Report on a QI Project Eligible for Part IV MOC

Timely and Accurate Interpretation of EKGs on Polysomnograms

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. Final confirmation of Part IV MOC for a project occurs when the full report is submitted and approved.

An option for preliminary review (recommended) is to complete a description of activities through the intervention phase and submit the partially completed report. (Complete at least items 1-16 and 27a-b.) 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 and answers should be in regular font (generally immediately below the questions). To check boxes electronically, either put an "X" in front of a box or copy and paste "☒" over the blank box.

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

Section		Items	
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B.	**Plan**	7-10.	General goal, patient population, IOM quality dimensions addressed, experimental design
		11-12.	Baseline measures of performance, specific performance objectives
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C.	**Do**	14-16.	Intervention(s), who is involved, initiated when
D.	**Check**	17-18.	Post-intervention performance measurement, data collection, performance level
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F.	**Redo**	20.	Second intervention
G.	**Recheck**	21-22.	Post-adjustment performance measurement, data collection, performance level
H.	**Readjust plan**	23.	Review, continuing/new underlying causes to address
I.	**Future plans**	24-26.	Subsequent PDCA cycles, standardize processes, "spread" to other areas
J.	**Physician involvement**	27-30.	Physician's role, requirements, reports, reflections, participation, number
K.	**Project Organization**	31-33.	Part of larger initiative, organizational structure, resources, oversight, Part IV opportunity

QI Project Report for Part IV MOC Eligibility

A. Introduction

1. Date (this version of the report): 05/14/2015

2. Title of QI project: Timely and accurate interpretation of EKGs on polysomnograms

3. Time frame
   a. Date physicians begin participating (may be in design phase): 09/01/2014-
   b. End date: 04/31/2015

4. Key individuals: Gaurav Nigam MD (QI Project Leader), Dr Riaz Muhammad, Dr Dafer Samara, Dr Syed Qamer, Dr Helena Schotland (project supervisor).

   a. QI project leader
      Name: Gaurav Nigam
      Title: MD
      Organizational unit: Sleep medicine
      Phone number: 7347639063
      Email address: gnigam@med.umich.edu
      Mailing address: University of Michigan Sleep Disorders Center
      C728 Med Inn Bldg.
      1500 E. Medical Center Drive
      Ann Arbor, MI 48109-584

   a. Clinical leader to whom the project leader reports regarding the project [responsible for overseeing/"sponsoring" the project within the specific clinical setting]
      Name: Helena Schotland
      Title: MD
      Organizational unit: Sleep medicine
      Phone number: 7347639063
      Email address: helenas@med.umich.edu
      Mailing address: University of Michigan Sleep Disorders Center
      C728 Med Inn Bldg.
      1500 E. Medical Center Drive
      Ann Arbor, MI 48109-584

5. Approximately how many physicians were involved in this project categorized by specialty and/or subspecialty? Five

6. Will the funding and resources for the project come only from internal UMHS sources?
No funding needed
   ☒ Yes, only internal UMHS sources
   ☐ No, funding and/or resources will come in part from sources outside UMHS,
      which are: _____

The Multi-Specialty Part IV MOC Program requires that projects engage in change efforts over time, including at least three cycles of data collection with feedback to physicians and review of project results. Some projects may have only three cycles while others, particularly those involving rapid cycle improvement, may have several more cycles. The items below are intended to provide some flexibility in describing project methods. If the items do not allow you to reasonably describe the methods of your specific project, please contact the UMHS Part IV MOC Program office.

B. Plan

7. General goal

    a. Problem/need. What is the "gap" in quality that resulted in the development of this project? Why is this project being undertaken?
Accurately interpreting 2-lead EKGs on polysomnogram by technicians for patients in the sleep lab has always been challenging given variability in quality and reliability of the tracing and the level of expertise of technicians. This often leads to technicians calling the on-call fellow at night (7 nights in a row) with the intent of not missing any critical EKG findings. The technicians are "upstream suppliers" of physician's work and indiscriminate phone calls negatively affect patient care provided by physicians through pooling of priority studies the next day and hampering the expedited interpretation of genuine priority studies. This in turn creates delays in timely communication to stake holders (patients, primary care providers and cardiologists) about EKG findings that need their immediate attention and action to circumvent cardiovascular morbidity and mortality. Unnecessary phone calls to the call fellow at night also indirectly affects care through the fellow's sleep fragmentation and impaired efficiency in the daytime.

    b. Project goal. What outcome regarding the problem should result from this project?
The goal of this project is to improve sleep lab technician's identification of "EKG priorities," thereby expediting rhythm interpretation and timely communication to stakeholders (patient, primary care providers and cardiologists). This will be accomplished through understanding the current system for technician's interpretation of 2-lead EKGs on polysomnograms and improving the process for labeling of studies as "EKG priorities".

