

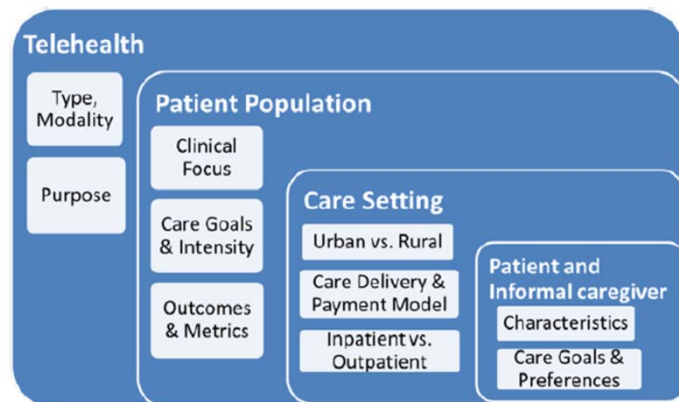
# Telemedicine in OSA

## New Approaches to Diagnosis and Management

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February 16, 2018

## Telemedicine

- Video Teleconferencing
  - Store and Forward of data
  - Remote monitoring of patient physiologic data
  - Telephone visits
  - Electronic Consultations
- 
- Medical Care
  - Counseling
  - Education
  - Screenings



Totten AM, et al. Telehealth: Mapping the evidence for patient outcomes from systematic reviews. AHRQ Publication No.16-EHC034-EF

## Does Telemedicine Work for Sleep Medicine?

- Can it change
  - How referrals come in?
  - How we screen patients?
- How does it alter our initial interactions with patients?
- Increase Patient satisfaction by reducing travel burdens?
- Depersonalizing the experience?
- Expedite timing of sleep testing and initial evaluations?
- Monitoring patients on therapy
  - Impact on adherence to treatment plans?

## Remote Monitoring Improves Compliance

**Table 1** Remote monitoring of Positive Airway Pressure Therapy in OSA: published studies

Author [reference]	Study design/ number of patients	Age (years)	Apnoea-hypopnoea index (number/hour)	Impact of TM on CPAP adherence	Functional outcomes	Patient's perception of TM	Labour/ cost-effectiveness
Stepnowsky CJ <sup>19</sup>	Pilot RCT/45	59 ± 14.3	39 ± 16.8	4.1 ± 1.8 (TM) vs 2.8 ± 2.2 (UC) hours, <i>P</i> < 0.07	No between groups differences for ESS, QOL (FOSQ)	No concern about being wirelessly monitored; wireless transmission data loss negligible	NA
Fox N <sup>24</sup>	Single-centre RCT/75	53.5 ± 11.2	41.6 ± 22.1	3 months CPAP adherence: 191 min/day (TM) vs 105 min/day (C), <i>P</i> = 0.006	CPAP side effects less severe in the TM arm	NA	More time was spent with patients in the TM arm: 210 ± 42 min (TM) vs 143 ± 48 min (UC)
Anttalainen U <sup>34</sup>	Arm allocation not randomized/115 50 TM; 61 UC)	53.9 ± 12.2 (TM); 56.4 ± 11.8 (UC)	34.4 ± 20.6 (TM); 34.8 ± 23.4 (UC)	CPAP adherence at 1-year follow-up: 6.4 h in TM vs 6.1 h in UC group, <i>P</i> = 0.63	No between groups differences for ESS, QOL and depression scales	NA	TM saved nursing time during CPAP habituation period
Turino C <sup>35</sup>	RCT/100	56 ± 13 (TM); 54 ± 12 (UC)	52 ± 25 (TM); 53 ± 26 (UC)	No difference in 3 months CPAP adherence	No between groups differences for ESS, QOL and side effects	Positive value on all aspects of TM, with the exception of privacy aspects	Total average cost was 28% lower in the TM arm
Munafo D <sup>21</sup>	RCT/140	52.3 ± 10.6 (TM); 50.0 ± 11.7 (UC)	34.3 ± 24.5 (TM); 27.4 ± 18.0 (UC)	No difference in 3 months CPAP adherence	NA	Program acceptance was high and similar in the two groups	Labour time for coaching was reduced in the TM arm

CPAP, continuous positive airway pressure; ESS, Epworth Sleepiness Scale; NA, not applicable; QOL (FOSQ), quality of life (Functional Outcomes of Sleep Questionnaire); RCT, randomized controlled trial; TM, telemonitoring; UC: usual care

Pepin Respiriology 2017;22:1508-1517

## Remote Monitoring Only

- Motivational interviewing increases adherence
- UC (n=36) vs. TM (n=39)
- Independent predictors of PAP adherence
  - Baseline ESS, age, TM

