Sleep Telemedicine Implementation Guide

AMERICAN ACADEMY OF SLEEP MEDICINE
WAKE
SLEEP

A resource guide developed by the
American Academy of Sleep Medicine
Telemedicine Implementation Task Force.

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MEMBERS:

Jaspal Singh, MD Chair; M. Safwan Badr, MD; Lawrence Epstein, MD; Barry Fields, MD; Dennis Hwang, MD; Seema Khosla, MD; Kimberly Mims, MD; Brandon Peters, MD; Afifa Shamim-Uzzaman, MD; Emerson Wickwire, PhD

BOARD LIAISON:

Doug Kirsch, MD

STAFF:

Steve Van Hout

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Introduction

Welcome to the Sleep Telemedicine Implementation Guide, which is a companion to the recently published American Academy of Sleep Medicine (AASM) *Position Paper for the Use of Telemedicine for the Diagnosis and Treatment of Sleep Disorders.* This guide is designed to help your practice develop a telemedicine sleep initiative, evaluate current initiatives in which you or your organization might be involved, or just simply help in understanding various aspects of sleep telemedicine.

To use this guide successfully, certain readers may decide to read this text from beginning to end; whereas, others may simply use the chapters or sections that are relevant to their specific questions. In addition, the reader can take advantage of the diagrams and worksheets included in this guide.

Several groups will find this guide of interest, including the following:

1) Sleep clinicians, in a variety of settings including solo/small practices, larger multispecialty groups, integrated health care systems, and other arrangements;

2) Practice managers, support personnel, and administrative personnel affiliated with the aforementioned clinicians;

3) Accredited sleep facilities and sleep-related treating entities (e.g., durable medical equipment (DME) companies); and

4) Health care-related associations, organizations, payers, and regulatory agencies affiliated with the provision of sleep medicine and/or telemedicine services.

After reading this guide, the user should feel comfortable with the steps for developing a sleep telemedicine initiative, but also recognize that this is a new and dynamic industry, making it necessary to monitor changes in laws, technology, and financial aspects of telemedicine.

AASM Position Paper for the Use of Telemedicine

Given the increasing demand for treatment of sleep-related disorders, the AASM leadership thinks that telemedicine is one of the mechanisms to address workforce challenges. Subsequently, the AASM Board of Directors convened a task force in 2014 to assess and define the key features, processes, and standards for telemedicine specific to sleep medicine, which culminated in the publication of the position paper in 2015. This position paper was not intended to include all aspects of telehealth and viewed telemedicine as a subset of telehealth applications. The task force noted that expansion of sleep telemedicine into all aspects of sleep disorders management is limited by technology resources and facilities able to manage those resources, reimbursement, and financial considerations, as well as the willingness of physicians, patients, and health care organizations to accept telemedicine as an alternative to in-person visits.

The Telemedicine Implementation Task Force supports telemedicine as a means of advancing patient health by improving access to the expertise of board-certified sleep medicine physicians. However, such access improvement needs to be anchored in attention to quality and value in diagnosing and treating sleep disorders. Telemedicine is also useful to promote professionalism through patient care coordination and communication between sleep medicine and other specialties. Many of the principles and key concepts adopted here are based on US industry standards, with special consideration given to the body of work by the American Telemedicine Association (*www.americantelemed.org*), and abide by standards endorsed by the American Medical Association (*www.ama-assn.org*).

Practitioners who wish to integrate sleep telemedicine into their practice should have a clear understanding of the salient issues, key terminology, and the following recommendations from the AASM:

The Task Force recommended the following guidelines in the position paper:

- Clinical care standards for telemedicine services should mirror those of in-person visits, including all aspects of diagnosis and treatment decisions as would be reasonably expected in traditional office-based encounters.

- Clinical judgment should be exercised when determining the scope and extent of telemedicine applications in the diagnosis and treatment of specific patients and sleep disorders.

- Live interactive telemedicine for sleep disorders, if used in a manner consistent with the principles outlined in the position paper, should be recognized and reimbursed in a manner competitive or comparable with traditional in-person visits.

- Roles, expectations, and responsibilities of providers involved in the delivery of sleep telemedicine should be defined, including those at originating sites and distant sites.

- The practice of telemedicine should promote a care model in which board-certified sleep medicine physicians, patients, primary care providers, and other members of the health care team aim to improve the value of health care delivery in a coordinated fashion.

- Appropriate technical standards should be upheld throughout the telemedicine care delivery process, at both the originating and distant sites, and specifically meet the standards set forth by the Health Insurance Portability and Accountability Act (HIPAA).

- Methods that aim to improve the utility of telemedicine exist and should be explored, including the utilization of telepresenters who are sometimes referred to as patient presenters, local resources and providers, adjunct testing, and add-on technologies.

- Quality assurance processes should be in place for telemedicine care delivery models that aim to capture process measures, patient outcomes, and patient/provider experiences with the model(s) employed.

- Time for data management, quality processes, and other aspects of care delivery related to telemedicine encounters should be recognized in value-based care delivery models.

- The use of telemedicine services and its equipment should adhere to strict professional and ethical standards so as not to violate the intent of the telemedicine interaction while aiming to improve overall patient access, quality, and/or value of care.

- When billing for telemedicine services, it is recommended that patients, providers, and others rendering services understand different payer reimbursement rules , and that there be financial transparency throughout the process.

- Telemedicine utilization for sleep medicine is likely to expand rapidly, as are broader telehealth applications in general; further research into the effect and outcomes of these applications is needed.

The position paper discussed the specific advantages and disadvantages of telemedicine and provided recommendations for appropriate use of telemedicine by board-certified sleep medicine physicians.

How to Start a Telemedicine Program

Starting a telemedicine program requires development of new procedures, capital outlays for new equipment, identifying the need and population for services, and training of new personnel. Because there are several models that can be adopted, identifying the right model for your practice requires meticulous planning and preparation to ease the transition and ensure high-quality service. You will be committing time and money by adding telemedicine to your practice; therefore, advance preparation can help yield better return on your investment and increase overall satisfaction with the telemedicine experience.

This guide describes the steps that will help in your planning, decision-making, and preparation. These steps, described in greater detail in each subsequent section, represent a template that can be adjusted to your practice situation. The general steps to starting a telemedicine program are:

- Develop a telemedicine strategy
  + Evaluate if telemedicine is right for your practice
  + Identify your target audience
  + Select a model that is right for you: Center to Home (C2H) or Center to Center (C2C)
- Identify hardware and software needs
- Evaluate financial considerations
  + How do I get paid?
  + How much does it cost?
- Understand the regulatory, legal, and ethical considerations to practical implementation of telemedicine

Developing a Telemedicine Strategy

Development of a strategy regarding telemedicine is the preliminary step to initiating this new service.

Questions to consider in this process include:

1. *Is telemedicine right for me and my practice?*
Define your overall desires and pressures to embark on providing a telemedicine service.

As with any health care venture, you need to understand your reasons for doing this and where this fits in with your practice's needs as well as personal and professional goals, both short-term and long-term. Start by analyzing your and your practice's comfort with technology.

Are you more comfortable with newer technologies and applications than many of your peers, or are you someone constantly frustrated by technology? If technology scares you and/or your providers, and you find yourself constantly upset by technological glitches, you might not choose to be the first in your group or institution to develop a telemedicine practice.

Also, consider your willingness to adopt new skill sets. In addition to being comfortable with technology, telemedicine requires slightly different communication skills than those used in an exam room. Developing these skills requires a physician to be open-minded and adaptable. *(See flowchart on pg. 6)*
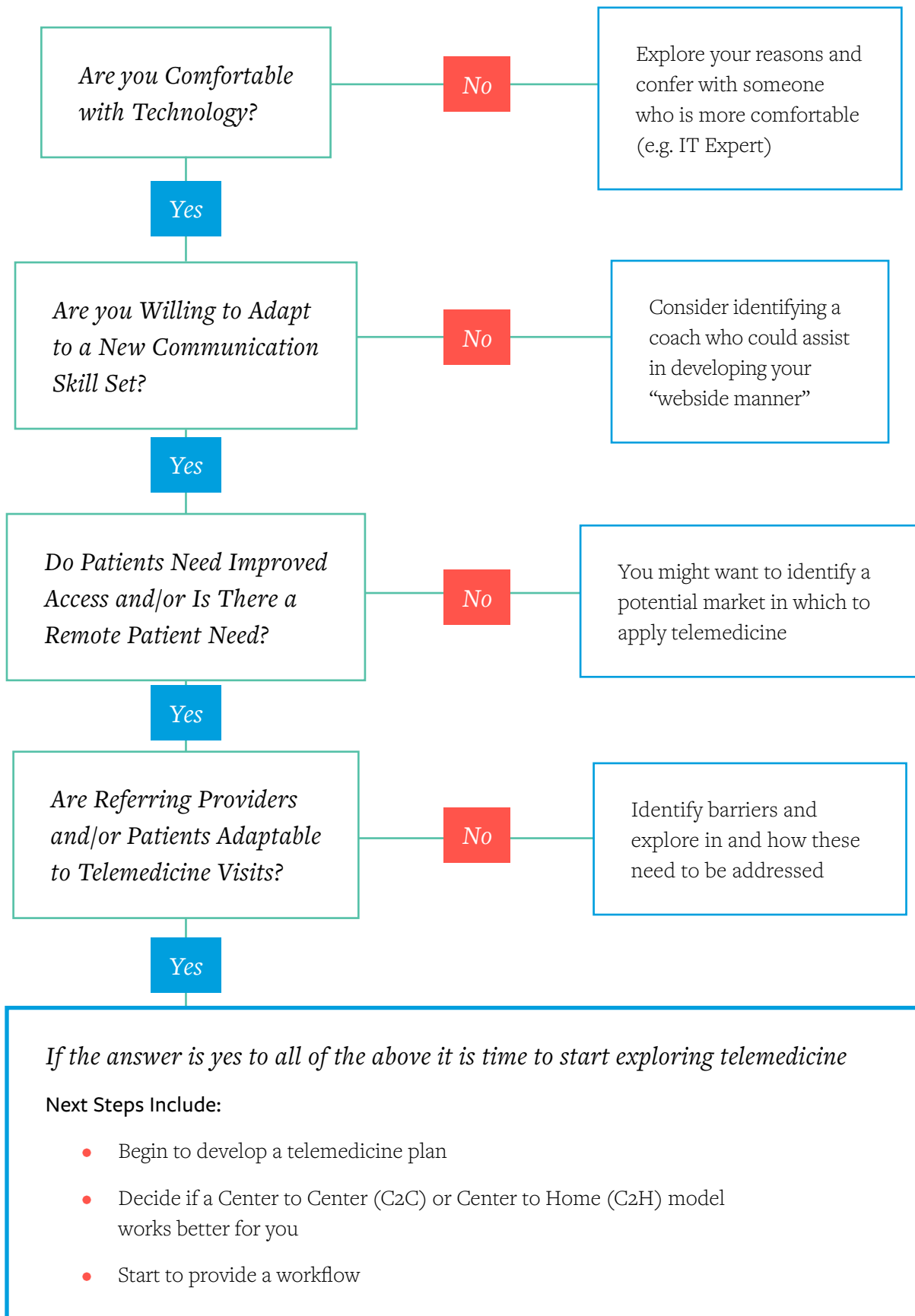
2. *Who is your target audience?*

If you think that you and other providers in your practice can adapt to technology, then the next step is to understand the local demands for technology. Survey your patients to determine if they would be willing to consider telemedicine visits and explore the opinion of referring providers. In exploring this key aspect, going through this document and creating a formal or even informal proposal will help you.