8. Patient population. What patient population does this project address.
Patients with suspected sleep disorders who are being tested using an "in lab" technician supervised polysomnogram

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

☒ Safety	☐ Equity	☒ Timeliness
☒ Effectiveness	☒ Efficiency	☒ Patient-Centeredness

10. What is the experimental design for the project?
☒ Pre-post comparisons (baseline period plus two or more follow-up measurement periods)
☐ Pre-post comparisons with control group
☐ Other: _____

11. Baseline measures of performance:

    a. What measures of quality are used? If rate or %, what are the denominator and numerator?

    Number of EKG calls to the on-call fellow labeled by technician as an EKG priority.

    Percentage of accurate interpretations of the calls as an EKG priority as read by the sleep fellow and the sleep medicine preceptor/attending:
Total number of studies correctly interpreted as EKG-related priorities/ Total number of studies labeled by technician as EKG priorities

    Note: Sleep fellows and sleep medicine preceptors/attendings determined whether an EKG was appropriately labeled a priority based on their interpretation of standard criteria for labeling a 2-lead EKG on a polysomnogram as an EKG priority requiring a physician's attention.

    b. Are the measures nationally endorsed? If not, why were they chosen? No

Both measures were developed locally to reflect the performance problems of unnecessary EKG related calls and of inaccurate interpretations.

c. **What is the source of data for the measure (e.g., medical records, billings, patient surveys)?**
Number of EKG-priority calls   On call fellow recorded the number of priority calls made to fellows during the night.

Percentage of accurate interpretations. The fellow reading the sleep study recorded the number and accuracy of EKG interpretation as a priority (after discussing with the sleep medicine attending).

d. **What methods were used to collect the data (e.g., abstraction, data analyst)?**
For both measures the Fellow team members assembled the data collected by individual fellows.

e. **How reliable are the data being collected for the purpose of this project?**
For both measures: Very reliable

f. **How are data to be analyzed over time, e.g., simple comparison of means, statistical test(s)?**
For both measures: Simple comparison

f. **For what time period was the sample collected for baseline data?**
1/1/2015 -01/14/2015

12. **Specific performance objectives**

a. **What was the overall performance level(s) at baseline?** *(E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)*

Time Period	# Calls for EKG Priority	% Accurately interpreted as EKG Priority
Baseline 1/1-14/15	10	70%

b. **Specific aim: What was the target for performance on the measure(s) and the timeframe for achieving the target?**
By the end of April 2015:
• Reduce the EKG call volume (calls due classifying EKG studies as priorities that actually are not priorities) by 10 %: from mean of 5/week to mean of 4.5 calls/week
• Increase accuracy of interpretation by 10%: from 70% to at least 80%.

c. **How were the performance targets determined, e.g., regional or national benchmarks?**
No national benchmarks exist. Team members developed targets based on reasonable expectations for the time period.

13. **Data review and identifying underlying (root) causes.**

a. **Who was involved in reviewing the baseline data, identifying underlying (root) causes of the problem(s), and considering possible interventions ("countermeasures") to address the causes? Briefly describe:**
• **Who was involved?** Fellow team members Nigam, Qamer, Mohammad and Samara

• **How?** After hours meeting was held in which participating team members (4 fellows including Team Leader) reviewed baseline data procured from the survey logs data collectively.

