TEXAS WOMAN'S
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Use of Evidence-Based Instrument to Identify Patients at Risk for Obstructive Sleep Apnea: A Practice Improvement Initiative

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Section I: Introduction and Background

Undiagnosed obstructive sleep apnea has a negative health impact on patients with cardiovascular disease
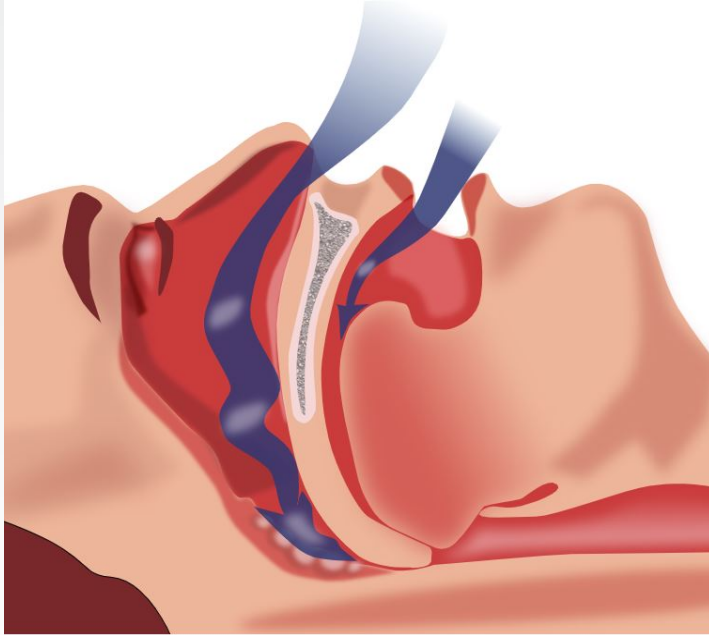
Heart attack

Heart failure

Stroke

Arrhythmia / atrial fibrillation

(Mayo Clinic, 2021)
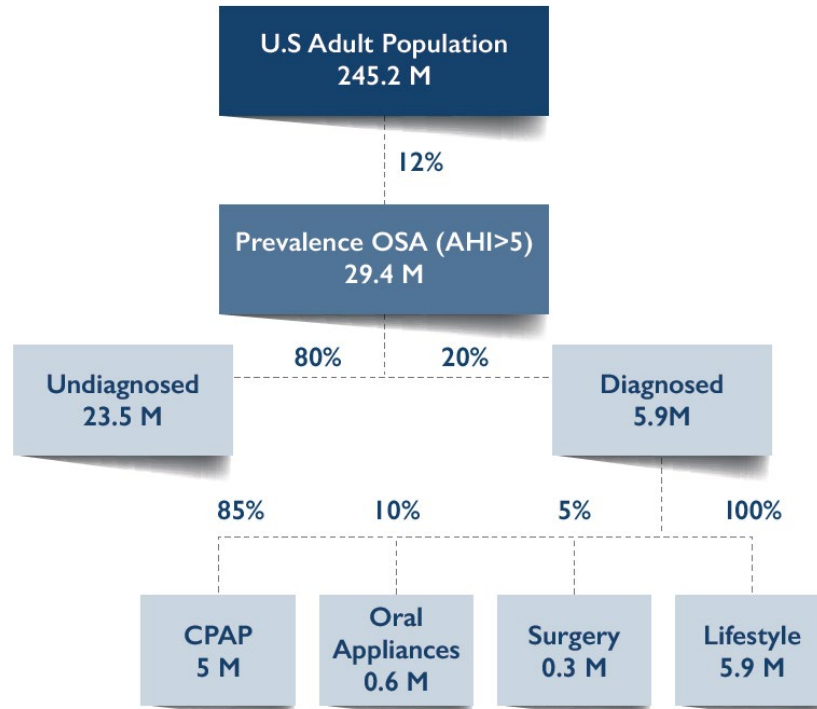
Incidence of Obstructive Sleep Apnea

- Sleep apnea: Repetitive breathing cessation >10 seconds during sleep (Tietjens et al., 2019)
- Obstructive sleep apnea (OSA): Major sleep disorder affecting 24 % of adult Americans (Patil et al., 2019)
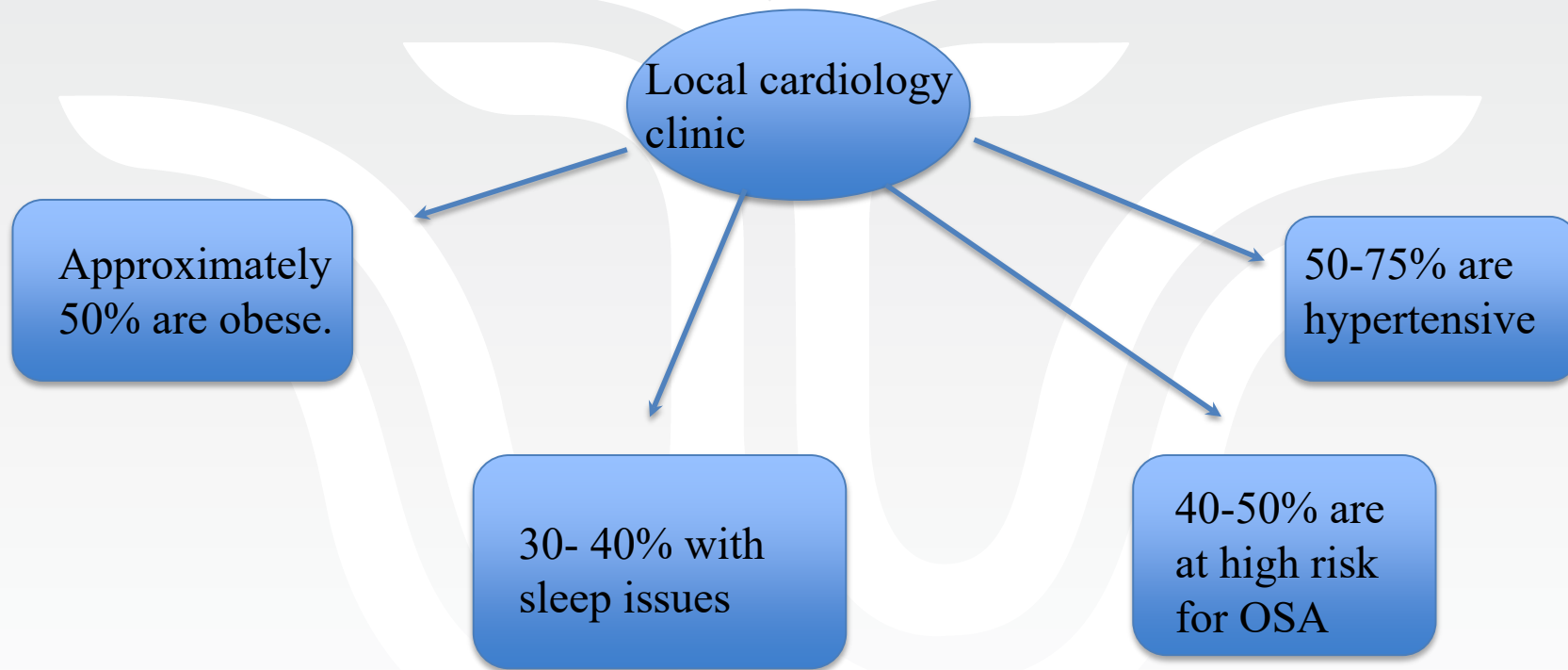
Obstructive Sleep Apnea (OSA)

