Report on a QI Project Eligible for MOC – ABMS Part IV and AAPA PI-CME

[Screening for Obesity Hypoventilation (OH) in Obstructive Sleep Apnea (OSA) Population in Adult Patients at the University of Michigan]

Instructions

Determine eligibility. Before starting to complete this report, go to the UMHS MOC website [ocpd.med.umich.edu], click on "Part IV Credit Designation," and review sections 1 and 2. Complete and submit a "QI Project Preliminary Worksheet for Part IV Eligibility." Staff from the UMHS Part IV MOC Program will review the worksheet with you to explain any adjustments needed to be eligible. (The approved Worksheet provides an outline to complete this report.)

Completing the report. The report documents completion of each phase of the QI project. (See section 3 of the website.) Final confirmation of Part IV MOC for a project occurs when the full report is submitted and approved.

An option for preliminary review (strongly recommended) is to complete a description of activities through the intervention phase and submit the partially completed report. (Complete at least items 1-20.) Staff from the UMHS Part IV MOC Program will provide a preliminary review, checking that the information is sufficiently clear, but not overly detailed. This simplifies completion and review of descriptions of remaining activities.

Questions are in bold font. Answers should be in regular font (generally immediately below or beside the questions). To check boxes, hover pointer over the box and click (usual "left" click).

For further information and to submit completed applications, contact either:

R. Van Harrison, PhD, UMHS Part IV Program Lead, 734-763-1425, rvh@umich.edu
Ellen Patrick, UMHS Part IV Program Administrator, 734-936-9771, partivmoc@umich.edu

Report Outline

Section	Items
A. Introduction	1-6. Current date, title, time frame, key individuals, participants, funding
B. Plan	7-10. Patient population, general goal, IOM quality dimensions, ACGME/ABMS competencies
	11-13. Measures, baseline performance, specific aims
	14-17. Baseline data review, underlying (root) causes, interventions, who will implement
C. Do	18. Intervention implementation date
D. Check	19-20. Post-intervention performance
E. Adjust – Replan	21-24. Post-intervention data review, underlying causes, adjustments, who will implement

F. Redo	25. Adjustment implementation date
G. Recheck	26-28. Post-adjustment performance, summary of individual performance
H. Readjust plan	29-32. Post-adjustment data review, underlying causes, further adjustments, who will implement
I. Reflections & plans	33-37. Barriers, lessons, best practices, spread, sustain
J. Participation for MOC	38-40. Participation in key activities, other options, other requirements
K. Sharing results	41. Plans for report, presentation, publication
L. Organization affiliation	42. Part of UMHS, AAVA, other affiliation with UMHS

QI Project Report for Part IV MOC Eligibility

A. Introduction

1. Date *(this version of the report):* February 14, 2017

2. Title of QI effort/project *(also insert at top of front page)***:** Screening for Obesity Hypoventilation in Obstructive sleep apnea population in adult patients at the University of Michigan.

3. Time frame

a. MOC participation beginning date – date that health care providers seeking MOC began participating in the documented QI project *(e.g. date of general review of baseline data, item #14c)**:*** October 12, 2016

b. MOC participation end date – date that health care providers seeking MOC completed participating in the documented QI project *(e.g., date of general review of post-adjustment data, item #29c)*: May 17, 2017

4. Key individuals

a. QI project leader *[also responsible for confirming individual's participation in the project]*

Name: Dong V. Dang, M.D., PharmD
Title: Sleep Medicine Fellow
Organizational unit: Sleep Medicine Clinic
Phone number: 734-732-4493
Email address: dodang@med.umich.edu
Mailing address: Sleep Disorders Center. University of Michigan - Med Inn building C728

1500 E. Medical Center Drive, SPC 5845. Ann Arbor, MI 48109

b. Clinical leader who oversees project leader regarding the project *[responsible for overseeing/"sponsoring" the project within the specific clinical setting]*
Name: Neeraj Kaplish, M.D.
Title: Assistant Professor of Neurology
Organizational unit: Sleep Center
Phone number: (734) 936-9037
Email address: neerajka@med.umich.edu
Mailing address: Sleep Disorders Center. University of Michigan - Med Inn building C728
1500 E. Medical Center Drive, SPC 5845. Ann Arbor, MI 48109

5. Participants

a. Approximately how many healthcare providers (by training level for physicians) participated in this QI effort *(whether or not for MOC)***:**

Profession	**Number** *(fill in)*
Practicing Physicians	1
Residents/Fellows	4
Physicians' Assistants	0
Nurses (APNP, NP, RN, LPN)	0
Other Licensed Allied Health (e.g., PT/OT, pharmacists, dieticians, social workers)	0

b. Approximately how many physicians (by specialty/subspecialty and by training level) and physicians' assistants participated for MOC?