Knowing who will use the service will influence decisions on equipment, technology, space, personnel, and time commitment.

- Will you be targeting patients remote to your typical practice catchment area or just those within your health care system?

- Will this program be part of a contractual agreement with a specific employer or payer, a result of referral from remote providers, or open to self-referred patients?

- Is the program available only to self-pay patients, those with commercial insurance, or those with government (Medicare) insurance?

Programs servicing those with government-based insurance must follow strict guidelines about technology, must use originating sites for patient location (C2C systems) and are restricted to under served areas. Requirements for programs servicing those with commercial insurance are more varied and often allow the use of less restrictive systems that connect the sleep physician directly to the patient via technology (C2C or C2H systems). Early determination of your target audience will help direct your decisions about the design of the program.

Is Telemedicine Right for You and Your Practice? *(Continued from Question 1 on pg. 5)*

Are you Comfortable with Technology? → **No** → Explore your reasons and confer with someone who is more comfortable (e.g. IT Expert)

↓ **Yes**

Are you Willing to Adapt to a New Communication Skill Set? → **No** → Consider identifying a coach who could assist in developing your "webside manner"

↓ **Yes**

Do Patients Need Improved Access and/or Is There a Remote Patient Need? → **No** → You might want to identify a potential market in which to apply telemedicine

↓ **Yes**

Are Referring Providers and/or Patients Adaptable to Telemedicine Visits? → **No** → Identify barriers and explore in and how these need to be addressed

↓ **Yes**

If the answer is yes to all of the above it is time to start exploring telemedicine

Next Steps Include:

- Begin to develop a telemedicine plan
- Decide if a Center to Center (C2C) or Center to Home (C2H) model works better for you
- Start to provide a workflow

3. Should I use a Center to Home (C2H) or Center to Center (C2C) model?

Center to Home (C2H):

This model uses the patient's own technology (laptop, cell phone, etc.) from wherever they choose to access your system.

With the Center to Home (C2H) model, there are key advantages to the patient using his or her own technology because (1) implementation costs are lower because space and equipment are not needed for the originating site; (2) it facilitates easier patient access because patients can use the system from wherever they are; and (3) patients are generally familiar with their own technology.

However, several key disadvantages for C2H models of care are worth noting, including: (1) privacy may be more difficult to monitor and ensure; (2) potential inability to use tools or personnel that can facilitate the visit (magnifying cameras, stethoscopes, etc.); and (3) signal quality may vary because it is dependent on the patient's technology.

Center to Center (C2C):

This model uses an originating site, typically a medical office or clinic where the equipment is located. A telepresenter facilitates the patient's interaction with the audiovisual equipment and can introduce additional technologies.

The key advantages to the Center to Center (C2C) model of care include: (1) more closely approximates a live in-clinic visit that often facilitates workflow and office coordination during program startup, but also may be important for billing purposes; (2) allows utilization of a presenter and additional clinical tools that increase the breadth of the physical examination and overall assessment; and (3) often results in high-quality audiovisual equipment and signal strength as the technical abilities are often greater with this modality.

However, key disadvantages of C2C include: (1) remote site agreement is required to participate; (2) often higher equipment and personnel costs; and (3) less convenience for patients because they must come to the originating site.

Advantages and Disadvantages of Telemedicine Models:

Telemedicine Model	Center to Home (C2H)	Center to Center (C2C)
Advantages **+**	+ Implementation costs lower + Ease of patient access + Patients familiar with own technology	+ More similar to in-person visit + Utilization of personnel and diagnostic tools + Reliable and high-quality technology
Disadvantages **−**	− Privacy more difficult to control − No tools or personnel available − Variable signal quality/reliability	− Remote site agreement required − Higher equipment and personnel costs − Less convenient for patients

4. Is C2H Right for You?

Increasingly, industry is moving toward developing C2H models for a number of disease states, including urgent care, elder care, diabetes management, heart failure, and behavioral health. The reasons are numerous, with patient and caregiver convenience being the most important driver. Technology is also increasingly able to meet the needs of consumers and providers, and consumers are more familiar with, and reliant on, information technology.

The first factor in deciding if a C2H program is possible is determining what regulations govern telemedicine programs for your target population. Currently, government-based insurers require C2C telemedicine programs, but we expect that to change over time, perhaps even at a rapid pace. State regulations provide oversight for commercial insurers and most leave it to the payer to authorize program types, making them more amenable to C2H programs. Self-pay services, which are usually C2H programs, must meet state telemedicine regulations and abide by federal patient confidentiality rules.

The next factor is deciding how your patient mix influences your comfort level with the limitations to the clinical evaluation inherent in C2H programs. The physical examination is more limited because additional tools cannot be added. If using a C2H model, you should develop guidelines for when a patient should come in for evaluation, such as making an upper airway evaluation a requirement to determine eligibility for upper airway surgery. If telemedicine is used because the patient is at a great distance and unable to attend a face-to-face visit, then you will need to establish relationships with local primary care providers or related specialty physicians in the patient's local area who can provide additional needed services (refer to cases later in this guide).

If you decide to offer a C2H program, then the basic tenets outlined earlier should be met. The meeting should be secure and HIPAA-compliant, and the patient must ensure privacy on their end. Although this is primarily the patient's responsibility, the physician should ensure privacy at the beginning of the visit.

Patient identification should be verified either through the portal used (patient identification scanned in during registration and verified prior to the visit) or directly by the treating physician. The photo identification presented should match the patient to the satisfaction of the physician.

After identification has been accomplished, the visit occurs in a manner similar to an in-person visit. Follow-up is arranged through a web-based scheduling system or via the physician's scheduling staff.

Ideal candidates for C2H interaction may include those who have limited mobility, those who are professional motor vehicle operators, or any patient who desires to have a C2H visit.

If the physician thinks that this type of interaction is inappropriate for a particular patient, the physician has the right and obligation to communicate this to the patient and to stop the telemedicine encounter in favor of an in-person visit. This decision can be made by either the provider or the patient at any time during the encounter.
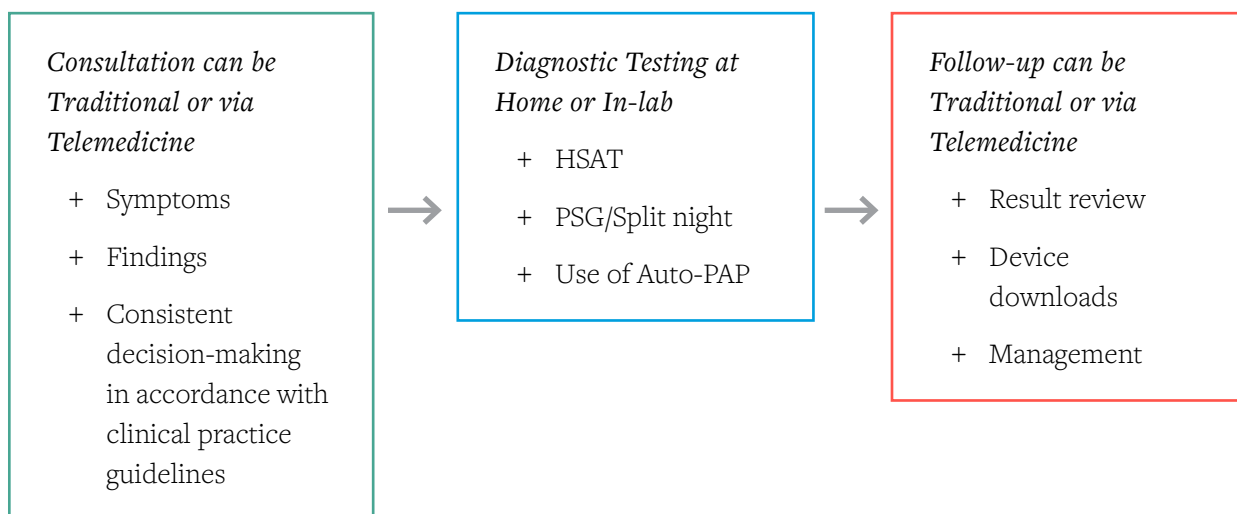
Developing a Workflow Plan

Provide a visual guide to how patients will flow from point of referral through testing and follow-up:

When one embarks on a telemedicine outpatient practice, it can be challenging to understand where patients are being serviced and who may be responsible or accountable for specific roles or interventions. Drawing up a plan can be very helpful to understand the overall schematics of the program you design and will help you and others with the other steps in this document. Key considerations to note include:

1) Consider your current sleep market, including the conditions most commonly being treated, and common pathways, algorithms, and resources currently used. Where do most patients in your practice come from, where do they go for other diagnostic and treatment purposes, and how often, as well as when and where, do they follow-up with you and your office?

