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Increasing Sleep Center Revenue by Collecting Data Intelligently

Wisconsin Sleep Society: Focus on Advanced Sleep Medicine

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Executive Summary

Approximately 5.9 million U.S. adults are diagnosed with OSA, but 23.5 million remain undiagnosed

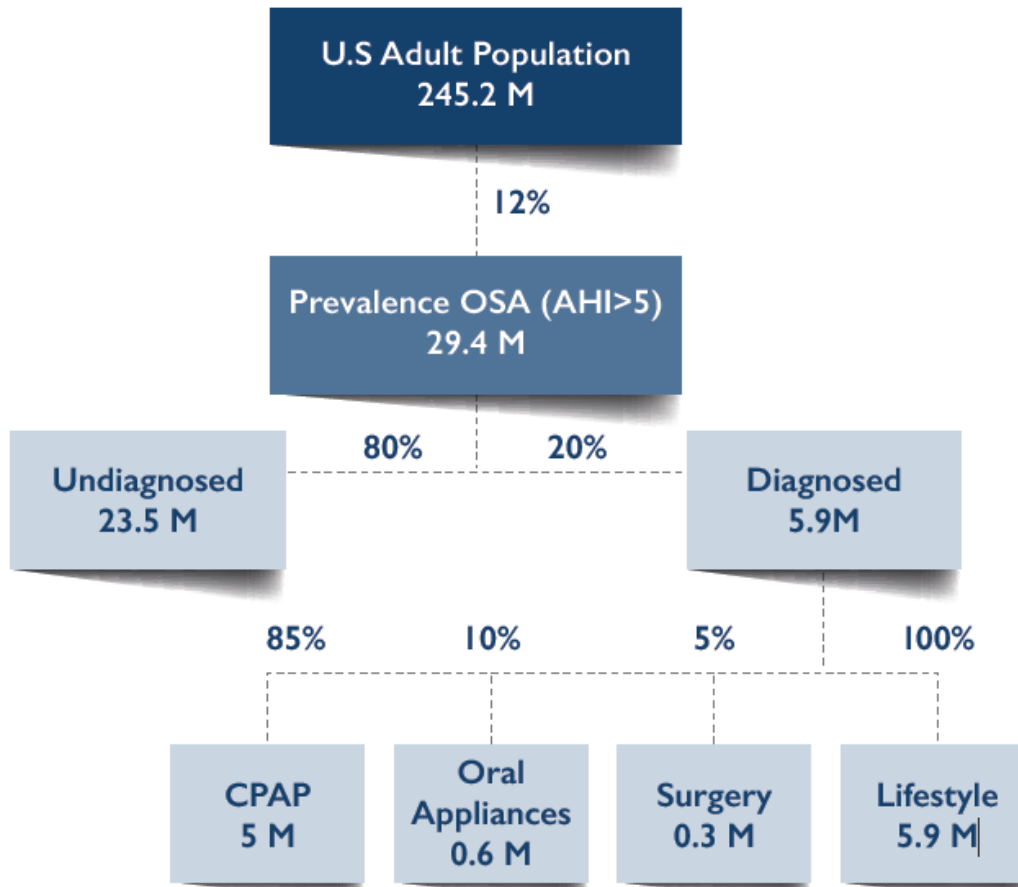
The under diagnosis and under-treatment of OSA is due to lack of education, underappreciation of the seriousness of the condition, and a healthcare system hyper-focused on acute illness; ***this is draining the US healthcare system of billions of dollars, while millions of patients suffer the chronic effects of this sleep disorder.***

Direct economic costs associated with undiagnosed OSA can include comorbidities such as high blood Pressure, diabetes, motor vehicle or workplace accidents, and compensating behaviors such as the substance abuse.

Indirect economic costs can include decreased productivity at work, reduced quality of life, and stress on interpersonal relationships.

Peppard, PE, T Young, JH Barnet, M Palta, EW Hagen, and KM Hla. "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013): National Center for Biotechnology Information. U.S. National Library of Medicine.

Epidemiology



Source: Primary research with experts, U.S. Census (2014), Peppard "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013)

Objectives

- 21st Century Health Care
- Medical Conditions Associated with OSA
- Barriers to Diagnosis and Treatment
- Diagnosis and Treatment
- Screening for OSA
- Screening Tools
 - The STOP & STOP-BANG Questionnaire's
 - Epworth Sleepiness Scale
- Screening Algorithms
 - Pre-Surgical
 - General Admission
 - Alveolar Hypoventilation Syndrome
 - Family Practice/Specialty Clinic
 - Pediatric & Adolescent

21st Century Health Care

Safe:

- Avoiding injuries to patients from the care that is intended to help them.

Effective:

- Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit.

Patient-Centered:

- Providing care that is respectful of and responsive to individual patient preferences, needs and values. Ensuring that patient values guide all clinical decisions.

Timely:

- Reducing waits and sometimes harmful delays for both those who receive and those who provide care.

Efficient:

- Avoiding waste, including waste of equipment, supplies, ideas and energy.

