A Clinical Sleep Model

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Objectives:

• Discuss the carious programs, platforms, and tools available within sleep medicine to impact follow-up of patients with OSA
• Discuss how technology can be specifically utilized to improve effectiveness and efficiency of care
• Discuss the importance of specifying roles of carious providers within the sleep center team
• Identify how these components can be integrated through using Kaiser Permanente Fontana Sleep Center as a case study
Continuous and forever Care:
comprehensive CPAP follow up

- Dara T. Vega, RN, CRTT, RPSGT
- Manager Fontana Sleep Center
- SCPMG/Kaiser Permanente
1. I do not have any potential conflicts of interest to disclose, **OR**

2. I wish to disclose the following potential conflicts of interest:

<table>
<thead>
<tr>
<th>Type of Potential Conflict</th>
<th>Details of Potential Conflict</th>
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<tr>
<td>Grant/Research Support</td>
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<td>Consultant</td>
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<td>Speakers’ Bureaus</td>
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<td>Financial support</td>
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3. The material presented in this lecture has no relationship with any of these potential conflicts, **OR**

4. This talk presents material that is related to one or more of these potential conflicts, and the following objective references are provided as support for this lecture:
Objectives

1. Programs, platforms, and tools available within sleep medicine to impact follow up of patients with OSA.
2. How to integrate technology to improve effectiveness and efficiency of care.
3. Specifying roles of various providers within the sleep center team.
4. Case Study: Integrating care components at the Kaiser Permanente Fontana Sleep Center
Effective Care Organizations

Understanding Narrow Networks

70 percent of hospital networks on exchanges are narrow or ultra-narrow

Fee-For Service

Outcomes-Based Payments

Effective Care

Cost-Effective Care
Why focus on CPAP follow up

• Decision to use CPAP generally made within first week.
• 29% to 83% use CPAP $\leq 4$ hours per night.
• Self-reported use over-estimates by 70 minutes.
• Average CPAP use 3-5 hours per night.


• Recommendations:
  • CPAP usage should be *monitored objectively* to assure utilization.
  • CPAP follow-up is recommended during the first few weeks
  • Longer-term follow-up is recommended (yearly or as needed) to troubleshoot

Consequences of CPAP non-adherence

• 41 successful CPAP users stopped CPAP use for 2 weeks:
  - Recurrence OSA mean AHI>25
  - Increased morning and evening blood pressure
  - Increased heart rate
  - Epworth Sleepiness Scale increased, but still under 10 at 2 weeks

Studies indicate:
• ≥6 hrs/night normalizes daytime sleepiness, improves memory and daily functioning.

• CPAP reduces CV risk to that of non-snorers


March 19, 2005, Lancet
Traditional CPAP Pathway
Minimal Sleep Medicine Follow up

Patient

Sleep medicine

Durable medical Equipment

Primary Care physician

Diagnosis
CPAP Trial/Prescription

CPAP dispensing-instruction
CPAP Troubleshooting
Immediate follow up

Safety Net
reorder supplies, retesting

CPAP troubleshooting
Immediate follow up

Reorder supplies, retesting
Cost Efficient and Effective CPAP Follow Up

With a Patient Centered Sleep Medicine Home
Team-based approach to care
1. Integration of technology
2. Self management

Office Visits
Telemedicine
- Web encounters
- Text/Email/Phone
- Automated mechanisms

Annual Office Visit

Physician/PSG

Patient

Physician

PA
RN
MA
Therapist/techs
CPAP follow up Technology in Sleep Medicine
Web-Based Education

- Emmi OSA
  - What is OSA? Why is it important?
- Emmi CPAP
  - How to treat OSA? How to use and troubleshoot CPAP
- Emmi HSAT & Emmi PSG
  - What should I expect on a sleep study? What do I need to prepare?
Emmi Patient Survey

Answer questions otherwise would have asked your healthcare provider?

Usefulness in:

Did the program improve your opinion of the organization that gave it to you?