2) Is the care coordination done through your office and staff, and does the staff have the training and capacity to handle calls through this arrangement?

3) Research the equipment needed, the location(s) involved, and the costs associated with these factors.

4) Factor in your own time, expense, and capacity to integrate telemedicine into your practice. Will the net result of all the aforementioned steps likely lead to a real and/or perceived benefit?

Sample Workflow for Patients with Obstructive Sleep Apnea

Consultation can be Traditional or via Telemedicine	→	*Diagnostic Testing at Home or In-lab*	→	*Follow-up can be Traditional or via Telemedicine*
+ Symptoms + Findings + Consistent decision-making in accordance with clinical practice guidelines		+ HSAT + PSG/Split night + Use of Auto-PAP		+ Result review + Device downloads + Management

Understanding Hardware and Software Needs

Telemedicine should complement one's practice, not interrupt or complicate it. Accordingly, telemedicine equipment should be adjacent to current clinical practice areas as much as possible. Determining equipment needs for telemedicine should be a collaborative process among the clinical providers and IT staff. For instance, clinic staff may require a cardiopulmonary evaluation to fully assess a patient, necessitating an electronic stethoscope. With that feedback, IT staff can choose an electronic stethoscope that integrates with currently available technology or may decide software upgrades may be necessary to provide appropriate care measures delineated by the care team.

IT staff are integral to the successful telemedicine team. Access to supportive and knowledgeable IT staff is indispensable in developing and using telemedicine. The technical staff needs experience to troubleshoot, make technical adjustments, and to acquire suitable authorizations to make network changes as necessary. An IT point person is ideal in helping integrate and provide support for telemedicine. Introducing IT personnel between sites may improve ease of technical troubleshooting between sites. Also, IT staff should be well-versed in all the software, hardware, and networks associated with telemedicine to prevent incompatible technology conflicts prior to launching a telemedicine program.

When implementing telemedicine, the provider should be familiar with the equipment. Technical support should be available if necessary. An alternative should be available, if the telemedicine equipment fails, to facilitate or reschedule the visit. This alternative plan should be prepared prior to a failure.

Four hardware and software areas that should be integrated to implement telemedicine:

1) *Identify the primary way in which telemedicine will be used* – Will telemedicine be used to provide live visits as C2C or C2H or primarily as a store and forward type of telemedicine?

2) *Determine the type of equipment needed for proper assessment* – For example, do you require separate technology to assess airway anatomy for sleep apnea evaluation?

3) *Assess existing hardware and software available* – Choosing technology complementary to current systems should reduce cost and improve ease of incorporating telemedicine into the practice.

4) *Evaluate financial resources* – What resources are needed to acquire and implement necessary components for telemedicine (including budgeted finances to maintain the equipment)?

Consultation with administrative, clinical, and IT staff may help in answering the considerations outlined in this section.

Data Transmission:

Equipment used for telemedicine may vary considerably, but one of the most important considerations when evaluating telemedicine equipment centers on security. Data should be transmitted and stored in compliance with HIPAA regulations. Notably, transmission of telemedicine may occur in several different ways:

- Private site-to-site connections (directly connecting an originating site to a distant site)
  + Most commonly used for C2C telemedicine
  + Requires patients to travel to specific sites
  + Not available for C2H telemedicine

- Major broadband networks providing exclusive secure, private data transit with prioritization to medical communications
  + Requires contracts and may be expensive and time consuming
  + May be easy to incorporate additional groups and users
  + Higher speed telecommunications may be limited to larger communities

- Enterprise high-speed internet (T1, T3, dedicated fiber, etc.)
  + Dedicated internet line
  + Potentially expensive
  + Guaranteed speed
  + Service level agreement guarantees high availability

- Consumer high-speed internet (cable, DSL)
  + Shared internet line, which makes it less reliable
  + Inexpensive
  + Available nearly everywhere
  + Most likely to be used by the patient

- Mobile broadband (LTE, 4G, 3G)
  + Available with most smart phones
  + Speed varies depending on signal strength

- Single-line telephone or video lines connecting providers with patients at home
  + Security and stability issues may be challenging

Technical Specification Recommendations:

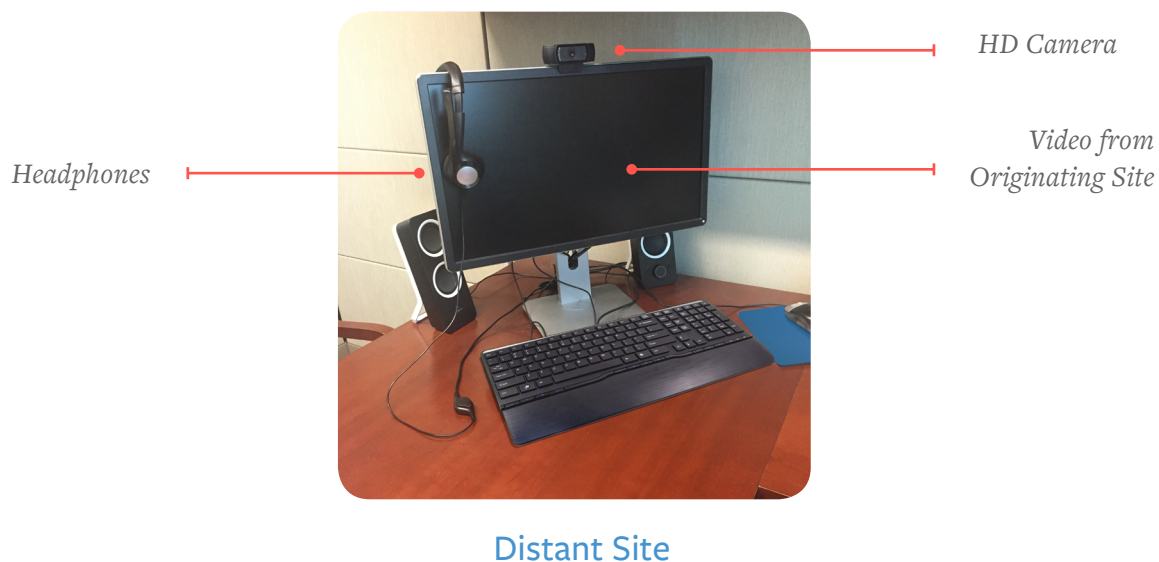| Domain	Telemedicine Specifications – (Adapted from American Telemedicine Association Guidelines and reprinted from the *Journal of Clinical Sleep Medicine*)
Bandwidth	Minimum connection speed @ 384 kbps; videoconferencing software adapts to changing bandwidth environments without connection loss
Resolution	Minimum live video services @ 640 × 480 resolution at 30 frames/second
Software	Software and operating system should be up-to-date and patched with the latest security updates; in the event software fails, the contingency plan should be known to the provider
Diagnostic Equipment	Electronic stethoscope for cardiopulmonary assessment is recommended in telemedicine practices, and additional peripheral devices are encouraged to be used if they can aid clinical needs. Providers and presenters are expected to ensure functionality and be knowledgeable about the equipment employed as well as contingency plans in event of equipment failure
Safety	Compatible with published regulations for devices used in patient care and infection control procedures followed
Privacy	+ Use of encryption for both live and stored information + Muting available + Passphrase required to access device on which patient data are stored + Inactivity timeout function requiring re-authentication with timeout not exceeding 15 minutes + Protected health information and confidential data only stored on secure data storage locations + Provider knowledge of how patient data are stored and the provider is expected to be able to answer patient questions regarding storage of patient health information + Access granted only to authorized users + Data streamed directly to storage to avoid accidental or unauthorized file sharing

Best Practices for Selecting Equipment:

- Selectively examine hardware, software, critical equipment components, communication systems, and financial investment.

- Understand requirements for upgrading resources and contracts associated with such upgrades.

- Utilize trustworthy and knowledgeable sources when identifying the most appropriate equipment needed.

- Assess differences in connectivity and equipment between different sites involved.

- Ensure specifications of equipment match currently used technical standards.

- Test equipment thoroughly prior to use and develop extensive practice and training for providers through both the initiation and continuation phase of the telemedicine program.

- Provide for redundancy of critical systems used in the telemedicine program; this may require additional budgeting of resources.

- Provide alternatives to telemedicine should technical issues prevent its usage.

- Monitor performance of the telemedicine program at regular intervals to reduce incidence of failures.

- Provide a plan to evaluate and monitor service usage, patient and provider comfort levels with the technologies used, and cost analysis.

Checklist of Factors in Designing the Telemedicine Environment

Internet accessibility needed or desired in the following locations:	☐ Patient rooms ☐ Conference rooms ☐ Provider offices (including staff desks)

Internet connectivity	☐ Wall jacks necessary? If so, number needed
	☐ Wireless connectivity? If so, consider backup system
	☐ Encrypted internet connection
	☐ Connectivity deployed
	  + Private site-to-site connections (directly connecting an originating site to a distant site)
	  + Major broadband networks providing exclusive secure, private data transit with prioritization to medical communications
	  + Enterprise high-speed internet (T1, T3, dedicated fiber, etc.)
	  + Consumer high-speed internet (cable, DSL)
	  + Mobile broadband (LTE, 4G, 3G)
	  + Single-line telephone or video lines connecting providers with patients at home

Current telemedicine equipment	☐ Video equipment ☐ Store and forward systems ☐ Do these require integration?
Video equipment needed	☐ High definition versus standard definition ☐ Monitor size ☐ Monitors and cameras: wall mounted or mobile ☐ Peripheral equipment needs
Store and forward systems needed	☐ Needs will vary by specialty ☐ Software utilized and compatibility ☐ Camera and digital imaging quality ☐ Electronic health record type, needs, and information stored

Equipment set-up example (C2C):

HD Camera

Video from Originating Site

Headphones

Distant Site

Originating Site

HD Camera

"Shared" data Screen

Video from Distant Site

Electronic Stethoscope

Portable Camera

Business Aspects of Telemedicine

Building a successful sleep telemedicine program depends on financial feasibility at its inception and income sustainability over time. Systematic analysis of many factors is essential to balance anticipated expenditures with potential income, as summarized in the following figure:

Expenditures	Income
Equipment	*Reimbursement from Patient Encounter*
Licensing	
Clinical Space	*Sleep Testing Reimbursement*
Staff	
Advertising	*Grant Funding*
Lost in-person Revenue	*Other Support*

An early decision point when projecting your program's financial viability is whether you will use a C2C or C2H model. Although more equipment and personnel are required for C2C systems, these investments may also allow expanded reimbursement potential (*see Sustainable Income section in the following paragraphs*). In the following discussion, we will highlight items specific to one model or the other.