Profession	**Specialty/Subspecialty** *(fill in)*	**Number** *(fill in)*
Practicing Physicians	Sleep Medicine	1
Fellows	Sleep Medicine	4
Residents	*(Not applicable)*	0
Physicians' Assistants	*(Not applicable)*	0

6. How was the QI effort funded? *(Check all that apply.)*

☒ Internal institutional funds

☐ Grant/gift from pharmaceutical or medical device manufacturer

☐ Grant/gift from other source (e.g., government, insurance company)

☐ Subscription payments by participants

☐ Other *(describe)*: No funding, volunteer time

The Multi-Specialty Part IV MOC Program requires that QI efforts include at least two linked cycles of data-guided improvement. Some projects may have only two cycles while others may have additional cycles – particularly those involving rapid cycle improvement. The items below provide some flexibility in describing project methods and activities. If the items do not allow you to reasonably describe the steps of your specific project, please contact the UMHS Part IV MOC Program Office.

B. Plan

7. Patient population. What patient population does this project address *(e.g., age, medical condition, location seen/treated)***:**

- Patients with increased or high risk of hypoventilation (adult patients age ≥18 year old, obesity with body mass index (BMI) ≥35, with or without baseline bicarbonate (HCO3) level ≥27, suspected to have obstructive sleep apnea (OSA)) undergoing a baseline sleep studies (polysomnogram (PSG), split night PSG, or home sleep apnea test (HSAT)) for obstructive sleep apnea through the sleep labs at the University of Michigan.

8. General goal

a. Problem/need. What is the problem ("gap") in quality that resulted in the development of this project? Why is important to address this problem?

Hypoventilation (i.e. respiratory depression) causes increased concentration of carbon dioxide (hypercapnia) and respiratory acidosis, which is a precursor to hypoxia and potential death due to carbon dioxide toxicity. The addition of surrogate carbon dioxide (CO2) monitoring during a baseline sleep study may improve the detection of hypoventilation. However, screening for hypoventilation is seldom done in high risk patients (age >18, body mass index (BMI) ≥35, suspected to have OSA, with or without baseline HCO3 level ≥27) at sleep centers of the University of Michigan.

b. Project goal. What general outcome regarding the problem should result from this project? *(State general goal here. Specific aims/performance targets are addressed in #13.)*

We hope to increase awareness and utilization of surrogate CO2 monitoring during baseline sleep studies as a screening tool in patients with high risk for hypoventilation.

9. Which Institute of Medicine Quality Dimensions are addressed? *[Check all that apply.]*

(http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf)

☒ Effectiveness ☐ Equity ☒ Safety

☒ Efficiency ☒ Patient-Centeredness ☒ Timeliness

10. Which ACGME/ABMS core competencies are addressed? *(Check all that apply.)* (http://www.abms.org/board-certification/a-trusted-credential/based-on-core-competencies/)

☒ Patient Care and Procedural Skills ☒ Medical Knowledge

☒ Practice-Based Learning and Improvement ☒ Interpersonal and Communication Skills

☐ Professionalism ☒ Systems-Based Practice

11. Describe the measure(s) of performance: *(QI efforts must have at least one measure that is tracked across the two cycles for the three measurement periods: baseline, post-intervention, and post-adjustment. If more than two measures are tracked, copy and paste the section for a measure and describe the additional measures.)*

Measure 1

- **Name of measure** *(e.g., Percent of . . ., Mean of . . ., Frequency of . . .)***:**
  - Percentage of patients at high risk for hypoventilation (age ≥18, body mass index (BMI) ≥35, suspected to have OSA, with baseline HCO3 level ≥27) being screened with surrogate CO2 monitoring during all baseline sleep studies with the sleep centers of the University of Michigan.
- **Measure components** – *describe the:*
  - Denominator *(e.g., for percent, often the number of patients eligible for the measure)*:
    - The number of patients receiving a sleep study with the sleep centers of the University of Michigan that met the high risk criteria for hypoventilation.
  - Numerator *(e.g., for percent, often the number of those in the denominator who also meet the performance expectation)*:
    - The number of these patients who have an order for a baseline sleep study with surrogate CO2 monitoring requested.
- **The source of the measure is:**