Will you take new action in managing your health?
Remote Monitoring
**CPAP Adherence at 3 months**

- **Average CPAP Use All Days**
  - Standard: 
  - Telemedicine: 
  - **P = 0.0064**

- **Average CPAP Use on Days Used**
  - **P < 0.0001**

*Fox et al, SLEEP, Vol. 35, No. 4, 2012*
Automated care mechanisms
Components of Telemedicine

**Goals**
1. Improved Access
2. Cost Efficiencies
3. Improved Quality

**Essential Components**
1. Remote capability
2. Automated care processes
3. Self-directed care
4. Integrate end-to-end care
Automated Care Mechanisms

Modem

Modem + Automated Platform (Usleep or Sleep Mapper)

Office Visit Telephone Enc

Automated algorithms

Message

Message
USleep

New OSA CPAP initiated w/ modem

TRADITIONAL CARE (n=64)

Phone Call
Days 1, 7, 14, 30

Usleep (n=58)

Usleep Automated Algorithm

3 month

Compliance*
73 vs 83% (NS)

CPAP hours
4.7 vs 5.3 (NS)

Mean provider hours
58.3 ±25 vs 23.9±26 (p<0.01)

*CMS definition for compliance

Abstract ATS 2014, courtesy of ResMed
Sleep Mapper

- Retrospective analysis (n~15,000)

- 90 day Compliance* (SM vs no SM):
  - 78% vs 56%
    (33% vs 11% in “early strugglers”)
  - 1.4h mean longer usage (SM)

*CMS definition for compliance

Unpublished data, courtesy of Philips
Peer to Peer

Finding answers...together!
Sleep apnea affects over 25 million Americans. We are working together to improve the health and well-being of people with sleep apnea through information sharing, support, and research.
Wake up to a better future - join now!
Join the Community
Conclusions:
1. USleep resulted in significant improvement in CPAP usage at 3 months
2. Emmi had no effect on CPAP usage at 3 months (but did reduce “no show” rates by 15% to appointments)

Interim Results, Telehealth Patient Engagement Study (KP Fontana Sleep Disorders Center)
Electronic Health Records Integration

Why is it necessary?
What are the EHR functions that puts this all together?
Function #1: Care integration (Workflow Effectiveness & Efficiency)

Self-directed care mechanisms
- Educate
- CBT Insomnia App
- CPAP App

Remote mechanisms
- Video Visit
- Email
- TXT

Integrated Database and Automated Care Processes

Team-Based Care
- Physician
- PA
- RN
- Therapists
- MA
- PAP (modem)
- Other Devices

Electronic Health Records
Integration systems
Function #2  Data Analytics—Risk Identification (Screening)

Population risk identification (primary care, anesthesiology/surgery, community)

- Questionnaire (ie. STOP BANG)
- Diagnosis based (ie. HTN, DM, insomnia)
- Utilization based (ie. HTN, psych meds)
- Testing based (ie. oximetry)

Risk ++

- Pop-up Alert (ie. PCP clinic)
- Email Questionnaire & Instructions
- Tablet Questionnaire

Pre-assessment
- Diagnostic Testing
- Therapy
- Follow-Up
- Disease Management
- Population Management (screening)
- Population Management (follow-up)
Function# 3 Data Analytics—Outcomes

- Population Management (screening)
- Pre-assessment
- Diagnostic Testing
- Therapy
- Follow-Up
- Disease Management

Query Clinical Outcomes (for reporting)
Query Clinical Outcomes (for population management)
Function #4: Predictive ➔ Prescriptive Analytics

- Personality Profile (Questionnaire)
- Demographics
- Other individualized patient info