Expenditures:

Anticipated expenditures can be divided into two categories: single (i.e., one-time) and operating (i.e., ongoing) expenses.

Initial Capital Expenses:

A substantial investment in technological infrastructure may be required. Although some telemedicine companies offer comprehensive plans for equipment purchase and maintenance, others offer consumers *à la carte* purchasing. Key start-up components include:

- Webcam at both the provider site and the patient's site

- HIPAA-compliant, encrypted software allowing video transmission

- Telestethoscope at the originating site with headphones at distant site (C2C)

- Mobile examination camera (C2C)

Purchasing a telemedicine console, or cart, that combines these tools may be convenient, but costs vary substantially; consoles range from approximately $2,000 to more than $20,000 depending on vendor, brand, and capabilities. Equipment rental may be available depending on vendor and locality.

Operating Expenses:

After necessary equipment has been purchased, several operating cost sources (i.e. "overhead") should be considered:

- Space at distant site and space at originating (C2C) site

- A telepresenter at the originating site (C2C); the individual could be a nurse, technician, or medical assistant who ensures data integrity, distributes questionnaires, and serves as the distant provider's "hands" during the visit

- Another sleep-trained staff member for positive airway pressure (PAP) and home sleep apnea testing (HSAT) set-up

- Medical licensing for out-of-state originating site(s)

- Advertising near the originating site

In practices already functioning at or near maximum capacity, you may want to project potential *lost* in-person clinic revenue during telemedicine clinics and balance potential financial gains:

- Lost new and follow-up in-person visits:

  + Telemedicine visits may not be reimbursed at parity with in-person visits *(see Sustainable Income section in the following paragraphs)*.

- Lost polysomnograms and HSATs generated from in-person visits:

  + Sleep studies that otherwise meet criteria for in-laboratory testing may be converted to HSAT due to logistical constraints

  + Sleep facilities near the patients' originating site may be used, decreasing revenue at the provider's laboratory

Income:

Analogous to single and operating expenses, revenue should be considered in terms of start-up and sustainable income.

Start-up Funding:

Financial support to start a program varies widely depending on setting (hospital system center vs. independent practice) and geography (urban vs. rural). Some funding sources include:

- Annual budget through an affiliated hospital/medical center system

- Income surplus from within the sleep facility

- External grants from state, federal, and/or private entities

Although external grants are not reliable sources of long-term funding, they can be useful in offsetting initial costs. Telemedicine programs incorporating rural originating sites are particularly likely to access this funding. Grant-related resources include:

- *www.raconline.org/amirural*
  Assists in determining whether a specific location is considered rural and what health care-related grants might be available

- *datawarehouse.hrsa.gov/RuralAdvisor/RuralHealthAdvisor.aspx*
  Produced by the US Health Resources and Services Administration (HRSA), and includes a helpful "Rural Health Grants Eligibility Analyzer"

- *www.gptrac.org/resource-center/financial-resources-and-opportunities*
  Produced by the Great Plains Telehealth Resource and Assistance Center, provides additional information on nonrural telemedicine grants (with some Great Plains-specific resources included)

Sustainable Income:

Reimbursement for service rendered is the cornerstone of long-term revenue. Primary sources include (1) private insurers, (2) Medicare, (3) Medicaid, and (4) patients' out-of-pocket fees.

1. Private insurers

Coverage rules vary based on the originating site's state. Most states require that insurers reimburse telemedicine visits the same as (at parity with) in-person visits based on Evaluation and Management coding rules. Several additional states are considering similar parity laws. Up-to-date, state specific information can be found at:

- *www.americantelemed.org/policy/state-policy-resource-center*
  American Telemedicine Association

- *telehealthpolicy.us/state-laws-and-reimbursement-policies*
  The National Telehealth Policy Resource Center

2. Medicare

Medicare only reimburses real-time video teleconferencing (C2C) when the originating site is in a health professional shortage area, as defined by the US Office of Management and Budget. It also excludes home-based telemedicine, significantly limiting patient eligibility. You can find out if a particular site is eligible for Medicare coverage at:

- *datawarehouse.hrsa.gov/telehealthAdvisor/TelehealthEligibility.aspx*
  US Department of Health and Human Services

If an originating site is Medicare eligible, the Centers for Medicare & Medicaid Services (CMS) provide up-to-date coding guidelines for clinical encounters at:

- *https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/TelehealthSrvcsfctsht.pdf*
  Centers for Medicare & Medicaid Services

Although CMS reimbursements remain tightly restrictive, some flexibility has materialized. In its 2016 bundled payment structure for joint replacements, the agency waives originating site geographic restrictions and includes C2H care as part of that bundle. Although it is unclear when (and whether) this paradigm will extend to sleep medicine, this recognition of telemedicine's valuable contribution to high-quality care is encouraging.

3. Medicaid

Similar to private insurer parity laws, Medicaid coverage for telemedicine visits is state specific. Additionally, individual states put restrictions on which type of telemedicine visit can be covered (e.g., real-time video telemedicine visit only). Two particularly useful Medicaid-related sources are:

- *www.americantelemed.org/policy/state-policy-resource-center*
  American Telemedicine Association

- *www.ncsl.org/research/health/state-coverage-for-telehealth-services.aspx*
  National Conference of State Legislatures

4. Patients' out-of-pocket fees

There is evidence that patients are willing to pay out-of-pocket costs for telemedicine services. Nevertheless, viability of this funding source depends on careful analysis of the population served. Additional expenditures may be incurred due to enhanced marketing, advertising, and direct-to-patient billing.

> *Although many of these financial considerations are not unique to sleep telemedicine, they are particularly relevant to new clinic development. Costs and reimbursements vary substantially among and within states, making these considerations just as helpful in formulating strategic questions as furnishing their answers. The case study that follows illustrates how to leverage the aforementioned resources and utilize cost analysis tools to inform implementation.*

Sleep Business Practice Case Study: Telemedicine or Satellite Clinic?

Introduction:

A board-certified sleep medicine physician in Georgia wants to expand her practice over a wider geographic region, including nearby Tennessee and Alabama. Instead of opening conventional satellite clinics, she considers using telemedicine. The physician inquiries about the financial feasibility of this strategy in comparison with in-person satellite clinics.

Questions to Consider:

1. How will my costs compare if I utilize telemedicine versus satellite clinics?

Satellite clinics are staffed in-person by clinical personnel who travel from a central, parent facility for designated patient care sessions. These medical professionals may include physicians, advanced clinical practitioners, and nurses. Utilizing satellite clinics typically obviates the need for telemedicine and mimics more traditional health care delivery at the providers' primary facility.

There are two overarching telemedicine provision options, C2C or C2H. C2C programs can potentially see all patients as a satellite clinic. C2H programs may be restricted to non-Medicare patients due to CMS reimbursement limitations. Several costs are common to these programs, whereas others are unique to the paradigm chosen. (See the cost source comparison, pg. 22) In either case, actual cost amounts are highly site-specific; the physician used a cost analysis worksheet to estimate her monthly costs for possible scenarios. (See the sample cost analysis worksheet, pg. 21)

2. How would I get reimbursed for telemedicine? Do Georgia, Alabama, and Tennessee's private insurers pay for telemedicine visits at parity with in-person visits? How do Medicaid rules compare among the states?

The American Telemedicine Association provides state-specific information at: *www.americantelemed.org/policy/state-policy-resource-center*

Using the website, the physician learned that Georgia and Tennessee require private insurers to reimburse telemedicine visits just as they do in-person visits, as long as real-time video teleconferencing is used. Alabama does not have such a law, making such reimbursement less likely. She also learned about state-specific stipulations for Medicaid coverage. For instance, Alabama and Georgia require written consent from the patient for reimbursement, whereas Tennessee does not.

3. Would Medicare cover my telemedicine patients?

Medicare coverage rules remain complex, so the physician visited: *datawarehouse.hrsa.gov/tele-healthAdvisor/telehealthEligibility.aspx*. There, she learned that C2H visits are ineligible for Medicare reimbursement. She then entered the address of potential clinic sites to determine their eligibility. None of her originating sites in Alabama or Tennessee were eligible, whereas two sites were eligible in Georgia.

She then reviewed appropriate coding for telemedicine visits at: *https://www.cms.gov/Out-reach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/telehealthsrvcsfctsht.pdf*

Cost Analysis Worksheet:

		C2H Telemedicine ($)	C2C Telemedicine ($)	In-Person Satellite Clinic ($)
Monthly Revenue	New patient visit reimbursement	+ _____	+ _____	+ _____
	Follow-up visit reimbursement	+ _____	+ _____	+ _____
	HSATs	+ _____	+ _____	+ _____
	PSGs	+ _____	+ _____	+ _____
	Other	+ _____	+ _____	+ _____
	TOTAL REVENUE	+ _____	+ _____	+ _____
Monthly Costs	Clinic space	N/A	- _____	- _____
	Telemedicine technician/presenter	N/A	- _____	N/A
	Other staff	N/A	- _____	- _____
	Practitioner travel	N/A	N/A	- _____
	Staff travel	N/A	N/A	- _____
	Software platform	- _____	- _____	N/A
	Public awareness/advertising	- _____	- _____	- _____
	Lost new in-person visits at primary clinic[a]	- _____	- _____	- _____
	Lost follow-up in-person visits at primary clinic[a]	- _____	- _____	- _____
	Lost HSATs from primary clinic[a]	- _____	- _____	- _____
	Lost PSGs from primary clinic[a]	- _____	- _____	- _____
	Other	- _____	- _____	- _____
Single Costs	Web camera	- _____	- _____	N/A
	Telestethoscope	N/A	- _____	N/A
	Interoral camera	N/A	- _____	N/A
	Other	- _____	- _____	- _____
	TOTAL COSTS	- _____	- _____	- _____
	NET GAIN/LOSS	_____	_____	_____

[a] Applies to practices already at or near maximum capacity. Other practices may indicate "$0."
HSAT = home sleep apnea test; **PSG** = polysomnogram.