Equitable:

- Providing care that does not vary in quality because of personal characteristics such as;
 - Gender
 - Ethnicity
 - Geographic Location
 - Socio-economic status

Medical Conditions Associated with Obstructive Sleep Apnea

Category	Condition	Prevalence (%)
Cardiac	Treatment Resistant Hypertension	63% - 83%
	Congestive Heart Failure	76%
	Ischemic Heart Disease	38%
	Atrial Fibrillation	49%
	Dysrhythmias	58%
Respiratory	Asthma	18%
	Pulmonary Hypertension	77%
Neurological	1 st Ever Stroke	71% - 90%
Metabolic	Type II Diabetes Mellitus	36%
	Metabolic Syndrome	50%
	Hypothyroidism	45%

Medical Conditions Associated with Obstructive Sleep Apnea

Category	Condition	Prevalence (%)
Metabolic	Morbid Obesity	50% - 90%
Surgical	Bariatric Surgery	71%
	Intracranial Tumor Surgery	64%
	Epilepsy Surgery	33%
Others	Gastroesophageal Reflux Disease	60%
	Nocturia	48%
	Alcoholism	17%
	Primary Open Angle Glaucoma	20%
	Head & Neck Cancer	76%

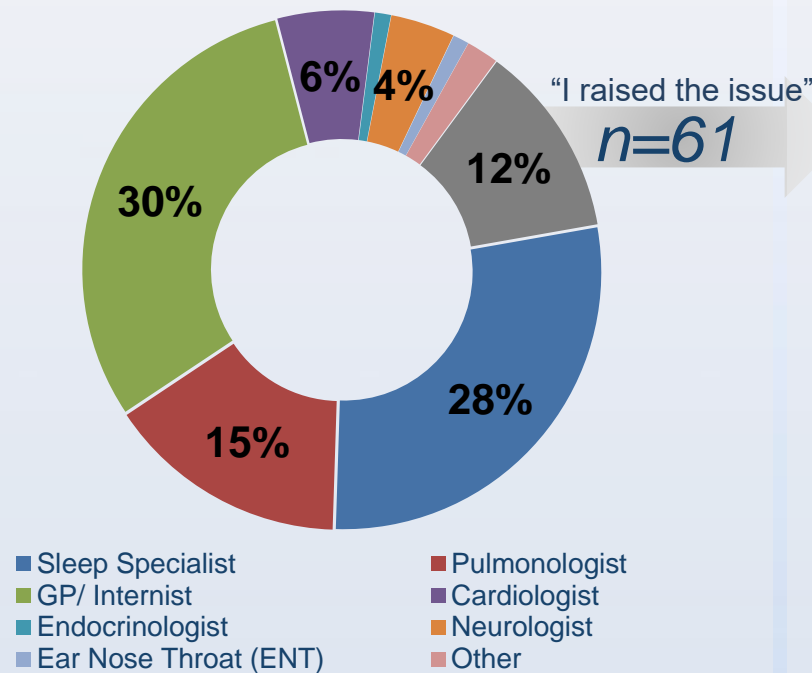
Barriers to Evaluation, Diagnosis & Treatment

General Public Awareness	Many individuals do not recognize symptoms and severity of the condition.
Primary Care Physician Education	Front-line caregivers do not routinely ask about duration and quality of sleep or screen patients for OSA.
Diagnosis and Treatment Costs	While usually covered by payors for qualified patients, costs average \$2,105 per year for testing, appointments, treatment devices and surgery if necessary.
Employer and Payor Investment for Chronic Care Management	Economic stakeholders are still developing cost models that financially reward managing chronic conditions in order to lessen longer-term risk for acute events

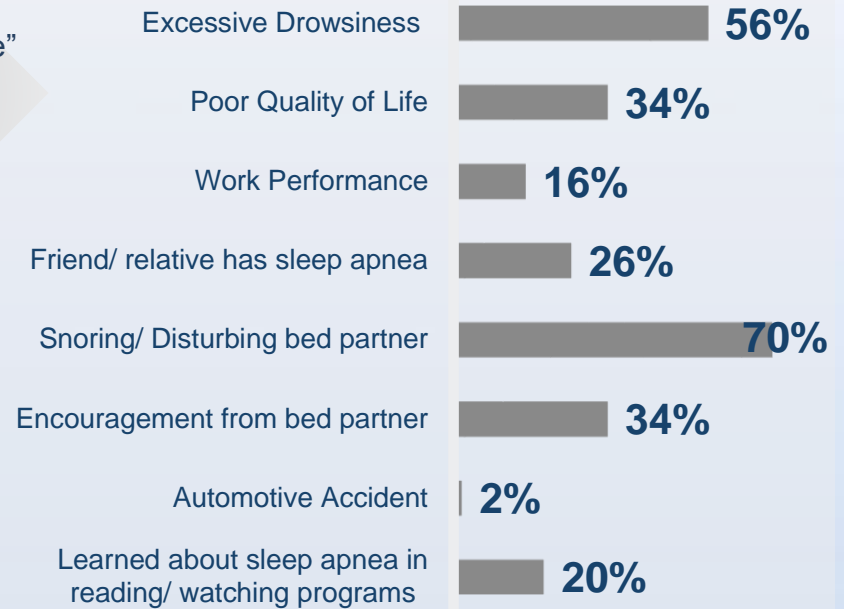
Source: Primary and Secondary Research

Evaluation

What type of healthcare provider initially warned you about the risk of sleep apnea? (n=506)