EHR Data

Predict PAP Adherence
Adherent
Non-Adherent

Predict PAP Non-Adherent
Non-Adherent
Adherent

Troubleshoot CPAP
Oral Appliance Therapy
Population Management

<table>
<thead>
<tr>
<th>Patient Demographics for 75808</th>
<th>Action View</th>
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<tbody>
<tr>
<td>Age: 65y</td>
<td>654 patients</td>
</tr>
<tr>
<td>Sex: female</td>
<td>690 patients</td>
</tr>
<tr>
<td>Race: White</td>
<td>620 patients</td>
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<tr>
<td>Ethnicity: Other</td>
<td>462 patients</td>
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<tr>
<td>City: North Branch, IN 46566</td>
<td>7 Day All Patients</td>
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<td>Privacy Notice: Fairfax</td>
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<td>Need Interpreter? No</td>
<td>90 Day All Patients</td>
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<td>No Data Transmitted</td>
<td>7 Day At Risk</td>
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<td>Therapy Issues</td>
<td>14 Day At Risk</td>
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<tr>
<td>Payor Compliance</td>
<td>30 Day At Risk</td>
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<tr>
<td>Payor Compliance Not Met</td>
<td>45 Day At Risk</td>
</tr>
<tr>
<td>Post 90 Day Monitoring</td>
<td>100 patients</td>
</tr>
</tbody>
</table>

Courtesy of Conrad Iber, MD (Fairview Health Services), Resmed, Usleep
CPAP program Case Study
Kaiser Permanente Fontana Sleep Center

A Closed Loop System
Personnel

Patient Volume (per month)
• 3800 visits
• 7500 telephone
• 180 inlab PSG (night)
• 20 inlab PSG (day)
• 440 HST (diagnostic)
• 400 APAP trials

Personnel
• 3 Physicians
• 2 dentists
• 1 PA
• 1 RN
• 10 RT (days)
• 7 RPSGT (days)
• 5 RPSGT/RT (nights)
• 1 LVN
• 4 Medical assistants
• 2 Managers (day/night)
• 1 Department administrator
• 6 Clerical/receptionist

Case Management Team
Integrated care

• Team Based Practice

• Protocol driven care

• Group appointments

• Individual appointments

• Using technology to improve efficiencies and enable patient engagement
Integration into Workflow

Automated Daily Usleep messaging:
- No CPAP data for 2 consecutive days > Patient & Provider
- CPAP usage <4 hrs for 3 consecutive nights > Patient & Provider
- Median mask leak >24 l/m for 2 consecutive days > Provider
- Apnea Hypopnea Index >15 for 5 consecutive days > Provider
- CPAP usage met Medicare criteria for adherence > Patient & Provider
Team-Based Care
Role of the Sleep Physician Team Leader

• Interpret Sleep Studies
• Direct consultation for complex patients
• Create a clinical care pathways via protocols for patients to be implemented by case managers
• Build staff capacity
• Build projects often in collaboration with other departments
Roles of Case Management Team

Physician Support
• HST Setup
• APAP setup
• Mask fitting
• Remote monitoring
• Therapy compliance checks
• Maintains equipment
• Occasionally communicates physician directed messages to patient (minimal clinical assessment)

Physician Extenders
• Patient education (class or individual)
• Communicates testing results with patient
• Clinical assessment and clinical decision making
• Referring or triaging to specific services
• Consults directly with sleep physicians
• Communicates directly with referring provider or other non-sleep dept medical staff.

Task Oriented

Clinical Judgment
Multi-disciplinary Care/Workflow

- **DX of Complex Sleep Disorder**
- **PSG**
- **Complex Case Managers**
- **MD Consult**
- **Diagnostic Workup**
  - PFT's
  - ABG
  - ECHO
  - CXR
- **Follow-Up**
  - Labs
  - Adherence to therapy
  - Oximetry study
Case Manager Based Follow-Up Pilot

Ambulatory PSG (+ OSA) → APAP Trial

CPAP order (purchase) n=82

CPAP order (rental) n=76

CPAP declined

1 month follow-up: 25%
2 month follow-up: 62%
3 month follow-up: 70%

39% (17/44) – only 44/82 followed-up
21% (17/82)