Cost Source Comparison:

Cost Source	Telemedicine C2H	Telemedicine C2C	Satellite Clinic
Medical licensing (AL, GA, & TN)	X	X	X
Clinic space		X	X
Clinic staff		X	X
Public awareness/advertising	X	X	X
Telepresenter		X	
Web camera (one-time cost),	X	X	
Telestethoscope, portable oral camera (one-time costs)		X	
Software (HIPAA compliant & encrypted; one-time cost)	X	X	
Travel			X
Lost revenue during transit			X

X = Present   **C2C** = Center to Center   **C2H** = Center to Home
HIPAA = Health Insurance Portability and Accountability Act.

Summary of the websites she used and their authors:

Website	Author
www.americantelemed.org/policy/state-policy-resource-center	**ATA**
datawarehouse.hrsa.gov/telehealthAdvisor/telehealthEligibility.aspx	**HRSA**
www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLN-Products/downloads/telehealthsrvcsfctsht.pdf	**CMS**

ATA = American Telemedicine Association, **CMS** = Centers for Medicare & Medicaid Services,
HRSA = Health Resources and Services Administration.

After familiarizing herself with reimbursement strategies (including rural medicine grants) and potential costs in each of the three states, the board-certified sleep medicine physician pursued a telemedicine program only within Georgia. She then began logistical planning for her new program.

Regulatory, Legal, and Ethical Considerations in Implementation of Telemedicine

The first practical consideration in enacting telemedicine is to investigate state laws regarding telemedicine practice. State-specific telemedicine policies differ in many ways but can be summarized into five main areas: physician-patient encounters, telepresenter requirements, informed consent, out-of-state practice and licensure, and internet prescribing.

States have instituted telemedicine policies pertaining to activities before, during, and after a patient encounter. For instance, some states mandate an in-person visit in addition to evaluation via telemedicine. Other states mandate policies distinct to telemedicine compared to in-person visits. State policies regarding use of telemedicine can affect the provider's licensure and permissibility to practice medicine.

States vary on presence of telepresenters and type of telepresenters available. Some states require the telepresenter be a licensed health care provider and be available in the room with the patient; whereas, others only require a health care provider be available on the premises, and the least stringent states do not require a telepresenter.

Informed consent can be the most variable policy from state to state when referencing telemedicine. Some states do not require informed consent preceding a telemedicine encounter, whereas some require a written acknowledgment from the patient.

State licensing can often be a deterrent to practicing telemedicine. Some states allow reciprocity for bordering states, physician-to-physician consultation exemptions, and conditional telemedicine licenses. Licensing rules should be examined when implementing a telemedicine program. Telemedicine programs serving less populated states often allow conditional licensing for telemedicine when serving rural populations otherwise underserved.

States have policies regarding internet prescribing as well, especially when prescribing occurs out of state. Both the medical and pharmacy boards of each state can dictate policies regarding internet prescribing, and these should be assessed and reviewed by physicians pursuing implementation of telemedicine programs.

As mentioned in the position paper, telemedicine providers should be familiar with and adhere to federal standards regarding real or perceived conflicts of interest, including receiving or providing services solely to induce referrals or providing free equipment.

Malpractice should cover telemedicine visits equivalent to face-to-face visits, but verifying with the insurance provider is recommended.

To ensure compliance with privacy regulations, encrypted communication and storage systems are paramount, and all telemedicine visits should be conducted in a manner ensuring patient confidentiality.

Telemedicine Legal Considerations Checklist:

The chart provided below may be used as a checklist for legal considerations regarding implementing telemedicine.

Legal Considerations	Advice	Notes
Conflicts of interest	Be mindful of federal regulations such as those that are explicitly noted by the Stark Law	
Privacy issues and data security	Be knowledgeable of applicable aspects of the Health Insurance Portability and Accountability Act (HIPAA)	
Physician-patient interactions	Structure sessions in accordance with local state policy	
Telepresenter	Be mindful of scope of practice issues regarding the provider performing the telepresenter role according to local state policy	
Informed consent	Check with your legal experts on verbiage	
Licensing	Determine what licensing requirements are, both for where you practice and where your patient will be, according to state policies	
Internet prescribing	Check with state medical boards and pharmacy boards as well as local and state policies	
Malpractice	Check with insurance provider to make sure the policy covers telemedicine and coverage extends across states	

Tips for a Successful Telemedicine Encounter

When implementing telemedicine, design layout and size of the facility are important considerations. The telemedicine environment should reflect the office environment and include similar considerations such as lighting, space, acoustics, wall color, and camera distance. Utilizing trial runs to optimize the telemedicine environment from both a provider and patient perspective is integral to successful implementation of a program.

Consider visiting other telemedicine facilities to experience how telemedicine works in practice and how providers use it, which may differ from vendor recommendations. Other telemedicine sites may also demonstrate examples of personnel and processes necessary to provide care uncompromised by its reliance on technology.

A successful telemedicine encounter should mirror the live visit as much as possible. Close attention should therefore be paid to the technical quality of the encounter, starting with the audio and video specifications. The system utilized must allow for uninterrupted, fluid interaction between the provider and the patient. As such, adequate bandwidth and high-resolution video should be utilized.

The audio must allow for two-way, fluid communication between the patient and physician. The video should adequately facilitate a seamless live-stream of the patient-physician encounter without significant interruptions that would impede normal conversation.

Patients should be offered a choice between traveling for an in-person visit and utilizing technology for a virtual visit. The provider-patient relationship can be established virtually in many states. Both the originating site and the distant site should be housed in a quiet, private, HIPAA-compliant environment.

In many states, CMS specifies the need to document an upper airway as well as cardiopulmonary physical examination. This can be accomplished either by first seeing the patient in-person or by utilizing diagnostic equipment.

During the Telemedicine Encounter:

- Position the equipment unobtrusively so the patient is able to focus on the physician's image rather than the equipment.

- Position the microphone and speakers so the patient can speak naturally without having to direct his or her view toward the microphone or turn toward the speakers in order to hear adequately.

- Even with adequate bandwidth and technical capabilities, occasionally the live streaming will have a slight delay. When patients are made aware of this possibility ahead of time, they typically are accepting of this minor technical issue.

- Utilize the picture-in-picture feature to display a self-view on the distant site (your) screen. This will allow the physician to view the image being shown to the patient and to adjust it accordingly. Pay attention to the horizontal and vertical eye lines – you should appear to be looking at the patient. One way to achieve this is by dragging the picture-in-picture window across your screen, so it is just beneath the camera. This way, by looking at your own image, you appear to be looking directly at the patient. This does require practice as it may appear that you are looking elsewhere when you are actually looking at the patient.

- It is highly recommended that the encounter be practiced prior to a live visit in order to become familiar not only with the specific application utilized but the technical aspects of creating a realistic virtual visit.

- Communication with the patient is essential – the patient should be aware that the visit will take place virtually but is otherwise identical to an in-person visit.

- Communication with the referring provider is also crucial – everyone involved should understand that the visit occurs virtually.

- State laws may dictate that the initial visit must occur in-person in order to prescribe medications. Please consult your local policies.

- If diagnostic equipment is utilized (i.e., electronic stethoscope), they should be tested ahead of time to ensure the sound is of adequate quality and volume to appropriately discern auditory physical examination findings.

- Since it is not routine to record an in-person visit, recording either the physical examination or the entire telemedicine encounter is optional and uncommon.

Troubleshooting Contact List

As you are setting up your telemedicine program, make sure to fill out the troubleshooting contact list, so you are prepared in case issues arise.

Local Coordinator:

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

Remote Site Coordinator:

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

Telepresenter:

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

Hardware Issues

General Information Technology Help Desk: (*Local Computer Issues*)

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

Computer make, model, serial number: _____

Internet Service Provider: (*Networking Issues*)

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

General Information Technology Help Desk: *(Remote Computer Issues)*

Contact Name: _____

Telephone Number: _____ (ext):_____

Email: _____

External Webcam:

Model Number:_____

Contact Name: _____

Website Address: _____

Contact person: _____

Telephone Number: _____ (ext):_____

Email: _____

Other Peripheral Plug-Ins: *(Digital Stethoscope, etc.)*

Model Number:_____

Contact Name: _____

Website Address: _____

Contact person: _____

Telephone Number: _____ (ext):_____

Email: _____

Software Issues

Operating System: *(Windows, Mac.)*

Version: _____

Contact Name: _____

Website Address: _____

Contact person: _____

Telephone Number: _____ (ext):_____

Email: _____

Conferencing Software:

Version: _____

Contact Name: _____

Website Address: _____

Contact person: _____

Telephone Number: _____ (ext):_____

Email: _____

Cloud-Based Services

Durable Medical Equipment Compliance Data:

Company Name: _____

Website Address: _____

Contact Person: _____

Telephone Number: _____ (Ext): _____

Email:_____

Billing:

Company Name: _____

Website Address: _____

Contact Person: _____

Telephone Number: _____ (Ext): _____

Email:_____

Case I:

Obstructive Sleep Apnea:

History of Current Illness: Mr. J was a 58-year-old man living in rural North Carolina who was referred for evaluation of possible obstructive sleep apnea (OSA). He had a history of hypertension, type II diabetes mellitus, and increasing weight gain. He was referred for a sleep medicine evaluation by his primary care physician because of increasing daytime somnolence, decreasing energy level, and increasing snoring to the point his snoring was severely disturbing his wife's sleep. Because of the long distance required for travel to the nearest board-certified sleep medicine physician, the patient used a tablet-based telemedicine program available through his health care system. During a telemedicine appointment from his home, a thorough sleep history was elicited by a board-certified sleep medicine physician. Based on the results, an HSAT was ordered.