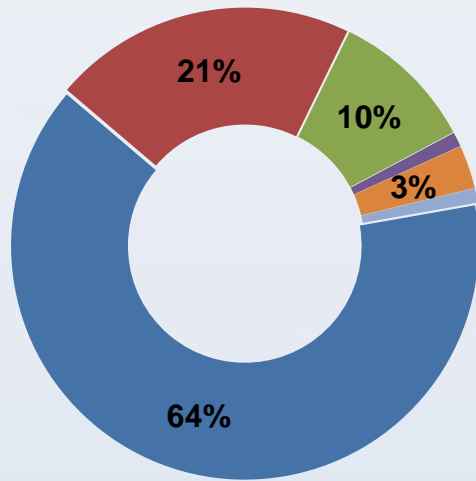
What caused you to raise the issue of your risk of sleep apnea with your healthcare provider? (n=61)



(Percentages under 3% not shown for transparency).

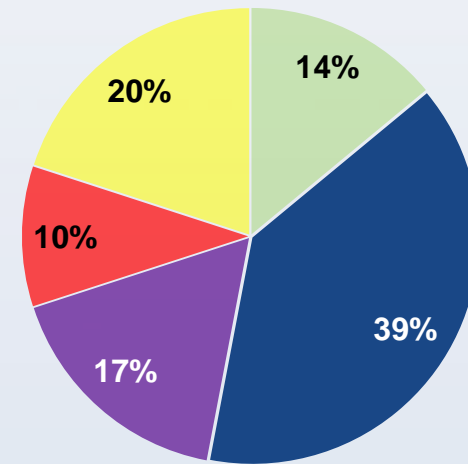
Diagnosis

What type of doctor diagnosed you with sleep apnea? (n=506)



- Sleep Specialist
- GP/ Internist
- Endocrinologist
- Ear Nose Throat (ENT)
- Pulmonologist
- Cardiologist
- Neurologist
- Other

Time between initial warning about sleep apnea risk and diagnosis following a sleep study (n=506)



- 0 Months
- 1 Month
- 2 Months
- 3 Months
- 4 or more months

(Percentages under 3% not shown for transparency).

Screening for Obstructive Sleep Apnea

The increased prevalence of obstructive sleep apnea (OSA) mandates the presence of simple but accurate tools to identify patients with this disorder for early detection and prevention of various serious consequences.

Therefore, a screening tool is necessary to stratify patients based on their clinical symptoms, physical examinations, and risk factors, in order to ascertain the risk and need of PSG and/or further treatment.

- The purpose of screening is early diagnosis and treatment. Screening tests are usually administered without current symptoms, but who may be at high risk for certain diseases or conditions.

Please note, clinical evaluation and diagnostic testing is essential to confirm or exclude OSA, since the clinical features of OSA are nonspecific and the diagnostic accuracy of clinicians' subjective impression varies.

A. Abrishami, A. Khajehdehi, F. Chung. A systematic review of screening questionnaires for obstructive sleep apnea *Can. J. Anesth./J. Can. Anesth.*, 57 (2010), pp. 423–438

The STOP & STOP –BANG Questionnaires:

S: Do you *snore*?

T: Do you often feel *tired*, fatigued or sleepy during daytime?

O: Has anyone *observed* you stop breathing during sleep?

P: Do you have or are you being treated for high blood *pressure*?

S: Do you *snore*?

T: Do you often feel *tired*, fatigued or sleepy during daytime?

O: Has anyone *observed* you stop breathing during sleep?

P: Do you have or are you being treated for high blood *Pressure*?

BMI more than 35kg/m²

AGE over 50 years old?

NECK circumference > 16 inches (40cm)?

GENDER: Male?

F. Chung, B. Yegneswaran, P. Liao, *et al.* STOP questionnaire. A tool to screen patients for obstructive sleep apnea *Anesthesiology*, 108 (2008), pp. 812–821

HIT and Screening for OSA: Background

It has been established that Health Information technology (HIT) can improve the screening and delivery of care to patients with chronic illness. However, to date there is no published data describing the use of HIT for screening patients at high risk for obstructive sleep apnea (OSA), a prevalent but under diagnosed condition that represents a substantial and growing socio-economic burden.

Geisinger Clinic is a physician-led, multi-specialty group practice in rural Central Pennsylvania with integrated electronic medical records. 160,000 Geisinger patients have access to their own EHR via MyGeisinger, an internet-based portal through which they can review their records, schedule appointments, and receive communication.

HIT and Screening for OSA: Study & Method

Study:

To determine whether health information technology could activate patients and efficiently increase the diagnosis of obstructive sleep apnea among patients at risk for the disease, independent of physician involvement.

Methods:

Patients with a body mass index (BMI) ≥ 40 and without a diagnosis or prior evaluation for sleep apnea were invited via the MyGeisinger patient portal to complete the “STOP” questionnaire. The STOP questionnaire is a concise, easy-to-use self administered screening tool that has been validated as a method for screening individuals at high risk for obstructive sleep apnea.