### Treatment Follow-up

□ Standard □ Telemedicine

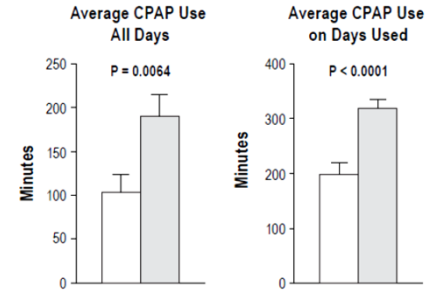


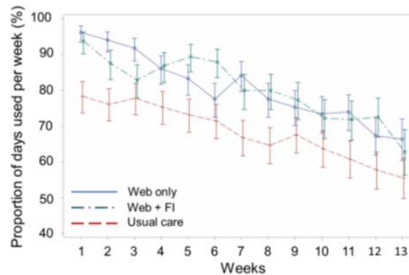
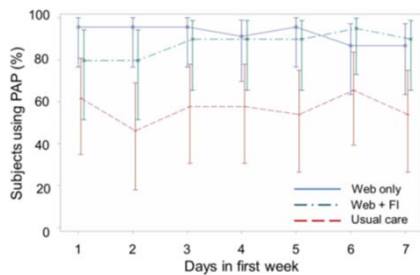
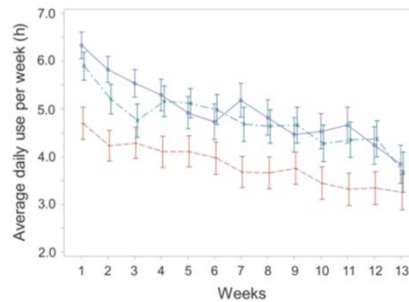
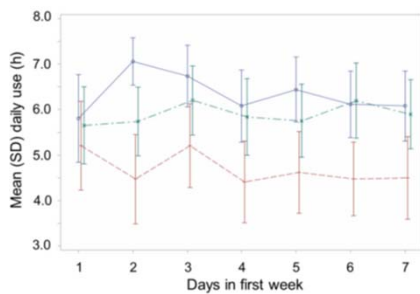
Table 2—Results of standard and telemedicine groups\*

	Standard	Telemedicine	P value
Mean % days used	45.9 ± 38.0	55.9 ± 40.0	0.19
Mean adherence (min per day)	105 ± 118	191 ± 147	0.006
Mean adherence on nights	207 ± 106	321 ± 80	< 0.0001
PAP used (min per day)			
Mean decrease in ESS	0.7 ± 5.2	1.6 ± 5.1	0.49
Mean AHI on treatment	6.6 ± 4.8	4.7 ± 3.8	0.12
Mean amount of time spent with patients (min over 3 mo)	143 ± 48	210 ± 42	< 0.0001

\*Results are given as means ± SD. AHI, apnea hypopnea index; ESS, Epworth Sleepiness Scale Score; PAP, positive airway pressure.

Fox et al. Sleep 2012;35:477-481

## Remote Monitoring + Financial Incentive



Kuna S Sleep 2015; 38:1229-1236

## TeleEducation & Messaging

- UC, Tele-Ed, Tele-TM, Tele-ED+Tele-TM
- Web-based education on OSA did not impact adherence rates at 3mo
- Automated messaging regarding PAP use increased adherence

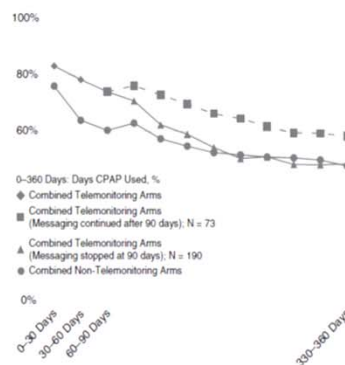


Table 3. CPAP Use and Subjective Outcomes 90 Days after CPAP Dispensation

	Usual Care	Tel-Ed	Tel-TM	Tel-Both	Tel-Ed Effect (95% CI), P Value	Tel-TM Effect (95% CI), P Value	Tel-Both Effect (95% CI), P Value
Days used, %	n = 129 64.8 ± 34.2	n = 163 68.6 ± 31.3	n = 125 76.6 ± 28.3	n = 138 78.3 ± 28.3	2.8 (-2.3 to 7.9), 0.28	10.6 (5.5 to 15.7), <0.0001	13.4 (6.1 to 20.8), 0.0004
Average usage on all days, h	3.8 ± 2.5	4.0 ± 2.4	4.4 ± 2.2	4.8 ± 2.3	0.3 (-0.1 to 0.7), 0.10	0.8 (0.4 to 1.15), 0.0002	1.1 (0.5 to 1.7), 0.0002
Average usage on days used, h	5.2 ± 1.8	5.2 ± 1.8	5.3 ± 1.7	5.8 ± 1.6	0.2 (-0.1 to 0.5), 0.13	0.4 (0.1 to 0.7), 0.006	0.6 (0.2 to 1.0), 0.003
Medicare adherence, n (%)	69 (53.5)	100 (61.0)	82 (65.6)	101 (73.2)	1.4* (1.0 to 2.0), 0.07	1.7* (1.2 to 2.4), 0.003	2.4* (1.4 to 3.9), 0.001
Change in ESS score <sup>†</sup>	n = 83 -3.7 ± 4.7	n = 113 -2.8 ± 6.4	n = 90 -3.7 ± 5.2	n = 93 -3.0 ± 3.7	0.8 (-0.2 to 1.9), 0.13	-0.14 (-1.2 to 0.9), 0.80	0.7 (-0.9 to 2.3), 0.38
Change in FOSQ-10 score <sup>†</sup>	-14.2 ± 10.3	-9.9 ± 12.9	-10.9 ± 11.2	-11.3 ± 12.8	1.9 (-0.8 to 4.5), 0.16	0.6 (-2.0 to 3.3), 0.64	2.5 (-1.3 to 6.4), 0.20