- **When?** 1/15/2015

d. **What were the primary underlying/root causes for the problem(s) that the project can address?** *(Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately. How the intervention(s) address each primary underlying cause will be explained in #14.c.)*
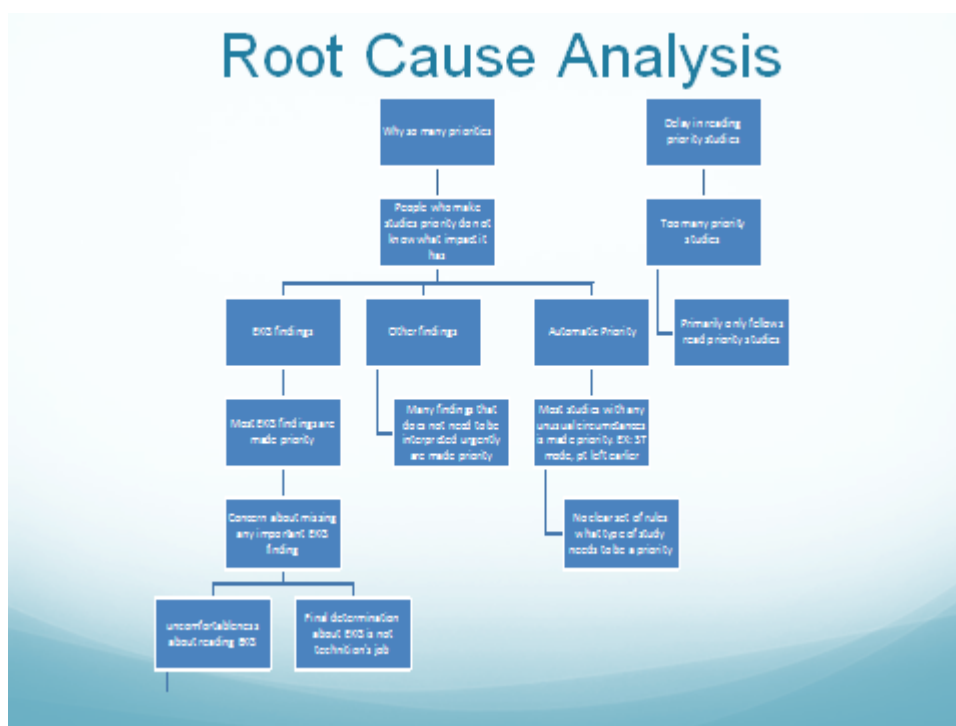
People.   The training of technicians focused on recognizing EEGs waveforms and breathing patterns, rather than training on critical EKG strips that require prompt physician attention ("EKG priorities"). Therefore sleep lab technicians are uncomfortable with their ability to interpret some EKGs as priorities and call the on-call fellow to be sure that critical EKG strips are not missed.

Equipment. EKGs look different on the standard 12-lead EKGs versus the 2-lead EKGs used during sleep study. Interpreting EKG findings based on 2-lead EKGs during PSG can be challenging and may not give accurate representations.

The primary cause on which the team focused is technologist's lack of training in identifying strips that are EKG priorities requiring physician attention. The limitations of 2-lead EKGs cannot easily be addressed because the many leads for other measures during polysomnograms make 12-lead EKGs impractical.

C. Do

14. Intervention(s).

a. **Describe the interventions implemented as part of the project.**

Education: The fellow team developed and held an hour-long interactive session with the sleep technicians that included a power point presentation and discussion addressing:
- Problems/barriers in interpreting EKGs accurately
- 2-lead EKGs strips that had the highest propensity for being misinterpreted

· Which strips should prompt a call

b. **How were underlying/root causes** (see #13.b) **addressed by the intervention(s)?** (List each
cause, whether it was addressed, and if so, how it was addressed.)