  ☐ An external organization/agency, which is *(name the source)*:

  ☒ Internal to our organization and it was chosen because *(describe rationale)*:
    - The measure reflects our sleep centers' performance in screening for hypoventilation.
- **This is a measure of:**

  ☒ Process – activities of delivering healthcare to patients

  ☐ Outcome – health state of a patient resulting from health care

Measure 2

- **Name of measure** *(e.g., Percent of . . ., Mean of . . ., Frequency of . . .)***:**
  - Percentage of patients at increased risk for hypoventilation (age ≥18, body mass index (BMI) ≥35, suspected to have OSA, with baseline HCO3 < 27 or without baseline HCO3)

being screened with surrogate CO2 monitoring during all baseline sleep studies with the sleep centers of the University of Michigan.

- **Measure components** – *describe the:*
  - Denominator *(e.g., for percent, often the number of patients eligible for the measure)*:
    - The number of patients receiving a sleep study with the sleep centers of the University of Michigan that met the increased risk criteria for hypoventilation.
  - Numerator *(e.g., for percent, often the number of those in the denominator who also meet the performance expectation)*:
    - The number of these patients who have an order for a baseline sleep study with surrogate CO2 monitoring requested.
- **The source of the measure is:**

  ☐ An external organization/agency, which is *(name the source)*:

  ☒ Internal to our organization and it was chosen because *(describe rationale)*:
    - The measure reflects our sleep centers performance in screening for hypoventilation.
- **This is a measure of:**

  ☒ Process – activities of delivering healthcare to patients

  ☐ Outcome – health state of a patient resulting from health care

Note: In addition to the two main measures of performance of ordering studies with CO2 described above, two additional measures are also reported that were collected for investigational purposes: (1) of the studies with CO2 that were ordered, the percent that had study with CO2 performed and (2) of the number of studies with CO2 that were performed, the percent that had a positive CO2 finding. These measures are also reported, but the improvement effort in this project focused on ordering studies with CO2.

12. Baseline performance

A. **What were the beginning and end dates for the time period for <u>baseline</u> data on the measure(s)?**
   - August 22, 2016 through September 4, 2016.

B. **What was (were) the performance level(s) at baseline?** *Display in a data table, bar graph, or run chart (line graph). Can show baseline data only here or refer to a display of data for all time periods attached at end of report. Show baseline time period, measure names, number of observations for each measure, and performance level for each measure.*

Patient Risk Groups and Measures	Baseline (8/22/16 – 9/2/16)	Post-Intervention (TBD)	Post-Adjustment (TBD)
Number of patient screened (N)	190	TBD	TBD
High risk patients – age ≥18, BMI ≥ 35, and HCO3 ≥ 27			
Of those screened, number and (%) at high risk]	28 (28/190 =15%)	TBD	TBD
Of those at high risk, number and (%) with study and CO2 monitor requested	0 (0/28 = 0%)	TBD	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	(No patients with study requested)	TBD	TBD
Of those with study done with CO2 performed, number and (%) with CO2 positive	(No patients with study performed)	TBD	TBD
Increased risk patients – age ≥18, BMI ≥ 35 and either HCO3 < 27 or HCO3 not known			
Of those screened, number and (%) at increased risk	58 (58/190 = 31%)	TBD	TBD
Of those at increased risk, number and (%) with study and CO2 monitor requested	1 (1/58 = 2%)	TBD	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	1 (1/1 = 100%)	TBD	TBD
Of those with study done with CO2 performed, number and (%) with CO2 positive	0 (0/1 = 0%)	TBD	TBD

Note: The two measures of performance are underlined.

13. Specific performance aim(s)/objective(s)

a. What is the specific aim of the QI effort? *"The Aim Statement should include: (1) a specific and measurable improvement goal, (2) a specific target population, and (3) a specific target date/time period. For example: We will [improve, increase, decrease] the [number, amount percent of [the process/outcome] from [baseline measure] to [goal measure] by [date]."*

- From the beginning of the project to the end of the second cycle of improvement, we aim to increase the screening for hypoventilation, in patients who are at risk, using CO2 surrogate monitoring during baseline sleep studies from 0% to 25%.

b. How were the performance targets determined, e.g., regional or national benchmarks?