- U.S. estimated economic cost of undiagnosed OSA: $150 billion in 2015 (AASM, 2016).
- Comorbid diseases from OSA ($30 billion), motor vehicle accidents ($26.2 billion), & lost productivity ($86.9 billion).
- Sleep apnea diagnosis: Polysomnography (PSG) or Home Sleep Apnea Test (HSAT).
- Sleep study helps to classify the severity of sleep apnea using the Apnea-Hypopnea Index (AHI).

Khattak et al. (2018)

Prevalence, Diagnosis, and Treatment of Obstructive Sleep Apnea in the USA

American Academy of Sleep Medicine, 2016

Profile of Patients Seen in the Pre-project Pilot

Local cardiology clinic

Approximately 50% are obese.

50-75% are hypertensive

30- 40% with sleep issues

40-50% are at high risk for OSA

PICOT Question

P- All patients of a local cardiology clinic older than 18 years visited the clinic between 02/22/2021 and 03/24/2021 for an ongoing cardiovascular diagnosis.

I- Screening for Obstructive Sleep Apnea (OSA) with the STOP-BANG instrument combined with clinical practice judgment for the identification of at-risk and possible diagnosis of patients.

C- Screening for OSA by expert clinician judgment with a possible diagnosis

O- Number of patients 1). identified at risk 2). underwent sleep study 3). diagnosed and followed up for treatment of OSA.

T- Over 10 weeks.

Project Question

Does implementing an obstructive sleep apnea screening practice improvement project improve the identification and diagnosis of patients with obstructive sleep apnea (OSA) at the local cardiology clinic?

Needs Assessment

| Strengths	Weaknesses
• Provide quality care for the population • Dedicated, enthusiastic nursing staff • Experienced APRN • Interprofessional collaboration	• No existing sleep apnea screening • Patient's hesitancy for OSA screening • Staff shortage • High patient volume, limited provider time • Patient's lack of understanding about OSA
Opportunities	**Threats**
• Potential for implementation of OSA screening Improving cardiovascular health of clinic patients • Opportunity to improve referral pipeline to Pulmonologist • Improvement of transitional care for patients diagnosed with OSA • Continued education for the staff	• Lack of financial support--Patient's financial issues-High insurance co-pays for the sleep study • Language, and educational barriers • Inability to effectively communicate risk • The complexity of the system for follow up • Undiagnosed sleep apnea increases cardiovascular complications

Project Purpose

By March 2021, through screening and clinician judgment 100% of clinic patients who are at high risk for OSA will be identified and placed on a diagnostic pathway.
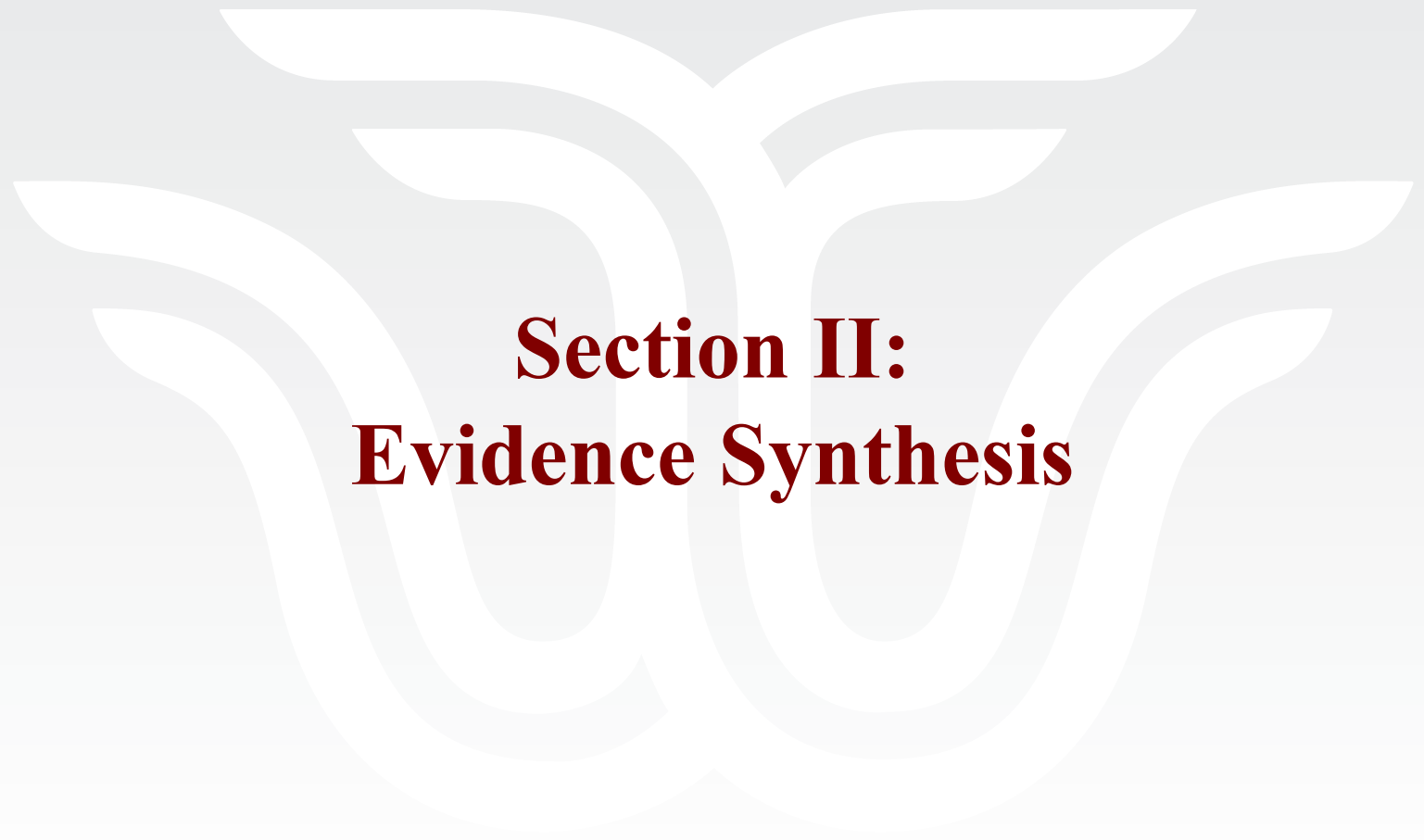
Project Aims