The educational session addressed each of the three causes:
· Uncertain ability to read critical EKG strips
· Differences with 2-lead EKGs
· Uncertainty regarding when to call.
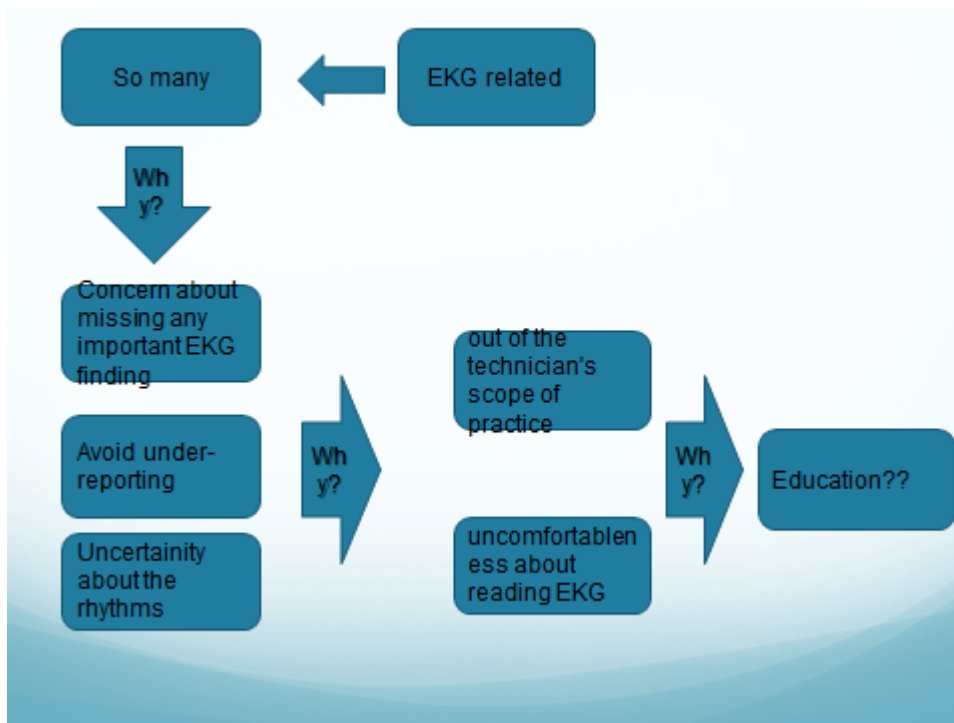
15. **Who was involved in carrying out the intervention(s) and what were their roles?**
All 5 participants (Drs. Schotland, Nigam, Qamer, Muhammad and Samara). All participants involved
creating draft for the first intervention with team lead (Dr Nigam) also doing the power point
presentation. Sleep technicians inputs were received as to what high yield EKG slides should be
included in the power point presentation.

16. **The intervention was initiated when?** (For multiple interventions, initiation date for each.)
1/21/2015

D. Check

17. **Post-intervention performance measurement. Did this data collection follow the same
procedures as the initial collection of data described in #11: population, measure(s), and data
source(s)?**

☒ Yes   ☐ No – If no, describe how this data collection

18. **Performance following the intervention.**

a. **The collection of the sample of performance data following the intervention occurred for the
time period:** 02/02/2015-2/15/2015

b. **What was post-intervention performance level?** *(E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)*

Time Period	# Calls for EKG Priority	% Accurately interpreted as EKG Priority
Baseline 1/1-14/15	10	70%
Post-Intervention 2/2-15/15	8	75%

c. **Did the intervention produce the expected improvement toward meeting the project's specific aim (item 12.b)?**
   <u>Number of EKG-priority calls per week</u>   Yes, the number of calls was reduced to 4 (20% reduction).
   <u>Percentage of accurate interpretations as EKG priority.</u> No, the increase of 5 percentage points did not yet reach 80%.

E. Adjust – Replan

19. Review of post-intervention data and identifying continuing/new underlying causes.

a. **Who was involved in reviewing the post-intervention data, identifying underlying (root) causes of the continuing/new problem(s), and considering possible adjustments to interventions ("countermeasures") to address the causes? Briefly describe:**

  • **Who was involved?** All 5 participants (Drs. Schotland, Nigam, Qamer, Mohammad and Samara). All participants involved in creating a poster for the second intervention.

  • **How? :** After hour meeting was held in which participating team members (4 fellows including Team Leader) reviewed baseline data procured from the survey logs data collectively.

  • **When? :** 2/16/2015

a. **What were the primary underlying/root causes for the continuing/new problem(s) that the project can address?** *(Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately. How the intervention(s) address each primary underlying cause will be explained in #20.c.)*

   <u>People: memory limitations.</u> During Intervention 1, technicians understood the concepts around basic EKG interpretations. However there was suboptimal visual recall during subsequent nights when they encountered related EKG rhythms while running sleep studies.

   <u>People: untrained individuals.</u> There were a few new recruits and some technicians who had missed the Intervention 1 interactive session so they continued to make similar errors before and after the Intervention 1.

F. Redo

20. Second intervention.
   a. **The second intervention was initiated when?** *(For multiple interventions, initiation date for each.)*
   04/15/2015

b. What interventions were implemented?
Developed educational tool and memory aid. The team developed a poster outlining common problem EKG arrhythmias, tachy-bradycardias, definitions and diagnostic criteria for accurate interpretation of most critical EKG tracings to be anticipated while conducting in lab sleep studies.