The patient received the HSAT and instructions through the mail several days later, and the test was interpreted by the sleep physician. A sleep technologist was available by phone to answer any questions about the HSAT procedure. Test results revealed severe OSA (apnea-hypopnea index [AHI] = 42/hour) with periods of significant oxygen desaturation down to a nadir of 72%. The sleep physician reviewed results of the HSAT with the patient via the tablet-based portal, and copies of the sleep study were sent to his primary care provider as well as the local DME company along with an order for autotitrating positive airway pressure (APAP). After starting on APAP the patient noted prompt improvement in symptoms and was satisfied with the therapy; his sleep physician accessed and reviewed adherence and effectiveness data remotely and continued to support the patient during regular follow-up via the tablet-based portal.

Learning Points:

- In sleep medicine, and in particular in evaluating OSA, much of the information needed to make a clinical decision can be derived through basic telemedicine-ready tools.

- C2H telemedicine is feasible for OSA.

- Providers should review state regulations and payer requirements prior to initiating a telemedicine evaluation. For example, Medicare regulations require a cardiopulmonary examination for purposes of billing and provision of DME. In these cases, C2C telemedicine might be preferred to allow for a telepresenter to facilitate the applications of electronic stethoscopes, high-resolution cameras, and other digitally-based tools to fulfill remotely the requirement for physical examination evaluation.

- Diagnostic studies such as polysomnography, HSAT, and actigraphy are often accessed and interpreted remotely, facilitating accurate diagnoses and treatment options.

- Downloads with modem access in particular are easier to obtain. In areas with limited connectivity, technicians can print the cards and scan this into the record for the interpreting physician.

Case 2:

Upper Airway Assessments:

Case: A 41-year-old woman received a diagnosis of moderate OSA (AHI = 22 events/hour). After 6 months of continuous positive airway pressure (CPAP) therapy, she remained unable to tolerate the treatment. The patient subsequently reported to a telemedicine clinic to discuss upper airway surgery and oral appliance therapy (OAT). A C2C model was employed, whereby the patient traveled to a local clinic to access telemedicine services.

Although PAP therapy remains the gold standard for OSA treatment, OAT and surgical interventions are viable alternatives. Therefore, identification of individuals most likely to benefit from these interventions is important. Craniofacial and upper airway anatomy assessments are essential during in-person visit; telemedicine-based care need not differ.

## Telemedical Upper Airway Assessment Offers Several Benefits to Patients:

- Focused physical examination from a board-certified sleep medicine physician without having to leave home (C2H models) or a local clinic (C2C models).

- Early assessment for OAT or surgery candidacy.

- Basic assessment for upper airway/craniofacial pathology.

- Facilitated referral to local dentists and surgeons.

There Are Two Primary Components of the Telemedical Upper Airway Examination:

1. Craniofacial Anatomy (C2H and C2C models):

Equipment needed to facilitate Craniofacial Anatomy exam:

HIPAA-compliant webcam with monitor (originating and distant sites)
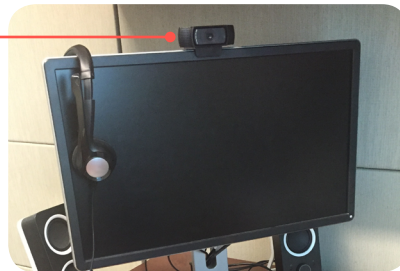
Next Steps:
*Patient turns full body laterally, and the head and neck are assessed for:*

- Retrognathia

- Lower jaw mobility

- Other anatomic abnormalities

Patient Findings:
The encounter with the patient reveals no significant retrognathia or other abnormality. The patient demonstrates adequate jaw mobility with protrusion. She does not report any temporomandibular joint pain.

2. Upper Airway Assessment (C2C models):

Equipment needed to facilitate upper airway assessment:

Intraoral Camera

Telepresenter's Hand


Telepresenter operates intraoral camera
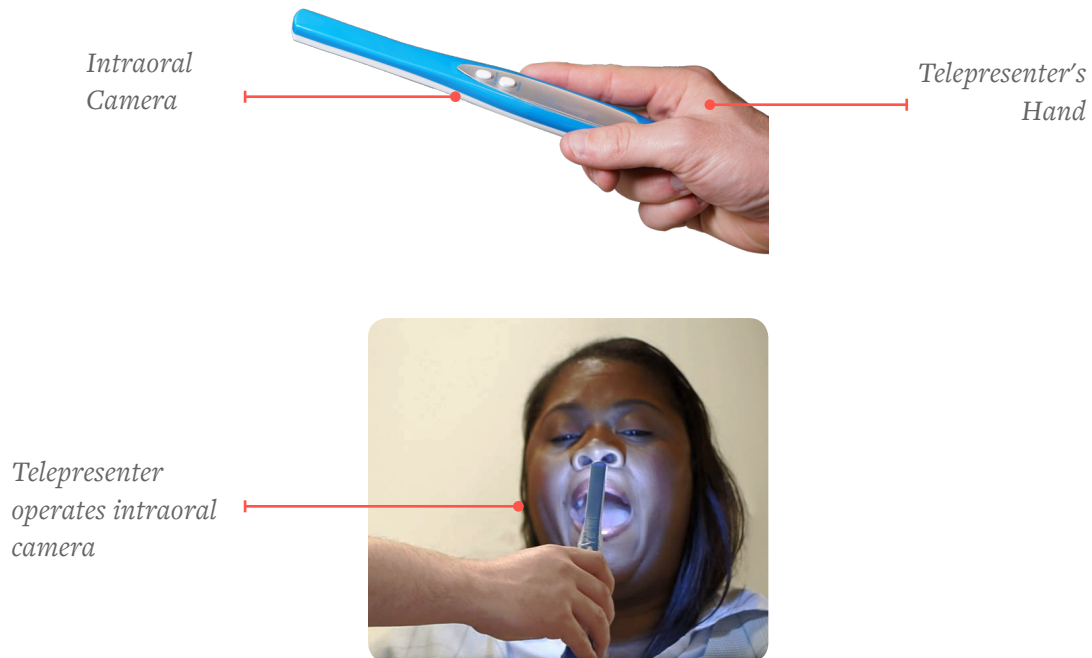
Next Steps:

Patient follows usual directions for the oral examination (open mouth, etc.) and is assessed for:

- Tonsillar/soft-tissue hypertrophy

- Airway size (i.e., Mallampati score)

- General dentition

Patient Findings:

The portable examination camera reveals a Mallampati class II airway. Tonsils are surgically absent and dentition is good, with all teeth present.

Class I   Class II   Class III   Class IV
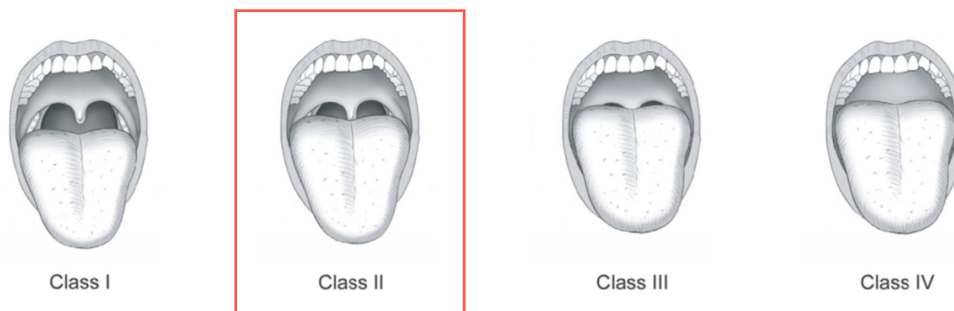
Because the patient was deemed an appropriate candidate for OAT, she was referred to a local qualified sleep dentist for appliance fabrication. After commencing OAT, she was subsequently scheduled for follow-up in the sleep telemedicine clinic. The telemedicine provider maintained a current list of qualified sleep dentist facilities near the patient's originating site. If tonsillar hypertrophy or redundant soft tissue had been observed, then referral to a local otolaryngologist for surgical intervention could have been considered.

Learning Points:

- Specialized devices (webcam, portable camera) allow telemedicine providers to obtain an appropriate upper airway assessment.

- In comparison with C2H models, C2C models are particularly advantageous for upper airway assessment because they enable use of a:

  + Specialized portable camera

  + Trained patient telepresenter to help capture appropriate views

  + Light source within the upper airway (a component of most portable cameras)

- An up-to-date list of local specialists (e.g., dentists, surgeons) should be maintained to broaden treatment options nearer the patient's home. Those practitioners should have the distant site telemedicine providers' full contact information to facilitate long-term data sharing.

Case 3:

Caregivers:

Case: An otherwise healthy 6-year-old boy had been experiencing recurrent sleepwalking and night terrors. His mother described him as a very restless, sweaty sleeper with chronic light to moderate snoring and bedwetting. His pediatrician noted enlarged tonsils and recommended a sleep evaluation. The child had one younger sibling who had no sleep difficulties. No pediatric board-certified sleep medicine physicians were accessible in the child's hometown, and his mother could not financially afford to miss time from work to travel to the nearest university sleep facility to access a provider. She was pleased to learn of the convenient telemedicine visit option now available for her son.

The patient was evaluated by a board-certified sleep medicine physician via telemedicine encounter, with his mother present. Although initially engaged, he quickly became inattentive and began to disrupt the camera positioning. Fortunately, the patient telepresenter was on hand to reposition the camera. On examination, the child was at the 15th percentile for both height and weight. Portable examination camera attachment allowed for proper assessment and revealed a size of 4+ on the tonsil grading scale. He also suffered from rhinorrhea and allergic shiners. The remainder of his examination was unremarkable.

The patient was recommended to undergo a diagnostic polysomnogram at a nearby accredited sleep facility. The test revealed both snoring and sleep apnea. There was no evidence of epileptiform activity. The patient was ultimately referred for tonsillectomy with a local surgeon. After adjunctive allergy treatment, repeat sleep testing showed resolution of his snoring and sleep apnea. At a routine follow-up telemedicine visit, he and his mother no longer reported bedwetting, disturbed breathing, or acting-out behaviors during sleep. Moreover, his height and weight had rebounded to the 40th percentile, consistent with his earlier trajectory. The mother reported improved attention and behavior at school and home and was pleased with his convenient telemedicine care.