- The team determined this to be a reasonable improvement target taking into accounts the limited time and resources available.

14. Baseline data review and planning. Who was involved in reviewing the baseline data, identifying underlying (root) causes of problem(s) resulting in these data, and considering possible interventions ("countermeasures") to address the causes? *(Briefly describe the following.)*

A. **Who was involved?** *(e.g., by profession or role)*

- Dr. Neeraj Kaplish, Project Supervisor and Faculty
- Dr. Dong V. Dang, Sleep Medicine Fellow, Team Leader
- Dr. Rosemarie Beckford, Sleep Medicine Fellow, Team Member
- Dr. Brynn Dredla, Sleep Medicine Fellow, Team Member
- Dr. Fareeha Hafeez, Sleep Medicine Fellow, Team Member

B. **How?** *(e.g., in a meeting of clinic staff)*:
   - Baseline data and root causes analysis was done over two designated sessions of QI training designed within the sleep medicine fellowship curriculum.

C. **When?** *(e.g., date(s) when baseline data were reviewed and discussed)*:
   - Baseline data and root causes analysis were done during QI training sessions on 12/7/16 and 12/14/16.

Use the following table to outline the plan that was developed: #15 the primary causes, #16 the intervention(s) that addressed each cause, and #17 who carried out each intervention. *This is a simplified presentation of the logic diagram for structured problem solving explained at http://ocpd.med.umich.edu/moc/process-having-part-iv-credit-designation in section 2a. As background, some summary examples of common causes and interventions to address them are:*

Common Causes	***Common Relevant Interventions***
Individuals: Are not aware of, don't understand.	*Education about evidence and importance of goal.*
Individuals: Believe performance is OK.	*Feedback of performance data.*
Individuals: Cannot remember.	*Checklists, reminders.*
Team: Individuals vary in how work is done.	*Develop standard work processes.*
Workload: Not enough time.	*Reallocate roles and work, review work priorities.*
Suppliers: Problems with provided information/materials.	*Work with suppliers to address problems there.*

15. What was the primary underlying/root causes for the problem(s) at baseline that the project can address?	**16. What intervention(s) addressed this cause?**	**17. Who was involved in carrying out each intervention?** *(List the professions/roles involved.)*
1. Ordering providers are not considering hypoventilation risk factors. 2. Ordering providers are not considering the availability of CO2 monitoring during sleep study as a screening tool	-- Created a "Smart Order Set" for common sleep medicine orders. Choosing orders from this "Smart Order Set" automatically suggests the ordering physicians to take into consideration screening for hypoventilation during sleep studies ordering process.	-- Dr. Alp Baran, Michart (EHR) Advisor -- Input from all team members
3. Order set did not contain necessary tools for ordering providers to properly/effectively evaluate patients who are at risk for hypoventilation.	-- "Smart Order Set" automatically populates the patient's BMI and HCO3 values and highlights it in red color.	-- Dr. Alp Baran, Michart Advisor -- Input from all team members

4. Ordering providers are not consistently assessing hypoventilation risk during the ordering process.	-- "Smart Order Set" contains multiple/redundant orders with specific features pre-checked. For example baseline PSG and baseline PSG with TCO2 monitoring are 2 selectable orders, instead of 1 order with box that provider have to manually check monitoring option as current.	-- Dr. Alp Baran, Michart Advisor -- Input from all team members

Note: If additional causes were identified that are to be addressed, insert additional rows.

C. Do

18. By what date was (were) the intervention(s) initiated? *(If multiple interventions date by when all were initiate*d.):

- Interventions were rolled out to all sleep medicine providers on January 16, 2017

D. Check

19. Post-intervention performance measurement. Are the population and measures the same as those for the collection of baseline data (see items 10 and 11)?

☒ Yes ☐ No – If no, describe how the population or measures differ:

The general population are the same (patients who are at risk for hypoventilation receiving a baseline sleep studies at MIB, KMS, and DF sites; however, the new sub-population will not be the exact group of patient included in the baseline analysis. We intended to keep the same characteristics in the follow up data analysis. This is adequate to assess the effective of the implemented changes for screening of hypoventilation in at risk patients undergoing a baseline sleep studies.