Educational session introducing the tool. The team members individually went to the sleep laboratory at 3 different sites and oriented the sleep technicians regarding the content and utility of the posters. Team members explained to the technicians how to increase the accuracy of EKG interpretation using the EKG poster in conjunction with EKG power point slides provided to them previously. Finally, they displayed the poster in the sleep lab control room.

c. How were continuing/new underlying/root causes (see #19.b) **addressed by the intervention(s)?** (List each cause, whether it was addressed, and if so, how it was addressed.)

Memory limitations and untrained individuals. Both of these causes were addressed by the poster providing key information, explaining how to use it, and making it available for ongoing reference and use.

G. Recheck

21. Post-second intervention performance measurement. Did this data collection follow the same procedures as the initial collection of data described in #11: population, measure(s), and data source(s)?

☒ Yes   ☐ No – If no, describe how this data collection

22. Performance following the second intervention.

a. The collection of the sample of performance data following the intervention(s) occurred for the time period:
4/15-28/15

g. What was the performance level? (E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)

Time Period	# Calls for EKG Priority	% Accurately interpreted as EKG Priority
Baseline 1/1-14/15	10	70%
Post-Intervention 2/2-15/15	8	75%
Post-Adjustment 4/15-28/15	8	88%

c. Did the second intervention produce the expected improvement toward meeting the project's specific aim (item 12.b)?
Number of EKG calls per week   Yes, the number of calls remained reduced to 4 (20% reduction was maintained post intervention 2).
Percentage of accurate interpretations. Yes, the increase of 13 percentage points (from post intervention #1) brought the accurate interpretation to 88%, exceeding the goal of 80%.

H. Readjust

23. Review of post-second intervention data and identifying continuing/new underlying causes.

   a. Who was involved in reviewing the data, identifying underlying (root) causes of the continuing/new problem(s), and considering additional possible adjustments to interventions ("countermeasures") to address the causes? Briefly describe:
   - **Who was involved?** All 5 participants (Drs. Schotland, Nigam, Qamer, Mohammad and Samara). All participants involved in data analysis using the information gained from the table above regarding performance level metrics.

   - **How? :** In clinic meetings

   - **When? :** 05/14/2015

   b. What were the primary underlying/root causes for the continuing/new problem(s) that the project can address? (Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately.)

   Likely reasons for initial interpretations by technicians not to be confirmed by sleep fellows and attending physicians are:

   I. Limited diagnostic capability of 2-lead EKGs on PSG: The limited leads available to interpret rhythms on 2-lead EKG makes it harder for technicians to accurately diagnose the EKG rhythm as a priority. Although the ability of technicians to recognize priority rhythms has increased, when technicians are uncertain due to the technical limits of 2-lead EKGs, technicians will place a priority call.

   II. Limited time to diagnose arrhythmias: The technicians have limited time that they can dedicate to arrhythmia detection. They simultaneously interpret respiratory events and correct them with CPAP up-titrations as events unfold. Sleep fellows and attending physicians have more focused time to interpret whether the rhythms were actually EKG priorities.

   III. Technician did not participate in the educational session: The EKG may have been read by one of the few technicians who were not able to attend the educational session (first intervention) or by a technician who started working the sleep lab after the first intervention.

   Technology limits (i) and multiple tasks (ii) will result in technician's interpretations of EKG priorities being less than 100% accurate. However, results of the educational and reminder interventions indicate that the ability of technicians to interpret EKG can be improved beyond our initial goal of 80%. Working with technicians who have not yet participated in these interventions (iii) could be continued fairly easily.

If no additional cycles of adjustment are to be documented for the project for Part IV credit, go to item #24.
If a few additional cycles of adjustments, data collection, and review are to be documented as part of the project to be documented, document items #20 – #23 for each subsequent cycle. Copy the set of items #20 – #23 and paste them following the last item #23 and provide the information. When the project to be documented for Part IV credit has no additional adjustment cycles, go to item #24.
If several more cycles are included in the project for Part IV credit, contact the UM Part IV MOC Program to determine how the project can be documented most practically.

I. Future Plans

24. **How many subsequent PDCA cycles are to occur, but will not be documented as part of the "project" for which Part IV credit is designated?**
Subsequent PDCA cycles: Will not be done by this group of participants. Next year's sleep medicine fellows will assess the priority for continuing to address this problem compared to other issues they can address.

