korytkowski MT. Use of a Standardized Protocol to Decrease Medication Errors and Adverse Events Related to Sliding Scale Insulin. Qual Saf Health Care. 2006;15(2):89-91.

16. National Quality Forum (NQF). Safe Practices for Better Healthcare–2010 Update: A Consensus Report. Washington, DC2010.

**1a.3.****SYSTEMATIC REVIEW(SR) OF THE EVIDENCE (for intermediate outcome, PROCESS, or STRUCTURE PERFORMANCE measures, including those that are instrument-based) If the evidence is not based on a systematic review go to section 1a.4) If you wish to include more than one systematic review, add additional tables.**

**What is the source of the systematic review of the body of evidence that supports the performance measure? A systematic review is a scientific investigation that focuses on a specific question and uses explicit, prespecified scientific methods to identify, select, assess, and summarize the findings of similar but separate studies. It may include a quantitative synthesis (meta-analysis), depending on the available data. (IOM)**

☐ Clinical Practice Guideline recommendation (with evidence review)

☐ US Preventive Services Task Force Recommendation

☐ Other systematic review and grading of the body of evidence (*e.g., Cochrane Collaboration, AHRQ Evidence Practice Center*)

☐ Other

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| **Source of Systematic Review:**   * **Title** * **Author** * **Date** * **Citation, including page number** * **URL** |  |
| Quote the guideline or recommendation verbatim about the process, structure or intermediate outcome being measured. If not a guideline, summarize the conclusions from the SR. |  |
| Grade assigned to the **evidence** associated with the recommendation with the definition of the grade |  |
| Provide all other grades and definitions from the evidence grading system |  |
| Grade assigned to the **recommendation** with definition of the grade |  |
| Provide all other grades and definitions from the recommendation grading system |  |
| Body of evidence:   * Quantity – how many studies? * Quality – what type of studies? |  |
| Estimates of benefit and consistency across studies |  |
| What harms were identified? |  |
| Identify any new studies conducted since the SR. Do the new studies change the conclusions from the SR? |  |

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**1a.4 OTHER SOURCE OF EVIDENCE**

*If source of evidence is NOT from a clinical practice guideline, USPSTF, or systematic review, please describe the evidence on which you are basing the performance measure.*

**1a.4.1** **Briefly SYNTHESIZE the evidence that supports the measure.** A list of references without a summary is not acceptable.

**1a.4.2 What process was used to identify the evidence?**

**1a.4.3.** **Provide the citation(s) for the evidence.**