HIT and Screening for OSA: Cost Breakdown

The information technology (IT) staff spent a total of 159.25 hours at a cost of \$5,967.69 (\$37.47/hr.).

The cost breakdown is as follows:

- Questionnaire \$2,307.28 (39%)
- Broadcast \$208.86 (3%)
- Self-scheduling \$2,124.83 (36%)
- Project management \$1,326.72 (22%).

The cost to screen each electronic portal user was \$0.03 and \$2.61 per eligible patient.

Note: Each IT work hour did impact 900 portal users and 14 eligible patients.

Results

Electronic invitations were sent to 2,283 eligible patients to take the questionnaire; 279 (12%) completed and submitted their responses. Based on their answers to the questionnaire, 122/279 (44%) were identified as being at high risk for having OSA and recommended to undergo evaluation in the sleep medicine clinic.

To date, 104/122 patients (85%) were offered an appointment with a sleep specialist; the remaining 18 (15%) are waiting scheduling. Of those offered a clinic appointment, 41/104 (40%) have undergone a sleep medicine evaluation, 38/104 (36%) are waiting to be scheduled, and 25/104 (24%) cancelled or did not keep their appointment. Of the evaluated patients, 38/41 (93%) were diagnosed with OSA, 2/41(5%) had negative sleep studies, and 1/41(2%) is awaiting polysomnographic evaluation.

The positive predictive value of the STOP questionnaire among patients who underwent polysomnography was 95%.

Study Summary

The study suggests that utilizing an internet-patient portal via the Electronic Health Record (EHR) can identify patients at high risk of OSA and facilitate their ultimate evaluation and diagnosis through the administration of a simple questionnaire.

However.....

- How do re-engage the individuals (88%) that chose not to participate in the self administered questionnaire?
- What is the actual burden of undiagnosed OSA and the associated cost?

Aim.....

Health Information Technology (HIT) be used to identify patients at high risk for OSA by using data obtained at the point of care (real time) through the use of a simple questionnaire.

Big Data in Health Care

Holds the promise of supporting a wide range of medical and healthcare functions, including among others clinical decision support, disease surveillance, and population health management.

Big data in healthcare is overwhelming not only because of its volume but also because of the diversity of data types and the speed at which it must be managed. The totality of the data related to patient healthcare and well-being make up “big data” in the healthcare industry.

When Data mining and predictive analytics are done right, the analyses aren't a means to a predictive end rather, the desired predictions become a means to analytical insight and discovery. We do a better job of analyzing what we really need to analyze and predicting what we really want to predict.

Michael Schrage in Predictive Analytics in Practice, A Harvard Business Review Insight Center Report.