The specific project aims are to improve the number of patients that are identified using the STOP-BANG screening instrument plus clinician judgment as 1) high risk for OSA and 2) lead to the opportunity for diagnosis via diagnostic testing with the HSAT or the in-lab sleep study so that treatment is offered to those that have OSA. Ultimately, it is hoped that this will reduce the burden of cardiovascular complications, improve health, and decrease cost.

Theoretical Framework
Pender's Health Promotion Model
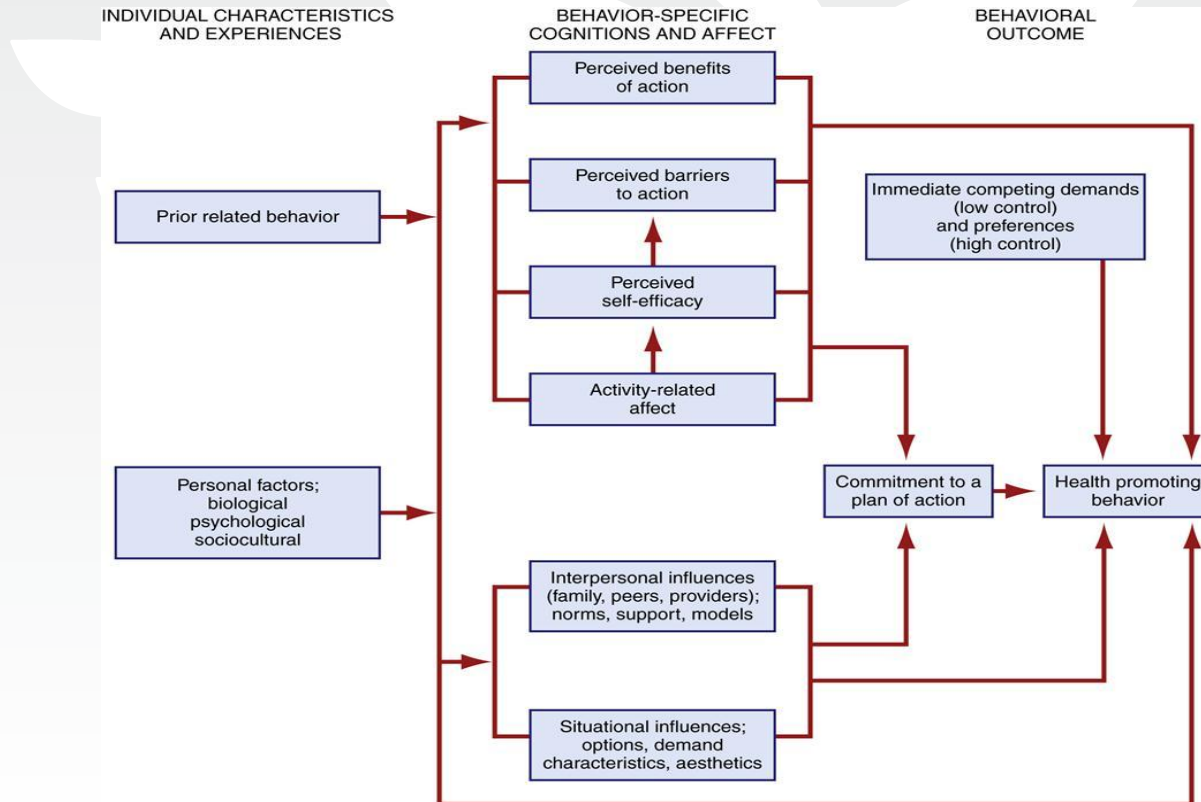
(Pender, 2011)

Section II:
Evidence Synthesis

Evidence Search

- Databases: PubMed, Google Scholar, Medscape, Cochrane, Science Direct, Ovid, CINAHL, Academic search complete, and EBSCO

- Keywords: 'obstructive sleep apnea', 'sleep apnea screening', 'STOP-BANG questionnaire', 'Home sleep test', 'Level III sleep test', 'sleep apnea burden', 'sleep apnea and obesity', and 'sleep apnea education'

- 2010- 2021

- 23/60 articles

- English & peer-reviewed

- Critically appraised using CASP- Articles with moderate to a high quality of evidence are used

Levels of Evidence/Strength

- 1 Systematic review - Level I- High
- 4 Systematic review/meta-analysis - Level I - High
- 6 Randomized control trials - Level I - High
- 4 Cohort studies - Level II - Moderate
- 1 Case-control study - Level III - Moderate
- 7 Descriptive studies - Level IV - Moderate

High strength: 11 articles
Moderate strength: 12 articles

Level 1 → Systematic Reviews and Randomized Control Trials

Level 2
Cohort Studies

Level 3
Case-controlled Studies

Level 4
Case Series

Level 5
Case-based Reasoning or Expert Opinion
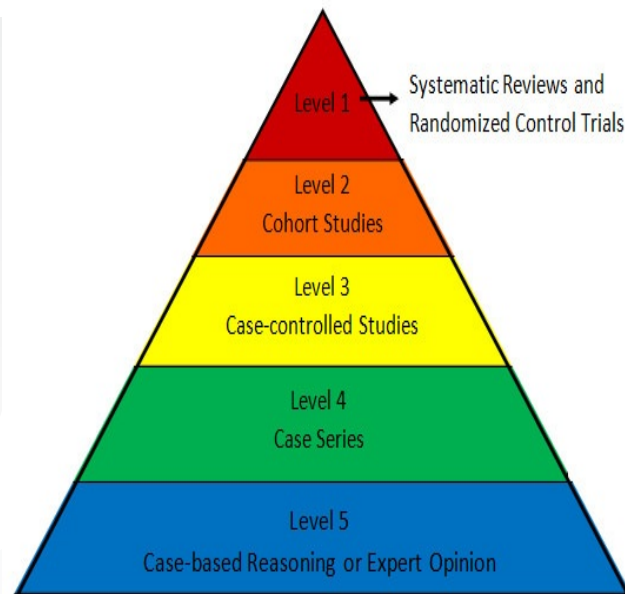
*based on the Oxford Centre for Evidence-based Medicine – Levels of Evidence

Themes and Evidence Synthesis

- Screening for OSA in outpatient settings **reduces the incidence** of undiagnosed sleep apnea (Ononye et al., 2019; Showalter & O'Keefe, 2019).