25. **How will the project sustain processes to maintain improvements?**

Repeated review of concerning EKG strips by referencing to the EKG poster put in the sleep lab will help accurate interpretation and decrease the number of calls made out to sleep fellows at night. Fellows on call need to send reminders via phone and emails when wrongly interpreted EKGs are identified.

We recommended to leadership at Sleep Disorder Center that in the future sleep medicine fellow/staff hold intermittent interactive sessions with sleep technicians to outline common EKG interpretation related errors.

26. **Do other parts of the organization(s) face a similar problem? If so, how will the project be conducted so that improvement processes can be communicated to others for "spread" across applicable areas?**

Other sleep labs face similar problems. Sleep technicians in different labs have varying degrees of experience in terms of EKG interpretations. Doing Intervention 1 and 2 in their clinics should increase accurate and timely interpretations of challenging EKG tracings. We are considering how to communicate our results to other sleep medicine centers in order to spread across areas to maximize efficacy of EKG interpretations.

J. Physician Involvement

Note: To receive Part IV MOC a physician must both:
a. Be actively involved in the QI effort, including at a minimum:
   • Work with care team members to plan and implement interventions
   • Interpret performance data to assess the impact of the interventions
   • Make appropriate course corrections in the improvement project
b. Be active in the project for the minimum duration required by the project

27. **Physician's role. What were the minimum requirements for physicians to be actively involved in this QI effort?** (What were physicians to do to meet each of the basic requirements listed below? If this project had additional requirements for participation, also list those requirements and what physicians had to do to meet them.)

a. Interpreting baseline data and planning intervention:
   Attend meeting on 1/15/15 to analyze data, consider underlying causes, and formulate relevant interventions.

b. Implementing intervention:
   Help draft the format for the Intervention #1 ie. EKG interactive session, help create EKG slides to be used during teaching session for the technicians. Subsequently inform technicians when EKG strip was misread.

c. Interpreting post-intervention data and planning changes:
   Attend meeting on 2/16/15 to review data, consider underlying causes, and formulate subsequent interventions.

d. Implementing further intervention/adjustments:
   Help create EKG and present poster for Intervention #2. Reinforce to the technicians the use of EKG poster while doing preliminary EKG interpretation at night to decide if that EKG needs to be labeled as a priority study. Inform technicians when EKG strip was misread.

e. Interpreting post-adjustment data and planning changes:
   Attend clinic meeting on 05/14/2015 to review data, consider underlying causes, and formulate subsequent interventions.

28. **How were reflections of individual physicians about the project utilized to improve the overall project?**
The formal team meetings and informal interactions among team members provided opportunities for all participants to share ideas, enabling the team to consider and act on reflections from all team members. Noteworthy for this group were the complementary backgrounds and experiences that helped the team improve the project from multiple perspectives:
- Dr Samara and Dr Schotland helped the group understand the nuances of EKG interpretation given their training in critical care and pulmonary medicine.
- Dr. Ali with his training in psychiatry helped understand the psychological barriers associated with over reporting the findings in order not to miss any critical EKGs and also role of repetition, positive reinforcement and encouragement in developing a collegial relationship between the sleep technicians and participating physicians.
- Drs. Riaz and Nigam with their training in family medicine provided the primary care physician perspective as it related to interpreting the challenging EKG tracings as well as helped develop a shared decision making model utilizing active engagement and collaboration from the sleep technicians to optimize collective efforts towards accurate and timely EKG interpretations. The expertise and experience of the project supervisor
- Dr Schotland helped trouble shoot technical and practical problems at multiple stages of the project implementation.

29. **How did the project ensure meaningful participation by physicians who subsequently request credit for Part IV MOC participation?**
The faculty advisor (Dr. Schotland) and the team lead (Dr. Nigam) directly oversaw the participation of all team members in each step of the project.

K. Project Organizational Role and Structure

30. **UMHS QI/Part IV MOC oversight – this project occurs within:**

☒ **University of Michigan Health System**

   ∙ **Overseen by what UMHS Unit/Group?**

   ∙ **Is the activity part of a larger UMHS institutional or departmental initiative?**
   ☒ No   ☐ Yes – the initiative is:

☐ **Veterans Administration Ann Arbor Healthcare System**
   ∙ **Overseen by what AAVA Unit/Group?**

   ∙ **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:**

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

☐ **Accountable Care Organization type** (specify which):

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

☐ **Other** (specify):