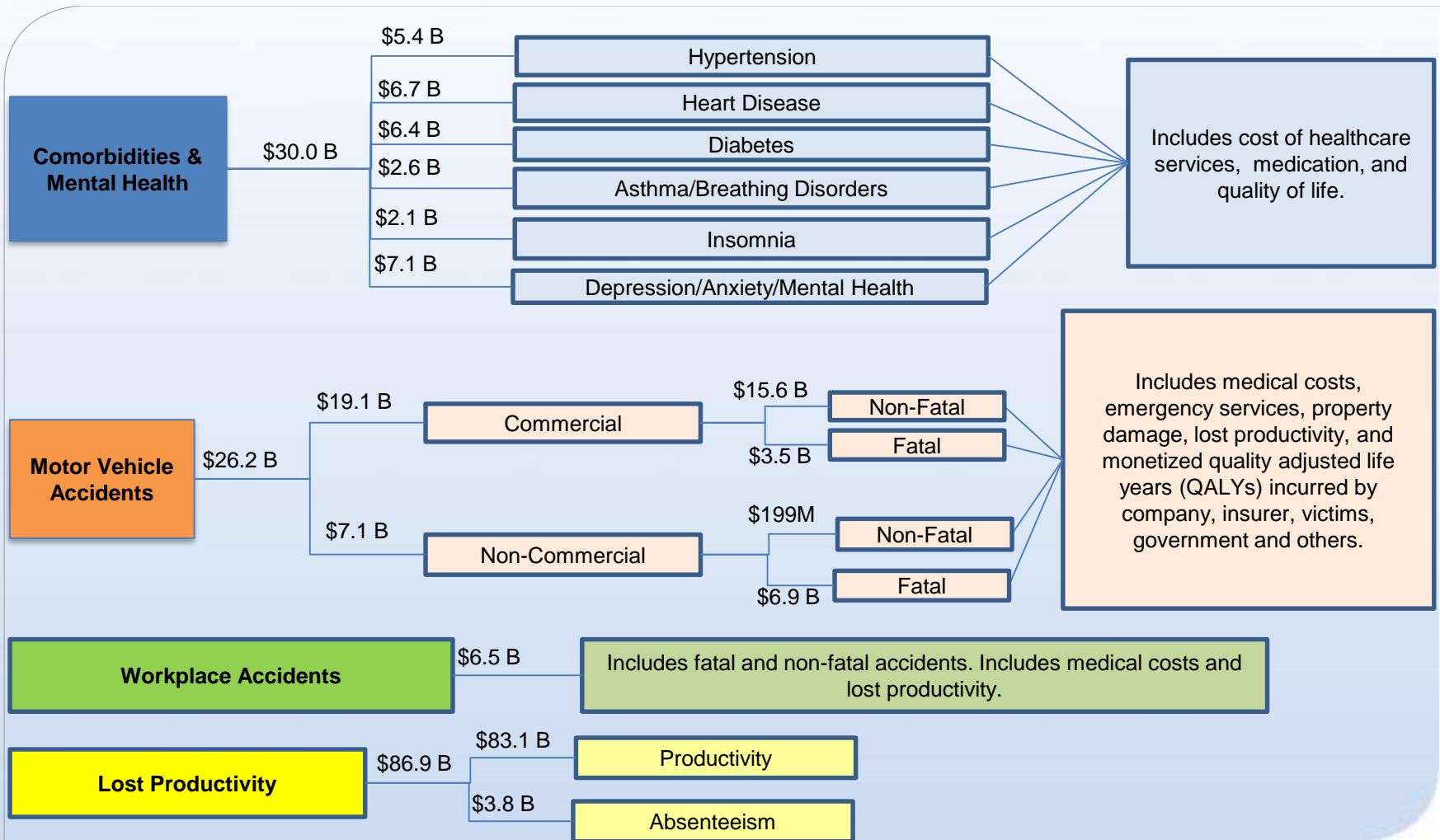
Cost Burden of OSA

Undiagnosed

# of individuals with OSA	23,500,000
Comorbidities & Mental Health	\$30 Billion
Motor Vehicle Accidents	\$26.2 Billion
Workplace Accidents	\$6.5 Billion
Lost Productivity	\$86.9 Billion
Total Cost	\$149.6 Billion
Cost per Individual	\$6,336

Source: ¹Primary research with experts, secondary clinical research, U.S. Census (2014), Peppard "Increased Prevalence of Sleep-disordered Breathing in Adults." American Journal of Epidemiology (2013), Frost & Sullivan Patient Survey,