- STOP-BANG questionnaire was found **sensitive and valid** in diagnosing sleep apnea (Miller et al., 2015 & 2018; Chung et al., 2013; Orbea et al., 2020; Nagappa et al., 2015).

- HSAT is **convenient, less expensive, and faster** than laboratory PSG tests (Saletu et al., 2018; Labarca et al., 2018; Kim et al., 2015).

- Significant positive correlation between OSA treatment in **quality of life** and reduced cardiovascular complications (Patil et al., 2019; Hall et al., 2020; Aiello et al., 2016; Barbe et al., 2012; Martinez - Garcia et Al., 2013; Durán-Cantolla et al., 2010).

Section III: Methodological Framework

Methodological Framework- Iowa Model

Problem-focused

Knowledge-focused

Identify priority

Form a team

Evidence synthesis

Is the evidence sufficient?

Pilot project

Is the change appropriate?

Quality evaluation

Institute change

Process & outcome evaluation

Dissemination

The Iowa model. (n.d.).

Implementation Strategies

OSA screening with STOP-BANG questionnaire → Risk education counseling to all patients screened → Refer for HSAT for patients high risk for OSA → Identify patients diagnosed with OSA → Refer patients with OSA to pulmonologists for treatment. → Annual follow up sleep study
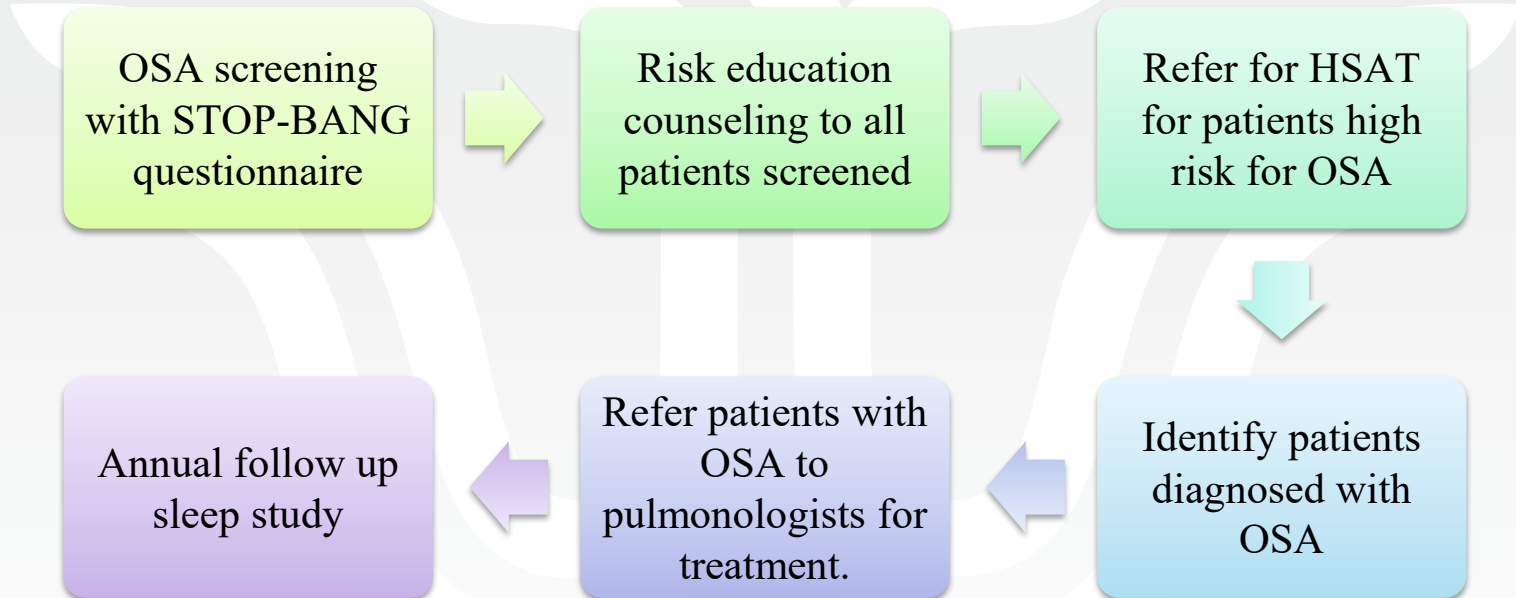
Sample Patient Risk Education Material

Obstructive sleep apnea

If the structures partly or completely block the throat, air can't flow to the lungs at all. This is called hypo-apnea (decreased breathing) or apnea (meaning "no breathing"). The lungs aren't getting fresh air. So the brain tells the body to wake up just enough to tighten the muscles and unblock the air passage. With a loud gasp, breathing starts again. This process may be repeated over and over again during the night. This can make your sleep fragmented with lighter stages of sleep. You may not remember waking up many times during the night however due to lighter sleep you will most likely feel tired the next day. The lack of sleep and fresh air can also strain your lungs, heart, and other organs. This may lead to problems such as high blood pressure, diabetes, behavioral disorders, heart attack, or stroke.

Monitoring your sleep

Your sleep can be monitored at a sleep clinic or at your home. In either case, your healthcare provider will discuss the results with you at a future visit:

- **At a sleep clinic.** Most sleep studies are done at a sleep clinic or a sleep lab. In most cases, you will need to stay overnight. You will sleep in a private room, much like a hotel or hospital room. A family member or a friend can come along. But he or she can't stay overnight. Most people don't have trouble sleeping during the study. In the morning you can go home. Sometimes you may be asked to stay at the lab the next day for a daytime nap study.
- **At home.** At times, a sleep study can be done at home. A home sleep study provides most of the same information as a study done at a clinic. A special computer is loaned to you by a sleep clinic or a medical supplier. You will be given instructions on how to use it. Before bedtime, the computer is turned on to monitor your sleep all night. In the morning, you return the computer.