20. Post-intervention performance

A. **What were the beginning and end dates for the time period for <u>post-intervention</u> data on the measure(s)?**
   - March 3, 2017 through March 14, 2017

B. **What was (were) the overall performance level(s) post-intervention?** *Add post-intervention data to the data table, bar graph, or run chart (line graph) that displays baseline data. Can show baseline and post-intervention data incrementally here or refer to a display of data for all time periods attached at end of report. Show baseline and post-intervention time periods and measure names and for each time period and measure show number of observations and performance level.*

Patient Risk Groups and Measures	Baseline (8/22/16 – 9/2/16)	Post-Intervention (3/3/17 – 3/14/17)	Post-Adjustment (TBD)
Number of patient screened (N)	190	393	TBD
High risk patients – age ≥18, BMI ≥ 35, and HCO3 ≥ 27			
Of those screened, number and (%) at high risk]	28 (28/190 =15%)	34 (34/393 = 8.7%)	TBD
Of those at high risk, number and (%) with study and CO2 monitor requested	0 (0/28 = 0%)	2 (2/34 = 5.9%)	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	(No patients with study requested)	2 (2/34 = 5.9%)	TBD
Of those with study done with CO2 performed, number and (%) with CO2 positive	(No patients with study performed)	0 (0/34 = 0.0%)	TBD
Increased risk patients – age ≥18, BMI ≥ 35 and either HCO3 < 27 or HCO3 not known			
Of those screened, number and (%) at increased risk	58 (58/190 = 31%)	26 (26/393 = 6.6%)	TBD
Of those at increased risk, number and (%) with study and CO2 monitor requested	1 (1/58 = 2%)	2 (2/26 = 6.9%)	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	1 (1/1 = 100%)	2 (2/26 = 6.9%)	TBD
Of those with study done with CO2 performed, number and (%) with CO2 positive	0 (0/1 = 0%)	0 (0/2 = 0%)	TBD

Note: The two measures of performance are underlined.

We do not believe that the above "Post-Intervention" data were reflective of the impact of our intervention. We originally collected the "Baseline" data using the database that recorded baseline studies that were scheduled to be done. The "Post-Intervention" data above were collected using the same method. However, the baseline studies that were ordered after our intervention would have not been scheduled, since there is a significant delay between the time that the study is ordered and scheduled. The following table is a more accurate reflection of the results of our intervention. Data was collected on baseline studies ordered by sleep providers for March 2017. We increased the number of days that data is collected to 1 month because 2 weeks did not yield enough cases for meaningful analysis.

Patient Risk Groups and Measures	Baseline (8/22/16 – 9/2/16)	Post-Intervention (3/1/17 – 3/31/17)	Post-Adjustment (TBD)
Number of patient screened (N)	190	66	TBD
High risk patients – age ≥18, BMI ≥ 35, and HCO3 ≥ 27			
Of those screened, number and (%) at high risk]	28 (28/190 =15%)	4 (4/66 = 6.1%)	TBD
Of those at high risk, number and (%) with study and CO2 monitor requested	0 (0/28 = 0%)	2 (2/4 = 50.0%)	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	(No patients with study requested)	2 (2/4 = 50.0%)	TBD

Of those with study done with CO2 performed, number and (%) with CO2 positive	(No patients with study performed)	1 (1/2 = 50.0%)	TBD
Increased risk patients – age ≥18, BMI ≥ 35 and either HCO3 < 27 or HCO3 not known			
Of those screened, number and (%) at increased risk	58 (58/190 = 31%)	11 (11/66 = 16.7%)	TBD
Of those at increased risk, number and (%) with study and CO2 monitor requested	1 (1/58 = 2%)	4 (4/11 = 36.4%)	TBD
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	1 (1/1 = 100%)	3 (3/4 = 75.0%)	TBD
Of those with study done with CO2 performed, number and (%) with CO2 positive	0 (0/1 = 0%)	1 (1/4 = 25.0%)	TBD

Note: The two measures of performance are underlined.

C. **Did the intervention(s) produce the expected improvement toward meeting the project's specific aim (item 13.a)?** Ultimately, yes.
   - There were initially challenges in accurately assessing whether the project's specific aim was met. Only a 6.0% improvement (vs. a target of 25% improvement) in both measures of performance was achieved when data were collected as originally designed.
   - However, 50% improvement and 36% improvement in measures of performance were seen when data collection was adjusted to take into account the time lag between test ordering and test scheduling reflect the true impact of our intervention. The percentage improvement exceeded our original targets of 25%, although the number of cases remains very small.