Sources of Cost for Undiagnosed OSA

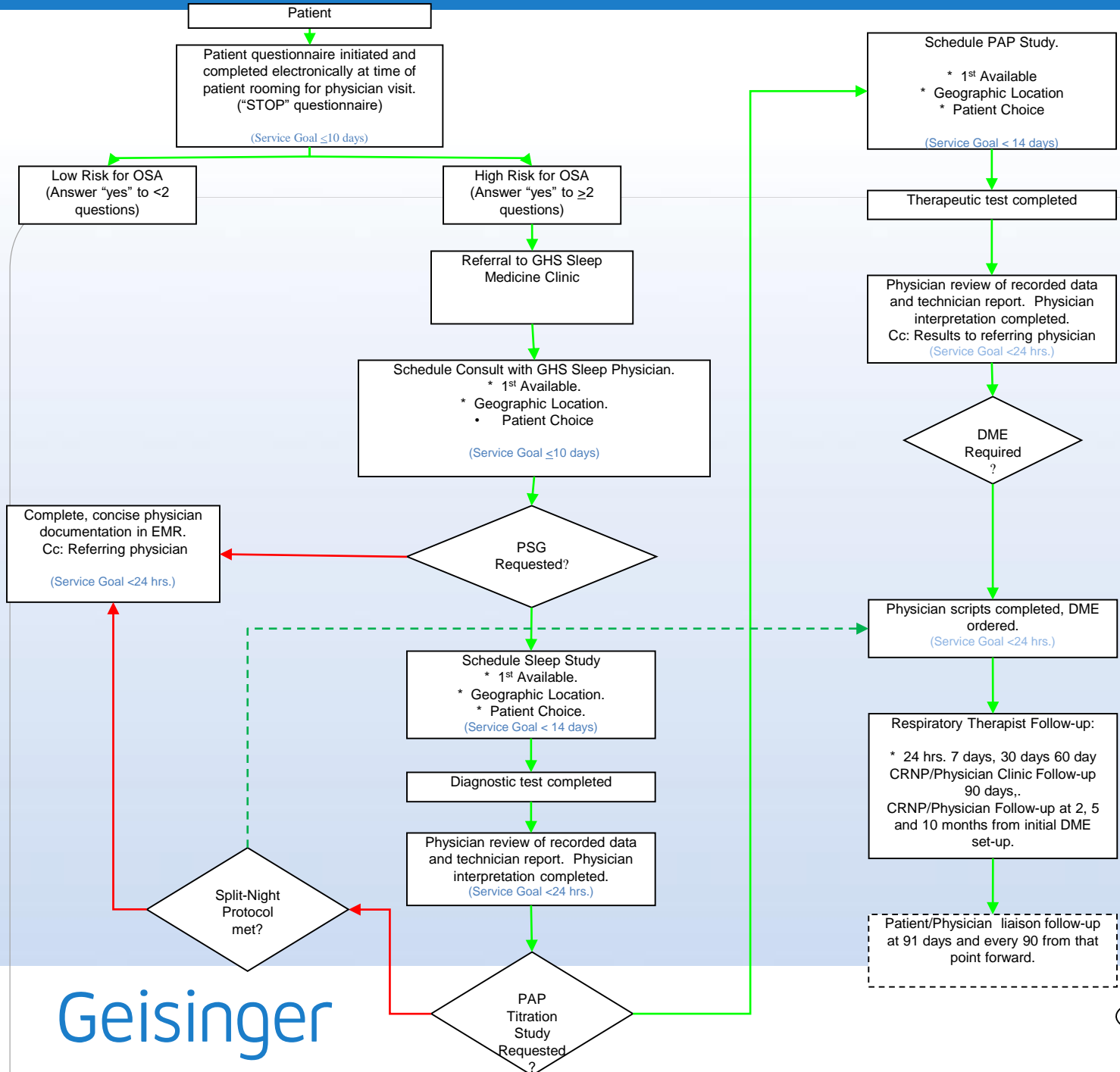


HIT Screening for OSA: Version 2.0

Electronic screening of all patients entering the Geisinger Health System for Primary or specialty care visit that has a body mass index (BMI) ≥ 30 and without a diagnosis or prior evaluation for sleep related disorders.

Family Practice & Specialty Care Screening





Pre-Surgical Screening



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Surgical Patient

Patient questionnaire initiated and completed at time of surgical evaluation.
("STOP" questionnaire)
(Service Goal ≤10 days)

Green = Yes
Red = No

Sleep consult not required

Low Risk for OSA
(Answer "yes" to <2 questions)

High Risk for OSA
(Answer "yes" to ≥2 questions)

Modify anesthesia as feasible.

Arrange for post-operative monitoring.

Counsel on the associated risk and hazards of OSA.

Peripheral surgery with general anesthesia or airway surgery with moderate sedation-no high dose post-op opioids.

- Neurosurgery
- Cardiothoracic Surgery
- Gastrointestinal Surgery
- Airway surgery with general anesthesia and any dose of post- op opioids.

Is patient on narcotics or have the following: Chronic Lung, or Cardiac, Disease? Acute/Chronic Pain Syndrome or Dialysis?

Schedule Pre-Op Polysomnography.
•Utilize Critical Test Spot.
•Split Night Study if Applicable.
(Service Goal ≤24 hrs.)

Diagnostic test completed

Physician review of recorded data and technician report. Physician interpretation completed.
(Service Goal <24 hrs.)

Should Surgery be delayed until clinic evaluation and for OSA can be completed.

Physician scripts for DME completed, DME ordered.
(Service Goal <24 hrs.)

Liaison Follow-up:
•72 hrs., 4, 12 & 24 Weeks.
•CRNP Follow-up at 8 Weeks and Annual
(Service Goal <24 hrs.)

All liaison activity/ interaction with patient, physician or DME company to be documented in the EMR.
(Service Goal <24 hrs.)

Schedule Therapeutic (PAP) Polysomnography.
•Utilize Critical Test Spot.
(Service Goal ≤24 hrs.)

Therapeutic test completed

Physician review of recorded data and technician report. Physician interpretation completed.
Cc: Results to referring physician
(Service Goal <24 hrs.)

PAP Titration Study Requested?