Risk education material provided to patients

Who needs a sleep study?

If you have sleep problems that last longer than a few weeks, you may need a sleep study. It's important to get tested for sleep disorders. Untreated sleep disorders raise your risk for heart failure, high blood pressure, stroke, diabetes, and depression. Talk with your healthcare provider. Be prepared to answer questions about your health history. Try to keep a daily sleep diary for a week or 2. Write down the time you go to bed, the time you wake up, and anything that seems to affect your sleep. Then your healthcare provider can refer you to a sleep specialist and recommend a sleep study.

What to expect?

Patients are screened for sleep apnea in the clinic using the STOP-BANG questionnaire to identify patients at high risk for sleep apnea. Identified high-risk sleep apnea patients will undergo a home sleep apnea test to diagnose sleep apnea after insurance pre-authorization. Patients will get an update on the status of the pre-authorization and co-pay. The materials for the home sleep study will be mailed to the patient's home. The materials after the home study need to be mailed back for interpretation. Patients can anticipate a callback from the provider's office regarding the home sleep study findings within 2-3 weeks after returning the materials. Patients who are diagnosed with sleep apnea will be referred to a pulmonologist for treatment initiation.

STOP-BANG Questionnaire

- Score of 3 & up has high sensitivity > 90%.
- Negative predictive value for OSA for score 3 & 4: 77%
- Negative predictive value for OSA for score 5 & up: 91%
- Diagnostic accuracy of score 3 & up: >80% .

Pivetta et al. (2021)

Name _____
Height _____ Weight _____
Age _____ Male / Female _____

STOP-BANG Sleep Apnea Questionnaire

STOP		
Do you SNORE loudly (louder than talking or loud enough to be heard through closed doors)?	Yes	No
Do you often feel TIRED, fatigued, or sleepy during daytime?	Yes	No
Has anyone OBSERVED you stop breathing during your sleep?	Yes	No
Do you have or are you being treated for high blood PRESSURE?	Yes	No

BANG		
BMI more than 35kg/m2?	Yes	No
AGE over 50 years old?	Yes	No
NECK circumference > 16 inches (40cm)?	Yes	No
GENDER: Male?	Yes	No

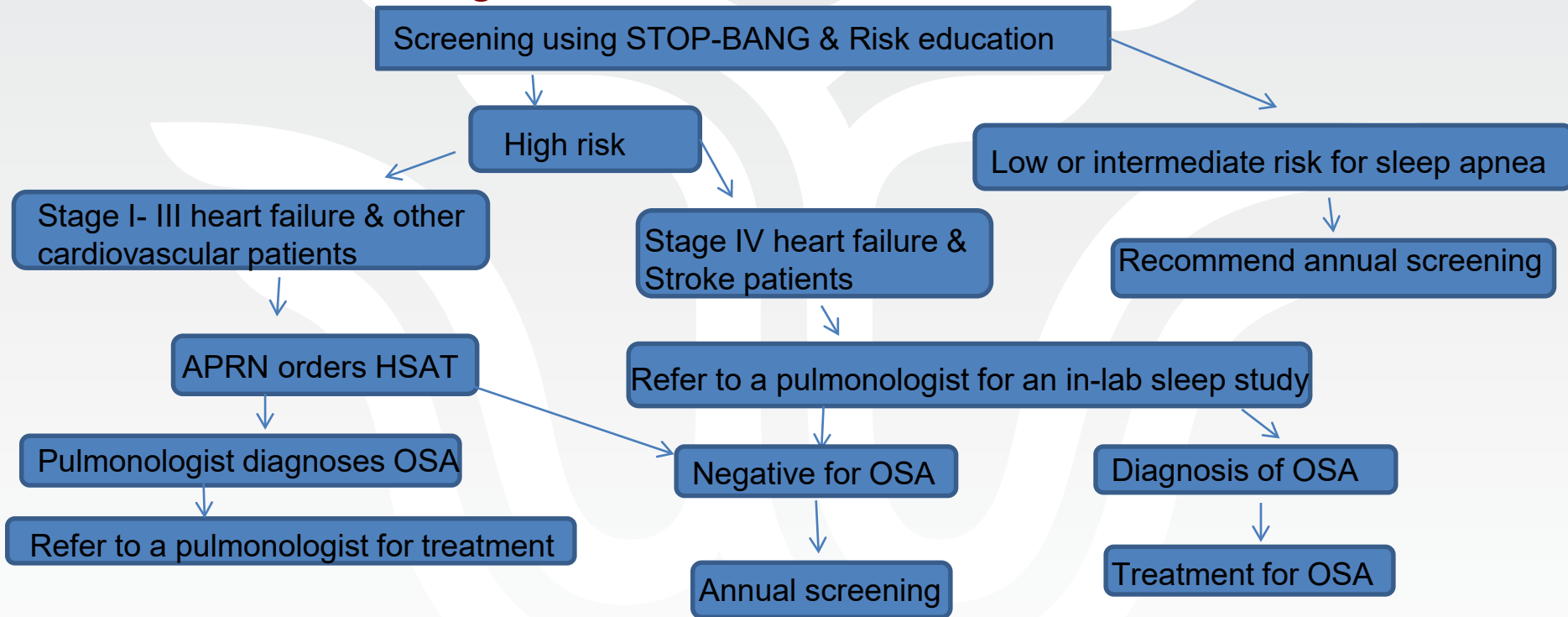| TOTAL SCORE		

High risk of OSA: Yes 5 - 8

Intermediate risk of OSA: Yes 3 - 4

Low risk of OSA: Yes 0 - 2

Team Roles and Responsibilities

Team Member	Roles and Responsibilities
Clinic Coordinator:	• Staff coordination • Addresses issues or concerns
Nurse Practitioner:	• Overall project coordination and follow up on the process • Education of team members about obstructive sleep apnea. • Assist the patient to complete the STOP-BANG questionnaire • Score patient's STOP-BANG questionnaire • Identify patients who need HSAT and recommend sleep apnea test • Risk education counseling to all screened patients • Assist the patient to complete the insurance pre-authorization document • Document about obstructive sleep apnea screening in clinic note. • Notify patient about sleep study report • Recommend referral to pulmonologists • Data collection and analysis
Physicians (Cardiologists):	• Collaborating with the NP in the referral process
Medical Assistants:	• Introduce STOP-BANG questionnaire to patients • Measure patient's height, weight, neck circumference, and BMI • Submit documents to the insurance for HSAT insurance pre-authorization • Fax necessary documents to the sleep lab to arrange HSAT • Scan documents to the patient's medical record • Carry out the referral process to a pulmonologist. • Documentation
Administrative staff:	• Check the insurance privileges of the pulmonologist before referral. • Assist the medical assistants with the referral process to pulmonologists
Pulmonary team:	• Arrange sleep study • Fax the sleep study report to the local cardiology clinic
Pulmonologist:	• Interpret sleep study and diagnose sleep apnea • Recommend treatment for sleep apnea