58% (31/53)
41% (31/76)
Sleep Center services

Case Manager RT/RN

Ambulatory PSG

Attended PSG

Research

Hypo-ventilation & Complex sleep disordered breathing Follow-up Program

Commercial Driver

Pediatrics

Pre-natal OSA program

CPAP Follow-up program

90 day f/up class U-Sleep

Alternative Therapy Program

Provent

OA Therapy

Winx

New APAP user class

Apria Closet Dispensing

Weight loss program

Sleep Physician Consultation

Insomnia Program

Inpatient Hypercapnic Respiratory Failure Program

Peri-Operative Program

Remote Ambulatory Program

Interventional Program
90 DAY FOLLOW UP CLASS

- APAP 90 MINUTE CLASS LEAD BY RCCs
  - APAP DATA CARDS DOWNLOADED RCC REVIEWS RESULTS
  - ADDITIONAL OSA EDUCATION
  - GROUP DISCUSSION ON APAP ADHERENCE AND EQUIPMENT USE
  - RESULTS GIVEN INDIVIDUALLY
    - NON adherence
      - MD CONSULTATION
    - RCC consult for TROUBLESHOOT
  - Adherence
    - FOLLOW UP PRN

- MD CONSULTATION
- RCC consult for TROUBLESHOOT
- FOLLOW UP PRN
WALK IN CLINIC

OPEN TUESDAYS ONLY BETWEEN 1:00 PM TO 4:00 PM

RCC INSTRUCTED

APRIA CLOSET OF SUPPLIES OPEN DURING THIS TIME

PURPOSE
- CPAP/APAP OPERATION FAILURE
- NEW MASK TRIALS
- BROKEN MASK, OR EQUIPMENT
- CPAP/APAP RE INSTRUCTION
- TROUBLESHOOT
- MISC
De-personalized Care? NO!

- Automated Feedback
- Self-directed follow-up
- Peer-to-Peer
- Support groups (web)
- RT/RN Case Manager
- Advanced Practitioners
- Sleep Physician
- Primary Care Physician
Impact of Closed-Loop Sleep Program

73%
Compliant with CPAP from <50%

90%
Non-invasive ventilation compliance improved from 10%

88%
PCP who thought case managers did a better job of managing OSA than themselves

25% & 77%
Reduction in PCP visits and sleep hypnotics 1 yr after attending insomnia program

100%
Primary care physician reduced time spent managing sleep disorders
Phone survey (KP Service Quality Department)

16 randomly picked 90 day follow up patients, conducted by Kaiser Service Quality Department, regarding overall experience in the sleep center on scale of 1 to 5:

Specifically liked:
• Re-education of equipment and OSA
• class organization
• Class Q&A
• Individual troubleshooting
Automated Comprehensive Clinical Care Pathways

Pop-up indicating OSA risk (ICD9/10, BMI, demographics, etc)

STOPBANG OSA risk (ICD9, BMI, etc) in all scheduled for surgery

Query individual and population based outcomes

↑ periodic breathing  
↑ residual AHI

Cardiology

Intake Q auto-linked to appt  
Web education auto-linked to appt

Wireless modem

Auto-feedback (continuous)

CPAP mobile application  
Auto sending Questionnaire (feedback Q, ESS, etc)

Follow-up Period

↑ periodic breathing  
↑ residual AHI

CHF
References

• http://www.uptodate.com/contents/adherence-with-continuous-positive-airway-pressure-cpap
• www.webmd.com/sleep-disorders/sleep-apnea/sleep-apnea
• http://healthysleep.med.harvard.edu/sleep-apnea/living-with-osa/health-consequences
• http://www.health.harvard.edu/family_health_guide/the-danger-of-untreated-sleep-apnea
Credits

• Dennis Hwang, MD, Medical Director, Kaiser Permanente Fontana Sleep Disorders Center
  Chair, AASM EMR Integration Task force
• Timothy Jenkins, MD, KP Fontana Medical Director
• Rosa Woodrum, Department Administrator
• Research Coordinators (Jeremiah Chang, Nehemiah Chang, Joanne Liang)

Sleep well and Thrive!