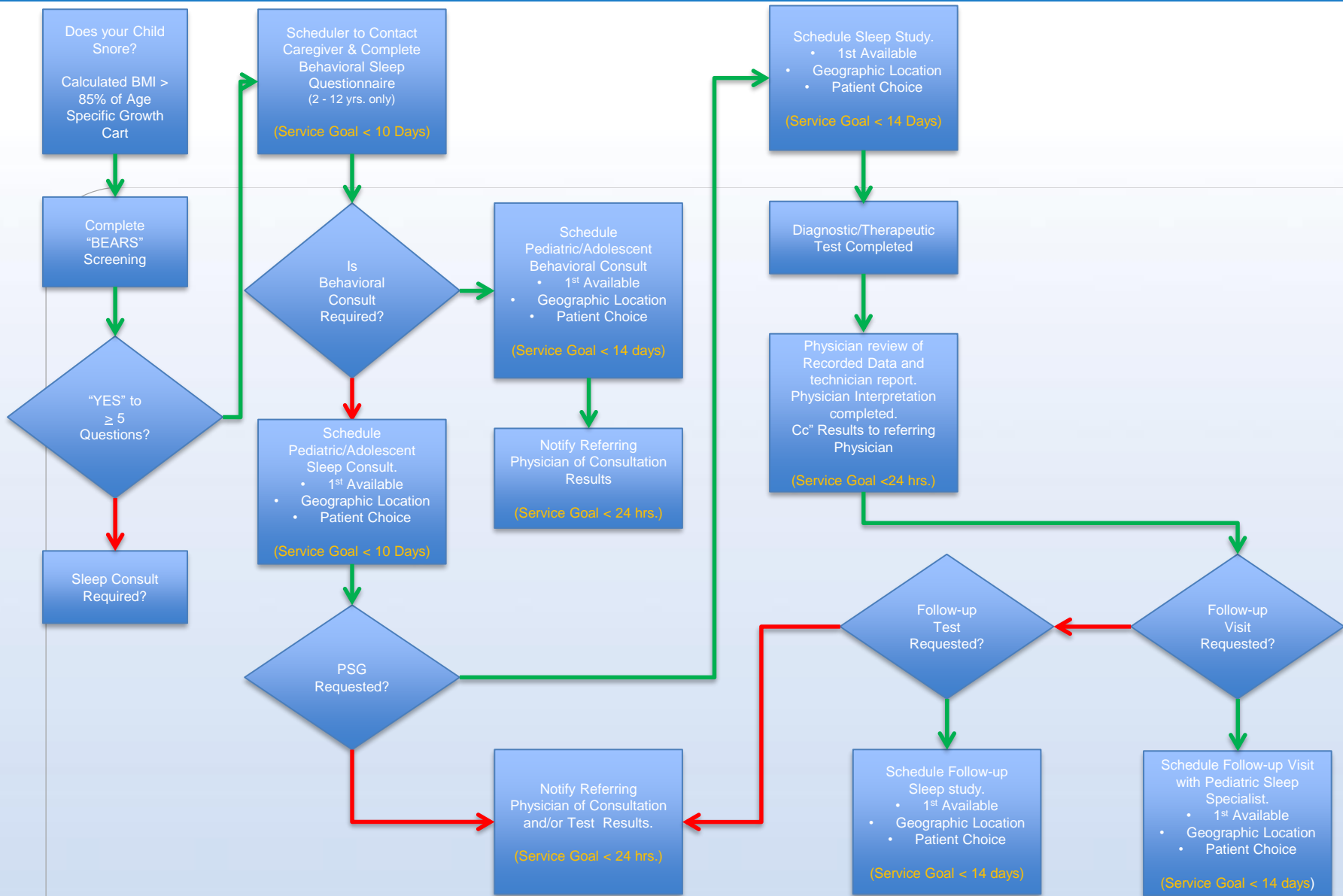


Screening for Sleep Related Disorders in the Pediatric & Adolescent Populations



The American Academy of Pediatrics (AAP) has recommended that all children/adolescents should be screened for snoring and possible signs/symptoms of Obstructive Sleep Apnea Syndrome (OSAS).

Sleep disorders are often due to temporary or chronic medical problems and are seen in as many as 25 to 30 percent of infants and children. Sleep disorders in children may lead to daytime moodiness, irritability, lack of focus in class, sleepiness in school, inability to get up in time for school, and significant behavioral and learning problems. Some sleep disorders are serious enough to cause adverse cardiovascular and metabolic effects as well as failure to thrive.



BEARS Screening Tool

	Toddler/Preschool (2 – 5 Years)	School-Aged (6 – 12 Years)	Adolescent (13 – 18 Years)
Bedtime	Does your child have any problems going to bed? Falling asleep?	Does your child have any problems at bedtime? (P) Do you have any problems going to bed? (C)	Do you have any problems falling asleep at bedtime? (C)
Excessive Daytime Sleepiness	Does your child seem overtired or sleepy a lot during the day? Does she still take naps?	Does your child have difficulty waking in the morning, seem sleepy during the day or take naps? (P) Do you feel tired a lot? (C)	Do you feel sleep a lot during the day? In school? While driving? (C)
Awakenings during the Night	Does your child wake up a lot at night?	Does your child seem to wake up a lot at night? Any sleepwalking or nightmares? (P) Do you wake up a lot at night? Have trouble getting back to sleep? (C)	Do you wake up a lot at night? Have trouble getting back to sleep? (C)
Regularity and Duration of Sleep	Does your child have a regular bedtime and wake time? What are they?	What time does your child go to bed and get up on school days? Weekends? Do you think he/she is getting enough sleep? (P)	What time do you usually go to bed on school nights? Weekends? How much sleep do you usually get? (C)
Snoring	Does your child snore a lot or have difficult breathing at night?	Does your child have loud or nightly snoring or any breathing difficulties at night? (P)	Does your teenager snore loudly or nightly? (P)

Behavioral Sleep Questionnaire

Current Sleep Symptoms (Ages 2 – 12 yrs.)

Nighttime Activity: Head banging or Body rocking:	0	1	2	3	4	5
Nightmares/Hallucinations:	0	1	2	3	4	5
Sleep walking:	0	1	2	3	4	5
Poor Appetite:	0	1	2	3	4	5
Wets Bed:	0	1	2	3	4	5
Screams Out In His/her Sleep:	0	1	2	3	4	5
Wakes Up During the Night:	0	1	2	3	4	5
Gets Out of Bed at Night:	0	1	2	3	4	5
Trouble Staying in his/her Own Bed:	0	1	2	3	4	5
Resist Going to Bed at Bedtime:	0	1	2	3	4	5

Note: If 5 out of the 10 following questions are answered with a score of 2 or greater, please schedule for a Pediatric Behavioral consult.

Integrated Care Delivery Model

Current State:

As the practice of sleep medicine evolves, location, technological advances and an integrated care delivery model will play a key role in maintaining and expanding sleep services. Today's sleep disorder clinics include diagnosis and treatment however the long term follow up and compliance to treatment is monitored by the DME companies that sit outside of most sleep centers.