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Project Decision Tree

Screening using STOP-BANG & Risk education

High risk

Low or intermediate risk for sleep apnea

Stage I- III heart failure & other cardiovascular patients

Stage IV heart failure & Stroke patients

Recommend annual screening

APRN orders HSAT

Refer to a pulmonologist for an in-lab sleep study

Pulmonologist diagnoses OSA

Negative for OSA

Diagnosis of OSA

Refer to a pulmonologist for treatment

Annual screening

Treatment for OSA

Data Collection

- The MA administers the STOP-BANG instrument to each patient along with COVID screening before check-in

- The MA guided patients in filling the STOP-BANG instrument, collected measurements, and referred to the APRN

- The APRN met with each patient and outlined the results of low, moderate, and high risk

- All patients with scores that are high risk are offered a sleep study

- APRN determined if the patient required A) Home Sleep Apnea Screening Test or B) In-Lab Sleep Apnea Test

- The pulmonologist definitively diagnoses OSA using the sleep study result

Outcome Measures

Ascertaining the proportion of patients at the local cardiology clinic with OSA diagnosis

Level 1 Outcome Measure:

 STOP-BANG instrument- indicates the level of risk

Level 2 Outcome Measure:

 HSAT or in-home sleep study or in-lab sleep study- a diagnostic tool

Level 3 Outcome Measure:

Diagnosis of OSA with subsequent treatment and follow-up

Section IV: Findings and Results

Findings and Results

Time:
17 working days

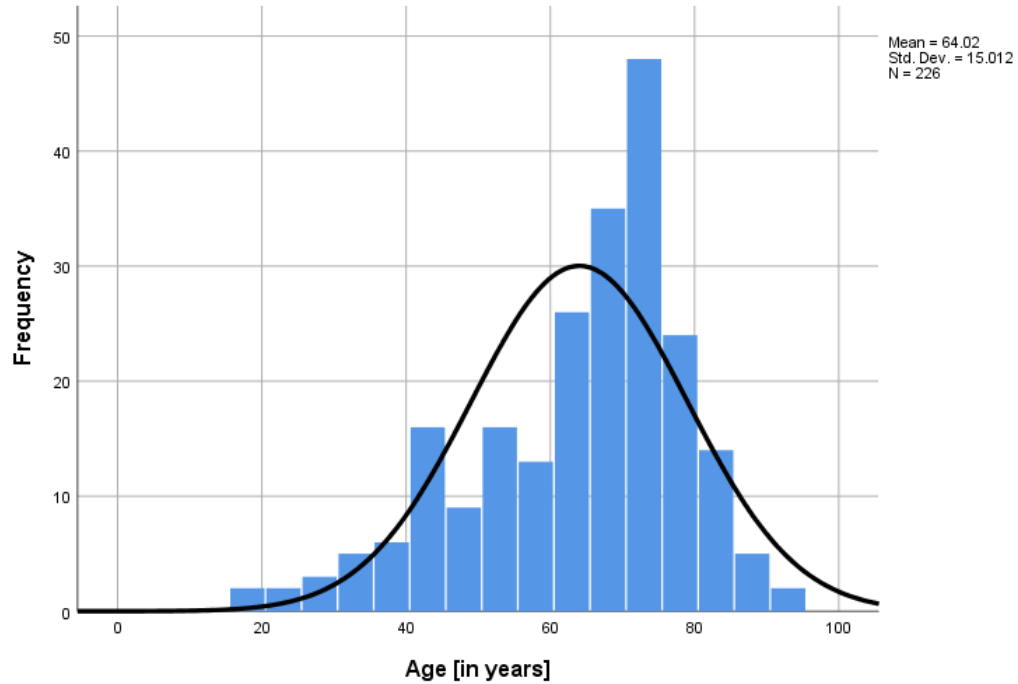Total screened, risk counseling: 226

High risk for OSA
83 (36.7%)

HSAT: 51(61.4%)
In-lab sleep study:9(11%)
Refused sleep study:23(28%)

S/P HSAT: 12 (24%)
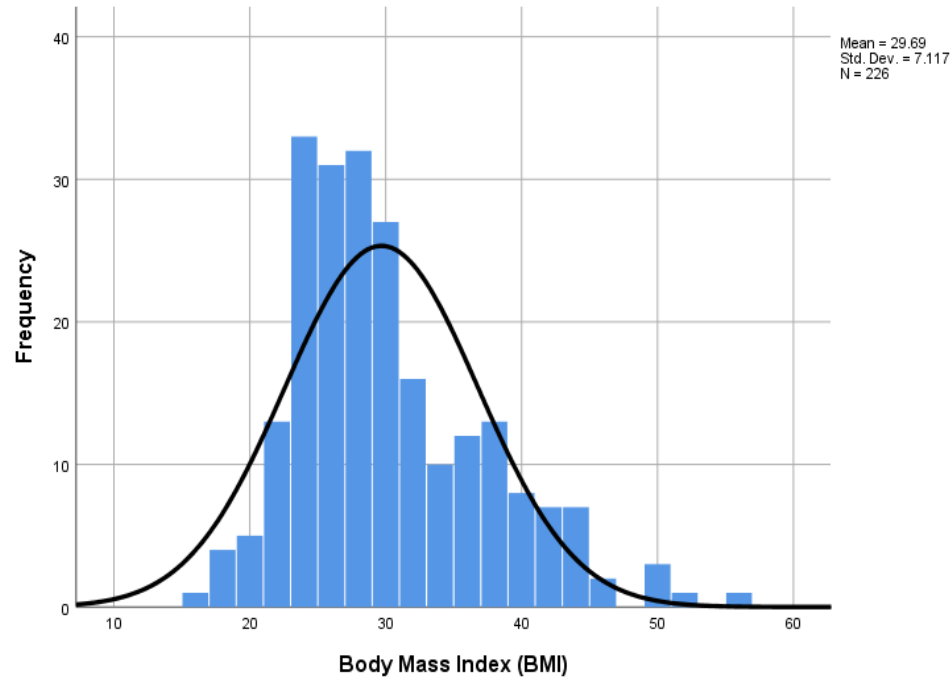Unable to obtain HSAT: 39 (76%)
OSA Diagnosed: 13