Learning Points:

- Pediatric sleep disorders including behavioral insomnia, bedwetting, snoring, sleep apnea, parasomnias, restless legs syndrome, and circadian rhythm disorders can be evaluated and managed via telemedicine, and both C2C and C2H models offer caregiver convenience.

- Interviews require caregiver involvement for accurate history-taking and assessment of familial interactions. Telemedicine increases access to specialists in underserved areas and provides a convenient option that minimizes life disruption to the family.

- Airway examinations are often difficult in children and may require the use of specialized equipment such as a portable camera, adjunctive allied provider evaluation, or in-person assessment.

- Minor children represent a vulnerable population with implications regarding consent and mandatory reporting of suspected abuse.

- Children with behavioral problems or other special needs may complicate evaluation and management. A well-trained patient telepresenter can provide support as needed to optimize the encounter.

- Care should be coordinated with the pediatrician to ensure proper utilization of local resources, but these may be inadequate to provide readily-accessible polysomnography and standard specialist treatments (e.g., surgery and orthodontics). As needed, referrals should be provided to facilities that provide comprehensive pediatric care.

- Telemedicine can extend the reach of scarce pediatric board-certified sleep medicine physicians. Access to quality care can be provided efficiently at a reduced cost and burden to patients and their families.

Case 4:

Mobile Patients:

Case: A 53-year-old man was referred by his Department of Transportation medical examiner for a sleep evaluation. He denied excessive sleepiness or snoring but reported a history of hypertension. On examination, his neck circumference was 18 inches and body mass index (BMI) was 38 kg/m^2. He was on the road 5 nights per week but traveled through the local state 1 day each week. He presented for telemedicine evaluation. He reported no overt sleep complaints, but based on his BMI, neck circumference, hypertension, and high-risk profession, an HSAT was ordered. The telepresenter provided the patient with a chain-of-custody device at the originating site; the patient spent the night in his truck with the HSAT and returned the following morning to review the results of his study. His HSAT demonstrated an AHI of 45 with oxygen desaturations to 80%. Although initially reluctant, he ultimately agrees to try nasal PAP. A PAP of 4-20 cm H$_2$O was ordered, and the DME company provided adherence and treatment data 2 weeks later. After the patient was on therapeutic PAP, he was allowed to return to work after demonstrating compliance.

Given that the prevalence of OSA may be higher in the commercial motor vehicle (CMV) operator population, and the risks inherent with CMV driving as a consequence to OSA, some trucking companies have partnered with adherence monitoring companies for drivers with OSA. Telemedicine may have several distinct advantages in the care of this population:

1) Treatment and coordination can be done in a manner that is potentially more flexible for the work lifestyle as many patients may be traveling for work during normal clinic visit times.

2) The potential volume of patients and the care coordination of such practices may be difficult to manage; a telemedicine component to the care may facilitate and enhance testing, treatment, and care coordination.

As CMV operators are incentivized to both minimize their symptoms and demonstrate PAP compliance, one of the concerns might be identifying whether the correct information is being obtained. If utilized, a telepresenter can serve as a liaison between the physician and the patient and can reinforce the collaborative nature of the interaction.

Learning Points:

- CMV operators require medical evaluations assessing their fitness to drive. In order to maintain certification, OSA must be effectively treated with compliance demonstrated.

- Telemedicine can facilitate the evaluation and treatment of commercial drivers as they are able to undergo sleep testing and treatment in different locations.

- Evaluating CMV operators in this fashion allows patients to have greater willingness to be tested and treated for sleep disorders, which affect a larger population of CMV operators, and thereby can improve public health and safety.

- Coordination of care is feasible through telemedicine applications including use of chain-of-custody testing, compliance monitoring, and visual confirmation of patient identity.

- Remote monitoring of compliance and treatment data allows for more efficient treatment and intervention in the case of noncompliance or suboptimal clinical results. If the patient is noncompliant with treatment, objective measurements of treatment adherence can be assessed in a more timely fashion through telemedicine applications.

Case 5:

Insomnia:

Case: Mr. T is a 67-year-old retired business executive with a 30-year history of difficulty initiating and maintaining sleep. He was evaluated through a telemedicine sleep encounter. Prior to his visit, a comprehensive intake packet including validated questionnaires and a sleep diary was mailed to the patient.

Questionnaires and sleep diary revealed evidence of both sleep-onset and sleep-maintenance insomnia. Total sleep time was 4 hours 50 minutes, with subjective sleep quality of "poor." During his telemedicine interview, Mr. T reported his sleep difficulties had begun during a period of high work and family stress, with then-frequent international travel and marital strain. His clinician reviewed his medical history, medications, family, and social histories, as well as lifestyle habits, in detail. Further, the patient also exhibited moderately severe anxiety during the interview.

The patient elected to enroll in an online cognitive behavioral therapy for insomnia program, which included use of stimulus control, sleep compression, and mindfulness training. He was also supported by his board-certified sleep medicine physician through periodic telemedicine encounters. Notably, the patient purchased a wearable fitness tracker and reviewed the data with his sleep physician; results were generally consistent with sleep diaries and demonstrated improved objective sleep parameters over time.

Learning Points:

- Insomnia is highly amenable to telemedicine management, as insomnia treatments typically require minimal physical examination. Further, there is a dramatic and unmet need among patients with limited access to specialty insomnia care.

- There is a historical and increasingly common precedent of evaluating mental and behavioral health disorders utilizing telemedicine; therefore, usage of telemedicine for insomnia can likely mirror and align with existing telemedicine resources for the care of such patients.

- Sleep diaries, sleep questionnaires, and wearable devices/fitness trackers allow for augmentation of clinical decision-making during telemedicine encounters for insomnia.

- Online cognitive behavioral therapy programs and other internet resources may offer additional tools to help care for patients with insomnia through telemedicine pathways.

Case 6:

Hypersomnolence and Regulated Prescriptions:

Case: Ms. W is a 22-year-old college student. She sees the board-certified sleep medicine physician in Alabama, where her family resides, but most of the year, she lives in Virginia where she attends college. She complains of excessive daytime sleepiness and often finds it hard to maintain wakefulness in class. These symptoms started in high school, but she attributed them to sleep deprivation at the time. Now, she finds that even with 8 hours of sleep per night, she finds it hard to stay awake throughout the day and often gets complaints about falling asleep at study groups. She often feels better after 10- to 15-minute naps and sometimes dreams during short naps. A multiple sleep latency test performed after a normal overnight polysomnogram reveals a mean sleep latency of 2.3 minutes and 2/5 sleep-onset rapid eye movement periods. The sleep physician makes the diagnosis of narcolepsy and prescribes modafinil, effectively improving the patient's wakefulness without side effects.

The patient plans to continue telemedicine follow-up with the board-certified sleep medicine physician in Alabama, who verifies Virginia's medical and pharmacy board requirements as well as state policy regarding interstate prescribing. The sleep physician obtains a medical license in Virginia to prescribe in Virginia and also to register into Virginia's prescription drug monitoring program to meet these requirements. Because of side effects from modafinil, the patient is switched to an amphetamine derivative for hypersomnolence. In order for the board-certified sleep medicine physician to e-prescribe amphetamine derivatives, however, specific software compliant with electronic prescription of controlled substances (EPCS) is needed. The Drug Enforcement Administration legalized EPCS in 2010, with the last state (Vermont) legalizing it locally in 2011. After the appropriate software is selected, verification of physician identity occurs through a third-party authentication service that often requires detailed personal information, including credit reports. One of the main limitations to e-prescribing schedule 2 drugs is the pharmacies; not all pharmacies accept EPCS prescriptions or have EPCS-certified software. Some physicians may find that even pharmacies with EPCS capabilities occasionally refuse to fill e-prescribed schedule 2 medications.

Learning Points:

- Prescribing medications across state lines often requires a medical license in the state where the drug prescription is being filled. Check with local medical and pharmacy boards to determine requirements.

- Some states require registering with a prescription drug monitoring program to prescribe schedule 2-4 substances. All states require EPCS-certified software for e-prescription of schedule 2 substances.

- Some pharmacies do not accept EPCS prescriptions.

Case 7:

Restless Legs Syndrome and Use of Laboratory Results:

Case: Mrs. D is a 44-year-old woman with sleep onset insomnia. She does not snore, has a BMI of 23 kg/m² and has no medical problems. She has symptoms of unusual leg sensations relieved by movement. She eventually falls asleep but wakes up frequently at night because of her leg discomfort. She is tired in the morning and has tried various over-the-counter remedies. She chooses a C2H sleep evaluation because it is more convenient. The sleep physician makes the diagnosis of restless legs syndrome and also discovers that the patient is experiencing menorrhagia. The sleep physician is concerned that the patient may be iron deficient, which is possibly a key contributor to her disease, and wants to check the patient's serum ferritin level. The patient lives 200 miles away but there is a local clinic with full laboratory facilities in her town. The sleep clinic staff contacts that facility and provides them with the physician's National Provider Identifier, state license number, and physical address with appropriate contact information.

The physician sends a signed order to that facility with instructions to send the results to their office. The patient's serum ferritin level is found to be low. When she is seen during follow-up, the physician reviews these results with the patient utilizing the telemedicine screen-sharing option. Iron with vitamin C is recommended and arrangements are made to check serum ferritin level in two months. The patient is advised to follow-up with her primary care provider to further evaluate her low serum ferritin level. The side effect profile of her over-the-counter diphenhydramine is reviewed and the physician suggests that the patient discontinue this medication because it likely is contributing to her symptomatology.

When she is seen again in clinic, both her sleep onset insomnia and her sleep maintenance insomnia have improved as her legs are no longer bothersome. She stopped utilizing the OTC sleep aid and is tolerating her iron. Repeat serum ferritin level from the same laboratory has normalized.

Learning Points:

- Local facilities can facilitate testing and enhance the diagnostic and treatment options of patients managed through a telemedicine encounter. By establishing a relationship with a local laboratory, patients can be tested at a closer facility.

- Providers ordering laboratory studies remotely need to verify laboratory policies and procedures as well as communicate and manage results as they would during in-person visits.

- Restless legs syndrome is a clinical diagnosis that can be made by eliciting an appropriate medical history through telemedicine applications.