Plan of Action:

An integrated care delivery model will allow sleep specialist to be actively involved in the care of patients beyond the diagnostics to include treatment and long term follow-up. The integrated care delivery model creates a new, comprehensive model of patient management with an emphasis on the following goals: improved care coordination; increased adherence to PAP therapy; reduced co-morbidities; strengthened patient satisfaction; and realized significant cost savings for insurers.

In order for sleep centers to retain its competitive advantage, investing in the expansion and inclusion of DME into the sleep disorder center is necessary to success. This integrated care delivery model will accommodate present demand and anticipated adult and pediatric referrals from specialties such as; Pulmonary, Family Practice, Neurology, Cardiology, and Otolaryngology.

Geisinger Sleep Services (GSS) PAP Compliance Study

Inclusion Criteria

- The study was conducted during the time period of September 2013 through February 2014.
- Charts were reviewed of all patients who were referred to GSS for CPAP therapy during this time period.
- Patients were referred from the GHS Sleep Clinics at South Wilkes-Barre, Bloomsburg, Shamokin and Woodbine Lane.
- 169 patients were enrolled with the Geisinger Sleep Services DME during this time period.
- Data was available on compliance at 7 days, 30 days, 60 days, 90 days and 1 year.
- Epworth Sleepiness Scale data was also available prior to treatment and after first follow up visit in the office (31-90 days after starting therapy).

Exclusion Criteria

Patients who did not meet the Medicare definition of compliance- without clear cut medical reason for exception (i.e. hospitalization during this period)- had their PAP machines returned for non-compliance. Data on those patient's were excluded at that point from this study (n=17).

Geisinger Sleep Services (GSS) PAP Compliance Study: Results

7 Days	84.60%
30 days	89.43%
60 days	83.17%
90 days	85.22%
1 Year	83.31%

Impression: GSS consistently performed higher than national statistics would predict.

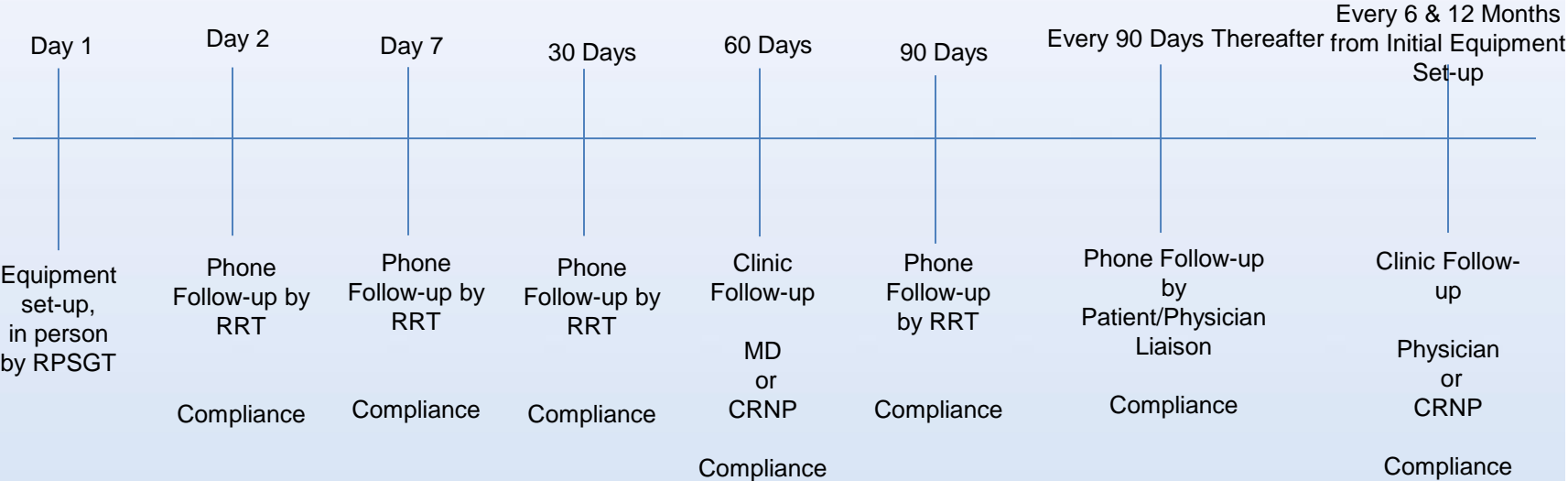
Pilot Study Conclusions

- A DME that is partnered with the physician in the treatment of the OSA patient is essential to compliance.
- On feedback from patients it appears that GSS distinguishes itself from the local competitors with frequent calls to proactively address PAP issues; utilizing respiratory therapists that are experienced with the treatment and adjustments required for patient comfort
- Continued improvements in patient treatment compliance may be possible with apps/ computer programs that will allow the patient to see their usage and average AHI with real time data.

The Power of Patient Education

Developing Flawless Follow-Up

Encouraging Patient Responsibility





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Fundamental to the success of all of this effort is the recognition that sufficient sleep is not a luxury—it is a necessity—and should be thought of as a “vital sign” of good health.

Department of Health and Human Services, Centers for Disease Control and Prevention. *Sleep and Sleep Disorders: A Public Health Challenge*. Retrieved September 08, 2009. <http://www.cdc.gov/sleep/>



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Happy Birthday Lisa!