E. Adjust – Replan

21. Post-intervention data review and further planning. Who was involved in reviewing the post-intervention data, identifying underlying (root) causes of problem(s) resulting in these new data, and considering possible interventions ("countermeasures") to address the causes? *(Briefly describe the following.)*

A. **Who was involved?** *(e.g., by profession or role)*

☒ Same as #14? ☐ Different than #14 *(describe):*

B. **How?** *(e.g., in a meeting of clinic staff)*

☒ Same as #14? ☐ Different than #14 *(describe):*

C. **When?** *(e.g., date(s) when post-intervention data were reviewed and discussed)*: March 15, 2017

Use the following table to outline the next plan that was developed: #22 the primary causes, #23 the adjustments(s)/second intervention(s) that addressed each cause, and #24 who carried out each intervention. *This is a simplified presentation of the logic diagram for structured problem solving explained at http://ocpd.med.umich.edu/moc/process-having-part-iv-credit-designation in section 2a.*

Note: Initial intervention(s) occasionally result in performance achieving the targeted specific aims and the review of post-intervention data identifies no further causes that are feasible or cost/effective to address.

If so, the plan for the second cycle should be to continue the interventions initiated in the first cycle and check that performance level(s) are stable and sustained through the next observation period.

22. What were the primary underlying/root causes for the <u>problem(s) following the intervention(s)</u> that the project can address?	**23. What adjustments/second intervention(s) addressed this cause?**	**24. Who was involved in carrying out each adjustment/second intervention?** *(List the professions/roles involved.)*
1. Ordering providers are still not consistently considering hypoventilation risk factors.	-- Education was delivered during sleep medicine grand round (Wednesday 3/29/17) for providers. A reminder email was sent on 4/3/17.	-- All members of the QI project
2. "Smart Order Set" is not easy to access.	-- Considered changing "Smart Order Set" to "hard stop" ordering for CO2 monitoring in Michart. Inquiries to make this change were initiated, but could not be pursued within the available time frame for this project.	-- Dr. Alp Baran, Michart Advisor -- Input from all team members
3. Ordering providers are not consistently assessing hypoventilation risk during the ordering process even while using the "Smart Order Set".	-- Considered changing "Smart Order Set" to "hard stop" ordering for CO2 monitoring in Michart. Inquiries to make this change were initiated, but could not be pursued within the available time frame for this project.	-- Dr. Alp Baran, Michart Advisor -- Input from all team members

Note: If additional causes were identified that are to be addressed, insert additional rows.

F. Redo

25. By what date was (were) the adjustment(s)/second intervention(s) initiated? *(If multiple interventions, date by when all were initiate*d.)

- April 3, 2017

G. Recheck

26. Post-adjustment performance measurement. Are the population and measures the same as indicated for the collection of post-intervention data (item #21)?

☒ Yes ☐ No – If no, describe how the population or measures differ:

27. Post-adjustment performance

a. What were the beginning and end dates for the time period for <u>post-adjustment</u> data on the measure(s)?

April 1 through April 30, 2017

b. What was (were) the overall performance level(s) post-adjustment? *Add post-adjustment data to the data table, bar graph, or run chart (line graph) that displays baseline and post-intervention data. Can show here or refer to a display of data for all time periods attached at end of report. Show time periods and measure names and for each time period and measure show the number of observations and performance level.*