Case 8:

Coding and Billing:

Case: A 78-year-old man has a history of vivid dreaming and nonrestorative sleep. He has fallen out of bed while dreaming and on one occasion hit his wife during sleep. His wife notes that at times he appears to be fighting someone in his sleep. She also indicates that he snores intermittently but has not witnessed any apneas. He has a history of diabetes and hypertension with no known history of neurologic disease and is evaluated through a telemedicine sleep consultation. A polysomnogram reveals findings consistent with REM sleep behavior disorder without significant sleep-disordered breathing. During the follow-up telemedicine encounter, polysomnography findings were discussed with the patient and management options presented. The patient and his wife were both educated regarding bedroom safety measures and the possible use of medications. The provider billed a level 4 initial new patient visit followed by a level 4 office visit follow-up with the GT modifier.

The telemedicine visit would be billed similarly to an in-person visit using the current evaluation and management code structure. The level of service is determined by the usual components of service (history, physical examination, and medical complexity) or time spent face-to-face with the patient. A GT modifier was added to indicate that the service was provided via synchronous telemedicine. The GT modifier was established by Medicare and is required by Medicare for telehealth billing. A number of private payers have also adopted this requirement. The use of the GT modifier does not indicate a reduced level of service and does not decrease the reimbursement for that service. For C2C visits (as compared with C2H visits), an additional facility fee (Q3014-GT) is charged. Reimbursement will vary from region to region and payer to payer.

Learning Points:

- Telemedicine visits are billed in a manner similar to an in-person visit using the current evaluation and management code structure with the exception of adding a GT modifier for some payers.

- Medicare allows billing an additional facility fee for C2C visits.

- Guidelines for reimbursement should be verified with payers. Additional information can be found at the following websites:

    + AASM SleepTM: *support.sleeptm.com*

    + Medicare: Health Professional Shortage Areas *datawarehouse.hrsa.gov/tools/analyzers/hpsafind.aspx*

Case 9:

Complex Sleep Disorders:

Case: A 54-year-old woman with OSA and morbid obesity is admitted for the third time this year to a rural hospital for an episode of acute diastolic congestive heart failure (CHF) and concomitant atrial fibrillation. With treatment the patient's condition improves, and empiric bilevel positive airway pressure therapy (BPAP) is tried at night. She had never been on CPAP therapy but thinks OSA was diagnosed 10 years ago. The hospital physician and cardiologist consider a sleep evaluation to facilitate her expedient diagnostic and treatment evaluation in order to manage her cardiovascular disease. Moreover, the hospital would like to avoid being penalized for 30-day hospital readmissions for CHF, so staff are incentivized to enable the patient's sustained clinical improvement. Because the patient lives 2 hours away from any board-certified sleep medicine physician and has transportation issues, a sleep telemedicine visit is elicited.

After interview, review of the patient's electronic medical record (including results of her echocardiogram), and virtual examination, the sleep physician also inquiries about her pulmonary history because of her smoking history. The sleep physician then requests the referring physicians to order pulmonary function studies at the hospital, ambulatory oxygenation saturation monitoring, room air blood gas, and follow-up chest radiographs. It is thus determined the patient has hypoxemia out of proportion to sleep-disordered breathing, likely due to concomitant moderate chronic obstructive pulmonary disease (COPD). In addition to her new cardiovascular regimen, she is started on supplemental oxygen and bronchodilators. She is then discharged to a local accredited sleep facility, which confirms severe OSA and performs optimal titration of the patient's PAP. She follows up with her local primary care provider and cardiologist, and with her board-certified sleep medicine physician through a telemedicine platform; the latter physician reviews her compliance data rigorously and provides ongoing education and assistance.

Learning Points:

- Sleep telemedicine clinicians often can partner with local clinicians to obtain diagnostic aids that might facilitate clinical decision-making in complex cases (e.g. skillful use of the electronic health record, requesting results of pulmonary function studies, laboratory studies, and other diagnostic methods).

- In this example, the hybrid approach of both the C2C model of telemedicine (while the patient was hospitalized) and the C2H model (after discharge) can be used effectively to manage this patient with local resources.

- Opportunities exist for sleep telemedicine programs to aid in disease management programs targeted at high-risk patients (e.g., COPD, CHF).

Case 10:

Facilitating Team-Based Care:

Case: Mr. S is a 45-year-old man who lives in a remote area in Southern California with the closest accredited sleep facility 50 miles away. He presents to his nearby primary care clinic with complaints of snoring and excessive daytime somnolence and is referred to a sleep facility for suspected OSA.

The sleep facility activates the remote ambulatory OSA program for this patient, which includes the following steps:

1) A sleep facility medical assistant (MA) discusses over the telephone with Mr. S next steps in workup. He is emailed a digital sleep intake questionnaire (subsequently reviewed by the MA for completeness and to screen for answers requiring an urgent response) and a link to an internet-based, interactive OSA educational program. The MA then schedules the patient with the nearby primary care clinic to undergo a HSAT.

2) The primary care clinic nurse (RN) sets up a type III HSAT device and data are eventually uploaded to the cloud.

3) Board-certified sleep medicine physician reviews the intake questionnaire, interprets the HSAT study, and gives Mr. S. a diagnosis of moderate OSA. Through a C2H video visit encounter, the physician obtains further history, performs a relevant physical examination, and discusses results and recommendations with the patient.

4) The local DME provider sets the patient up with an APAP device with an activated cellular wireless modem and an automated PAP self-management platform on Mr. S's smart phone.

5) The sleep respiratory therapist case manager (RT) responds to an automated alert from the device platform indicating that Mr. S's PAP use has been suboptimal for 3 consecutive nights along with excessive mask leak. The RT sets up a C2H video visit and the patient indicates he has not been able to sleep with PAP because the air is blowing into his eyes. Mr. S demonstrates his mask fit, and it is apparent he is putting on his mask upside down. The RT demonstrates proper mask fit. As part of this encounter, Mr. S also asks about alternative treatments, and the RT is able to show a model of a mandibular advancement device and emails him further information to review.

An automated follow-up questionnaire is emailed to Mr. S 3 months after PAP was ordered. The RT reviews the results, which indicate that the patient is symptomatically improved and Epworth Sleepiness Scale score has decreased from 12 to 6. Remote access of PAP data indicates that the patient meets program's definition for PAP compliance. The board-certified sleep medicine physician reviews this overall case.

Learning Points

- Team-based care delivery can be enhanced with synchronous and asynchronous mechanisms that can streamline and automate aspects of care, enhance the capability of providing population health management, and augment interdepartmental care coordination.

- Enabling multiple team members with telemedicine capability can enhance their ability to effectively deliver care relevant to their scope of practice.

- Leveraging telemedicine capabilities across multiple team members can allow for team-based care even in care areas where such resources are limited.

GLOSSARY

Broadband: Communications (e.g., broadcast television, microwave, and satellite) capable of carrying information, images, and data via a wide range of frequencies over a segment of the total bandwidth available.

Confidentiality: The fundamental requirement whereby personal information is safeguarded and accessible only in agreed-upon circumstances.

Center-to-Center (C2C) telemedicine: This model utilizes an originating site, typically a medical office or clinic where the equipment is located. A presenter facilitates the patient's interaction with the audiovisual equipment and can introduce additional technologies.

Center-to-Home (C2H) telemedicine: This model utilizes the patients' own technology (laptop, cell phone, etc.) from wherever they choose to access the physician's system.

Digital Imaging and Communication in Medicine (DICOM): A standard for the identification, formatting, and communication of medical images.

e-Health: The application of information and communication technologies across the whole range of functions that affect the health sector.

Electronic Health Record (EHR): An electronic record that can be maintained directly by providers and patients that securely holds information and data relating to patient health history, medication, and care received.

Informed Consent: Voluntary permission given, in a context of understanding by the patient (or where appropriate their caregivers), to the purpose, procedures, benefits, risks and rights relating to their use of a technology or service.

Live interactive: Synchronous telemedicine in which information exchange such as two-way audiovisual interactions are occurring real-time between the originating and distant sites.

mHealth: Mobile communications and network technologies for health care.

Peripheral Device: Devices that communicate with a computer, phone, or other device, e.g., scanners, mouse pointers, printers, keyboards; pulse oximeters, weight scales, fall detectors, etc. Includes some diagnostic equipment such as electronic stethoscopes, digital otoscopes, etc.

Picture Archiving and Communications Systems (PACS): PACs provide centralized storage and access to medical images over information systems.

Privacy: The state afforded to patients whereby their right to control information (including images and data) relating to their health and lifestyles is both recognized and respected.

Store and Forward (S&F): A type of telehealth encounter or consultation where digital images of a patient are forwarded asynchronously in order to assist in diagnosis or treatment.

Teleconferencing: Interactive electronic communication between multiple users at two or more sites that facilitates real-time voice, video, and/or data transmission.

Teleconsultation: The means by which clinicians and other health care practitioners use telephone or videotelephony to consult with patients and their care providers.

Telehealth: The means by which technologies and related services at a distance are accessed by or provided in order to facilitate patients empowerment, assessment, or the provision of care and/or support in relation to needs associated with their health (including clinical health) and well-being.

Telemedicine: The delivery of medical care at a distance by clinicians and other health care staff, via telecommunications technologies. Telemedicine will sometimes involve and include the patient.

Telemonitoring: The use of communications technologies to remotely collect/send data relevant to the health and well-being of a patient to a monitoring facility to assist in diagnosis and monitoring.

Telepresenter: An individual, located at the patient remote site, who provides support to the patient and the telemedicine consulting provider in completing the physical examination and/or telemedicine activity.

Videoconferencing: Real-time two-way transmission of digitized video images between two or more locations.

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Conclusion:

We sincerely hope you found this guide useful. We expect telemedicine to dramatically affect the world of sleep medicine in an effort to improve quality, access, and value in the care of patients with sleep disorders.

Still, the field of telemedicine is changing rapidly, and additional uses of telemedicine were not discussed in this guide (e.g., live physician-to-physician consultations, supervision of other members of the care team, reduce hospital readmissions to provide value-based care).

Of course, there are many more utilities and applications for telemedicine in sleep practices, and we look forward to your interest and participation.