Pulmonologist for treatment:13
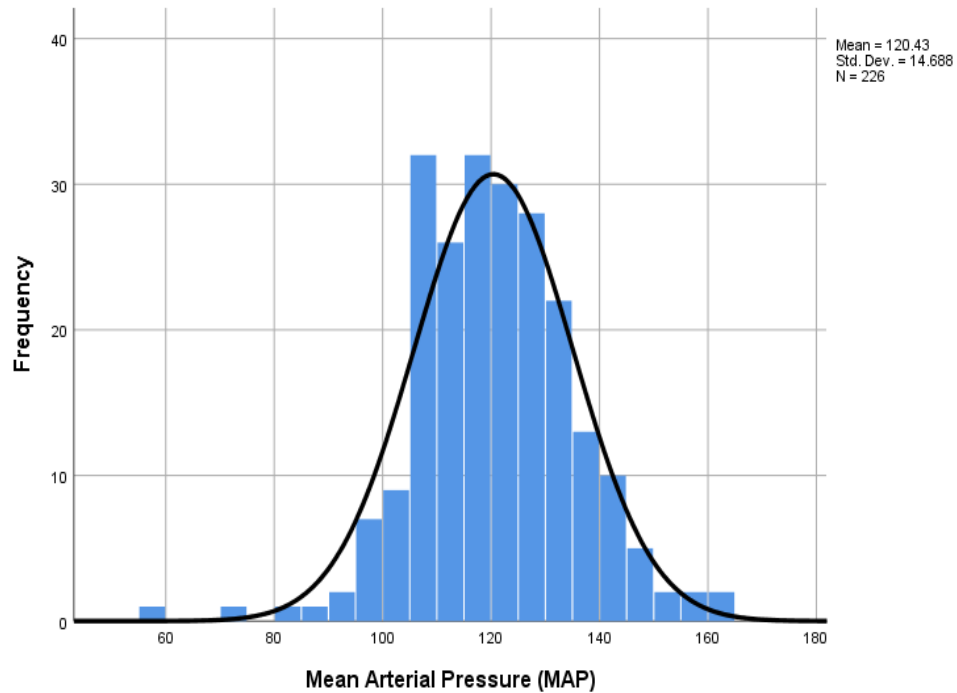
27

Age

Mean age: 64 years

Body Mass Index (BMI)

Mean = 29.69
Std. Dev. = 7.117
N = 226

BMI Classifications
- Normal: 18.5- 24.9
- Overweight: 25-29.9
- Obesity: >30

Mean BMI: 30

Mean Arterial Pressure (MAP)

Mean = 120.43
Std. Dev. = 14.688
N = 226

Normal: 70 -100 mm of Hg
MAP >100 mm of Hg is high

Mean MAP: 120

STOP-BANG Score

Mean = 3.1
Std. Dev. = 1.333
N = 226
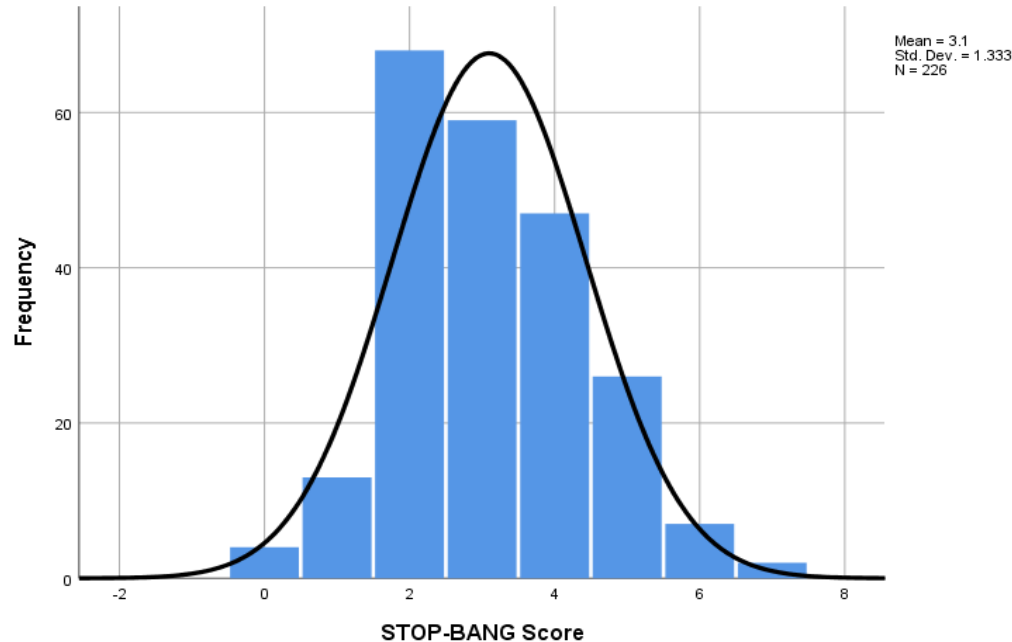
OSA risk
Low risk: 0-2
Intermediate risk: 3-4
High risk: 5-8