Patient Risk Groups and Measures	Baseline (8/22/16 – 9/2/16)	Post-Intervention (3/1/17 – 3/31/17)	Post-Adjustment (4/1/17-4/30/17)
Number of patient screened (N)	190	66	61
High risk patients – age ≥18, BMI ≥ 35, and HCO3 ≥ 27			
Of those screened, number and (%) at high risk]	28 (28/190 =15%)	4 (4/66 = 6.1%)	12 (12/61 = 19.7%)
<u>Of those at high risk, number and (%) with study and CO2 monitor requested</u>	<u>0 (0/28 = 0%)</u>	<u>2 (2/4 = 50.0%)</u>	<u>6 (6/12 = 50.0%)</u>
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	(No patients with study requested)	2 (2/4 = 50.0%)	7(7/12 = 58.3%)
Of those with study done with CO2 performed, number and (%) with CO2 positive	(No patients with study performed)	1 (1/2 = 50.0%)	1(1/7 = 14.3%)
Increased risk patients – age ≥18, BMI ≥ 35 and either HCO3 < 27 or HCO3 not known			
Of those screened, number and (%) at increased risk	58 (58/190 = 31%)	11 (11/66 = 16.7%)	12 (12/61 = 19.7%)
<u>Of those at increased risk, number and (%) with study and CO2 monitor requested</u>	<u>1 (1/58 = 2%)</u>	<u>4 (4/11 = 36.4%)</u>	<u>4(4/12 = 33.3%)</u>
Of those with study and CO2 monitor requested, number and (%) with study done with CO2 monitor performed	1 (1/1 = 100%)	3 (3/4 = 75.0%)	4(4/4 = 100%)
Of those with study done with CO2 performed, number and (%) with CO2 positive	0 (0/1 = 0%)	1 (1/4 = 25.0%)	1(1/4 = 25.0%)

Note: The two measures of performance are underlined.

c. Did the adjustment(s) produce the expected improvement toward meeting the project's specific aim (item 13.a)?

- Yes, 58% and 33% improvement were seen in the measures of performance, compared to our targets of 25%. (Although the overall number of cases remains very small).

28. Summary of individual performance

a. Were data collected at the level of individual providers so that an individual's performance on target measures could be calculated and reported?

☐ Yes ☒ No – go to item 29

H. Readjust

29. Post-adjustment data review and further planning. Who was involved in reviewing the post-adjustment data, identifying underlying (root) causes of problem(s) resulting in these new data, and considering possible interventions ("countermeasures") to address the causes? *(Briefly describe the following.)*

a. Who was involved? *(e.g., by profession or role)*

☒ Same as #21? ☐ Different than #21 *(describe):*

b. How? *(e.g., in a meeting of clinic staff)*

☒ Same as #21? ☐ Different than #21 *(describe):*

c. **When?** *(e.g., date(s) when post-adjustment data were reviewed and discussed)*: The dates of post-adjustment data review and discussion occurred May 6th.

Use the following table to outline the next plan that was developed: #30 the primary causes, #31 the adjustments(s)/second intervention(s) that addressed each cause, and #32 who would carry out each intervention. *This is a simplified presentation of the logic diagram for structured problem solving explained at http://ocpd.med.umich.edu/moc/process-having-part-iv-credit-designation in section 2a.*

Note: Adjustments(s) may result in performance achieving the targeted specific aims and the review of post-adjustment data identifies no further causes that are feasible or cost/effective to address. If so, the plan for a next cycle could be to continue the interventions/adjustments currently implemented and check that performance level(s) are stable and sustained through the next observation period.

30. What were the primary underlying/root causes for the problem(s) following the adjustment(s) that the project can address?	**31. What further adjustments/ intervention(s) might address this cause?**	**32. Who would be involved in carrying out each further adjustment/intervention?** *(List the professions/roles involved.)*

The target goals of 25% have been surpassed. The concern is whether performance will continue to be above goal levels.	If it were practical, monitor performance during an additional follow-up month.	The current team of fellows is leaving fellowship. New fellows would have to agree that another cycle of monitoring would be a priority.

Note: If additional causes were identified that are to be addressed, insert additional rows.

33. Are additional PDCA cycles to occur for this specific performance effort?

☒ No further cycles will occur.

☐ Further cycles will occur, but will not be documented for MOC. *If checked, summarize plans:*

☐ Further cycles will occur and are to be documented for MOC. *If checked, contact the UM Part IV MOC Program to determine how the project's additional cycles can be documented most practically.*

I. Reflections and Future Actions

33. Describe any barriers to change (i.e. problems in implementing interventions listed in #16 and #23) that were encountered during this QI effort and how they were addressed.

- Disseminating information regarding the new order set to ordering physicians was challenging
- System wide problem with timely access to resources to implement change changing existing order in MiChart
- Limited availability of resources to actually conduct timely intervention (CO2 monitoring devices)

We addressed these issues in the following ways:

- Provided direct face-to-face education with physicians during Grand Rounds
- Sent reminder and encouraging e-mails to physicians to use the order set

34. Describe any key lessons that were learned as a result of the QI effort.

- Implementation of order set changes requires system approval, takes time and resources to carry out---high degree of difficulty
- Greater education as part of the intervention may have led to increased buy-in from ordering physicians. which may have increased overall rate of ordering.