Mean STOP-BANG score: 3.1

Patient Profiles for those Screened
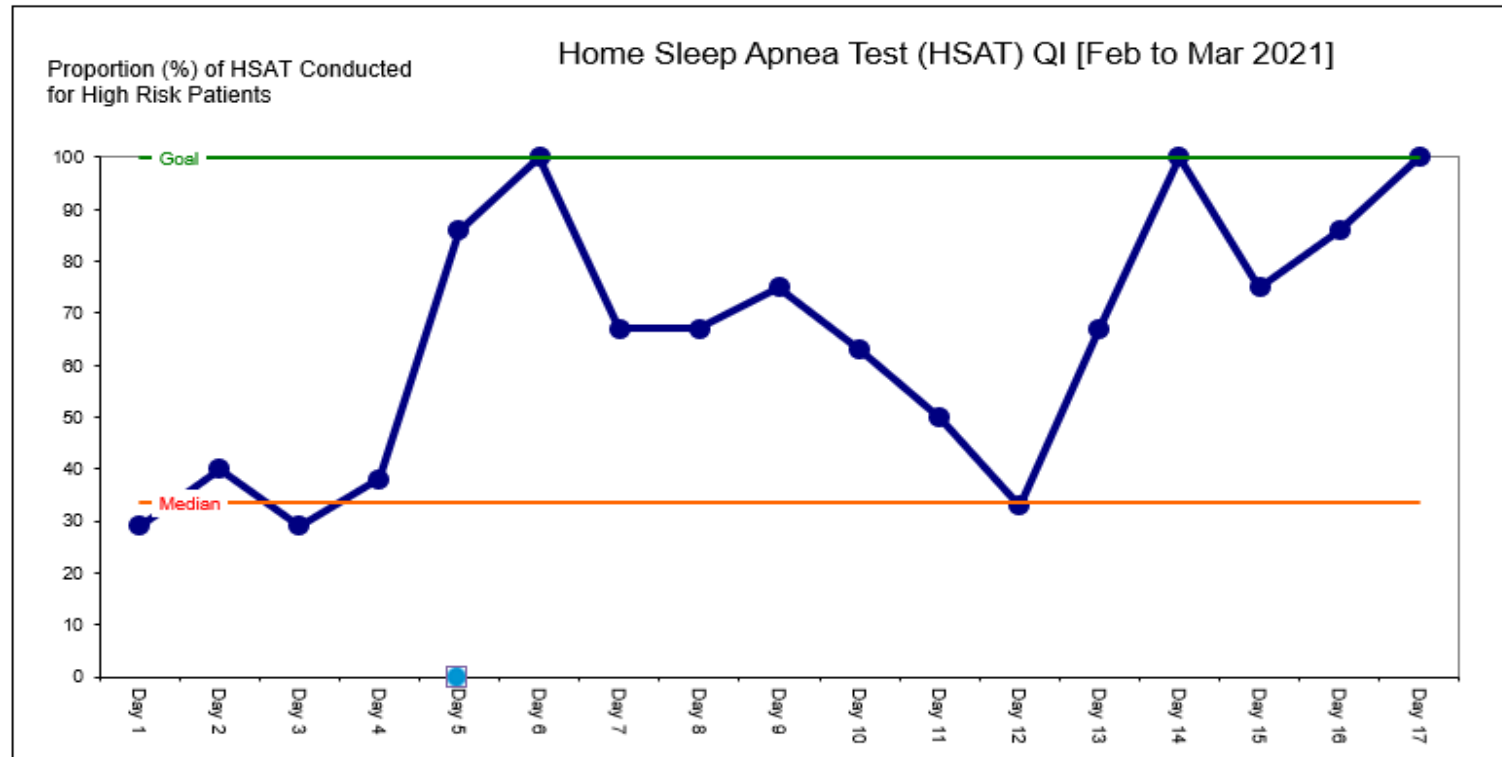
Mean age: 64 years

77% Hypertensive

Mean BMI: 30

Mean MAP: 120 mm Hg

60% Cardiac disease

HSAT Run Chart Tracking

X-axis: number of days of the project.

Y-axis: Proportion of HSAT- the number of patients referred for HSAT to the patients identified as high risk for obstructive sleep apnea on each day of the project.

Discussions

DNP project allowed a valuable opportunity to screen and diagnose patients with OSA that was previously unavailable in the local cardiology clinic

STOP-BANG instrument was quick, easy to use, understandable and sensitive to clinic construct

It can be a depressing event for patients to be screened and unable to be diagnosed with subsequent opportunities for treatment

In the future it would be helpful to identify financial resources prior to screening

Conclusions

- Following the screening of 226 patients, 83 patients were identified as high risk for OSA. It was surprising to the interprofessional team that 37% of patients screened were at high risk for OSA. If the group of intermediate-risk patients was to be added to the high risk, there would be an overwhelming number of patients at risk for OSA and subsequent poor cardiovascular outcomes.

- Out of the 83 high-risk patients identified, only 13 patients were able to undergo a sleep study, and all 13 patients were diagnosed with OSA.

- Sleep apnea screening and subsequent diagnosis are a critical part of an initial assessment of every patient seen in the local cardiology clinic. However, the process needs to be modified to improve the outcome.

Limitations

- Effect of COVID pandemic and winter storm reduced the number of patients seen in the clinic
- Patients' hesitancy for in-lab sleep study due to the need for overnight stay
- Patients' financial constraints- $ 600 copay
- The project took place over a very short period with a longer turnaround time for referrals

Section V: Recommendations and Implications of Practice

Project Sustainability

<u>Local Cardiology Clinic:</u>

- Continue screening as number of patients screened for OSA were high risk

- Establish a policy committee to develop an institutionalized policy to encourage colleague support and further establish structure

- Explore electronic STOP-BANG screening with health record population

- In-depth assessment of copays with insurance follow-up and necessary steps to reduce copay

- Monthly institutional quality indicators with OSA 1) screening 2) follow up

<u>Application to other Clinical Settings:</u>

- Digitalized pre-clinic STOP-BANG screening

- General educational campaigns across disciplines

Recommendations/Implications for Practice

- STOP-BANG instrument is sensitive at score 4 and up for OSA risk identification.

- Awareness of the practitioner about the financial impact of the sleep study

- Need for telephonic follow up at scheduled intervals to remind patients about high-risk status and need for sleep study

- Annual screening for untreated OSA by AASM (2015)

- Evaluation of long-term outcomes in the correlation of sleep apnea and cardiovascular complications, especially in hypertensive patients

- Future projects: Assessing quality-of-life improvements with OSA treatment

Obstructive Sleep Apnea Treatment

Weight reduction & regular exercises

Position while sleeping

Avoid alcohol before bedtime

Avoid sedative before bedtime

Quit smoking

Surgical interventions

Use of airway protective devices

Positive Airway Pressure devices

DNP Essentials (2006)

- Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

- Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based m Practice

- Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care

- Essential VI, Interprofessional Collaboration for Improving Patient and Population Health Outcomes

- Essential VIII, Advanced Nursing Practice

Dissemination *

Hospital System Leadership

Professional Organizations

Clinic staff

Advanced Practice Education Day

Journal Publication

Dissemination

* proposed

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Dr. Mari Tietze

Questions and Feedback

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