35. Describe any best practices that came out of the QI effort.

- The ability of implementing desired intervention requires education and dialog with stakeholders
- Feasibility and scope should be discussed thoroughly prior to launching an intervention
- It's important to work rapidly to shorten cycles for review and change

36. Describe any plans for spreading improvements, best practices, and key lessons.

- Will continue with sleep provider specific cohort as a pilot group; lessons and best practices can be adapted and used in system-wide implementation
- Ongoing discussion and education on utility of intervention

- Following assessment of the impact of our intervention on the patient population of interest, the need for system wide implementation will be highlighted.
- Key lessons will be discussed with faculty to be used in guiding future fellows with their QI projects

37. Describe any plans for sustaining the changes that were made.

- Order for TCO2 monitoring is in the Sleep Clinic Smart Order Set, and will be a key support in sustaining the improvement

J. Minimum Participation for MOC

38. Participating directly in providing patient care.

a. Did any individuals seeking MOC participate directly in providing care to the patient population?

☒ Yes ☐ No *If "No," go to item #39.*

b. Did these individuals participate in the following five key activities over the two cycles of data-guided improvement?

– Reviewing and interpreting baseline data, considering underlying causes, and planning intervention as described in item #14.
– Implementing interventions described in item #16.
– Reviewing and interpreting post-intervention data, considering underlying causes, and planning intervention as described in item #21.
– Implementing adjustments/second interventions described in item #23.
– Reviewing and interpreting post-adjustment data, considering underlying causes, and planning intervention as described in item #29.

☒ Yes ☐ No *If "Yes," individuals are eligible for MOC unless other requirements also apply and must be met – see item # 40.*

39. Not participating directly in providing patient care.

a. Did any individuals seeking MOC not participate directly in providing care to the patient population?

☐ Yes ☒ No *If "No," go to item 40.*

b. Were the individual(s) involved in the conceptualization, design, implementation, and assessment/evaluation of the cycles of improvement? *(E.g., a supervisor or consultant who is involved in all phases, but does not provide direct care to the patient population.)*

☐ Yes ☐ No *If "Yes," individuals are eligible for MOC unless other requirements also apply and must be met – see item # 40. If "No," continue to #39c.*

c. Did the individual(s) supervising residents or fellows throughout their performing the entire QI effort?

☐ Yes ☐ No *If "Yes," individuals are eligible for MOC unless other requirements also apply and must be met – see item # 40.*

40. Did this specific QI effort have any additional participation requirement for MOC? *(E.g., participants required to collect data regarding their patients.)*

☐ Yes ☒ No *If "Yes," describe:*

Individuals who want their participation documented for MOC must additionally complete an attestation form, confirming that they met/worked with others as described in this report and reflecting on the impact of the QI initiative on their practice or organizational role. Following approval of this report, the UMHS QI MOC Program will send to participants an email message with a link to the online attestation form.

K. Sharing Results

41. Are you planning to present this QI project and its results in a:

☒ Yes ☐ No Formal report to clinical leaders?

☐ Yes ☒ No Presentation (verbal or poster) at a regional or national meeting?

☐ Yes ☒ No Manuscript for publication?

L. Project Organizational Role and Structure

42. UMHS QI/Part IV MOC oversight – indicate whether this project occurs within UMHS, AAVA, or an affiliated organization and provide the requested information.

☒ **University of Michigan Health System**

• **Overseen by what UMHS Unit/Group?** *(name):*

• **Is the activity part of a larger UMHS institutional or departmental initiative?**

☒ No ☐ Yes – the initiative is *(name or describe*):

☐ **Veterans Administration Ann Arbor Healthcare System**

• **Overseen by what AAVA Unit/Group?** *(name):*

• **Is the activity part of a larger AAVA institutional or departmental initiative?**

☐ No ☐ Yes – the initiative is:

☐ **An organization affiliated with UMHS to improve clinical care**

• **The organization is** *(name)***:**

• **The type of affiliation with UMHS is:**

☐ **Accountable Care Organization** *(specify which member institution):*

☐ **BCBSM funded, UMHS lead state-wide Collaborative Quality Initiative** *(specify which):*

☐ **Other** *(specify)*