Hwang et al. AJRCCM2018;197:117-126

## Vtel, HSAT, and Remote Monitoring

- INP (n=28) vs. TELE (n=32)
- Primary outcome: FOSQ
- CVT is accepted for initial consultations
- Technical failures for HSAT 83% vs. 65%

Variable	In-Person Care (n = 20)	Telemedicine Care (n = 14)	P
% days with device usage	54 ± 8	65 ± 8	0.493
% days ≥ 4 h	39 ± 8	47 ± 9	0.493
Use, min (all days)	175.6 ± 36.8	220.8 ± 37.5	0.301
Use, min (days used)	268.9 ± 32.1	305.7 ± 29.9	0.426

Values presented as mean ± standard error.

Measure (Total Scores)	Change in Score		Difference in Changes	P
	In-Person (n = 20)	Telemedicine (n = 14)		
FOSQ	0.89 ± 0.59	2.57 ± 0.69	1.69 ± 0.91	0.067
CES-D	-4.31 ± 1.73	-6.51 ± 2.03	-2.19 ± 2.66	0.413
ESS	-3.56 ± 1.13	-4.22 ± 1.31	-0.67 ± 1.73	0.702
SF-12 <sub>physical activity</sub>	2.08 ± 1.54	0.86 ± 1.83	-1.22 ± 2.40	0.611
SF-12 <sub>mental health</sub>	0.73 ± 1.78	9.26 ± 2.09	8.53 ± 2.75	0.003
WAI-SF	1.70 ± 1.50	5.93 ± 1.77	4.23 ± 2.32	0.074
CSQ-8	0.013 ± 0.48	-0.31 ± 0.57	-0.32 ± 0.74	0.665

Values presented as adjusted mean ± standard error. Includes all observations with one or more follow-up FOSQ measure, site, age, and body mass index. Estimated using mixed models and adjusted for baseline score. CES-D, Center for Epidemiologic Studies Depression Scale; CSQ-8, Client Satisfaction Questionnaire; ESS, Epworth Sleepiness Scale; FOSQ, Functional Outcomes of Sleep Questionnaire; SF-12, Short Form 12; WAI-SF, Working Alliance Inventory-Short Form.

Fields et al. Sleep Disordered Breathing 2016;39:501-509

## VHA Telehealth

- 150 VA Medical Centers and 750 CBOCs using CVT, HT, and SF
- >1.4M telehealth consultations completed in FY12
  - 30% rural veterans
  - 70% annual growth in telehealth services
- 41,483 patients were supported in home instead of LTCF
- Cost Reduction:
  - \$34.45 for CVT
  - \$38.83 for SF
  - \$1999 per annum per patient savings for HT
- Patient Satisfaction: 86-93% for HT, SF, CVT
- Reduction in Utilization of bed days (53%) and admissions (30%)

VA Telehealth Services

## TeleSleep

- VA National Program Office Grant (FY18-20)
- Implement Hub-Spoke Models of care to reach Rural Veterans
- 7 Hubs
  - Philadelphia, Pittsburgh, Portland, San Francisco, Boise, Spokane, Phoenix
- 32 Spokes (VAMCs and CBOCs)

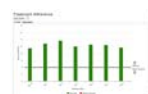
## TeleSleep Value/Benefits

- The TeleSleep Program provides Veterans with faster diagnosis and treatment options for sleep-related breathing disorders such as obstructive sleep apnea.
- TeleSleep improves sharing of resources between facilities with a goal of providing a personalized and convenient sleep care plan for patients.
- The TeleSleep Program allows VA clinicians to evaluate and treat Veterans remotely, in the comfort of their own home, in a more timely and efficient manner.
- There are 1.4 million enrolled Veterans with sleep apnea, making innovative care initiatives such as TeleSleep extremely important.

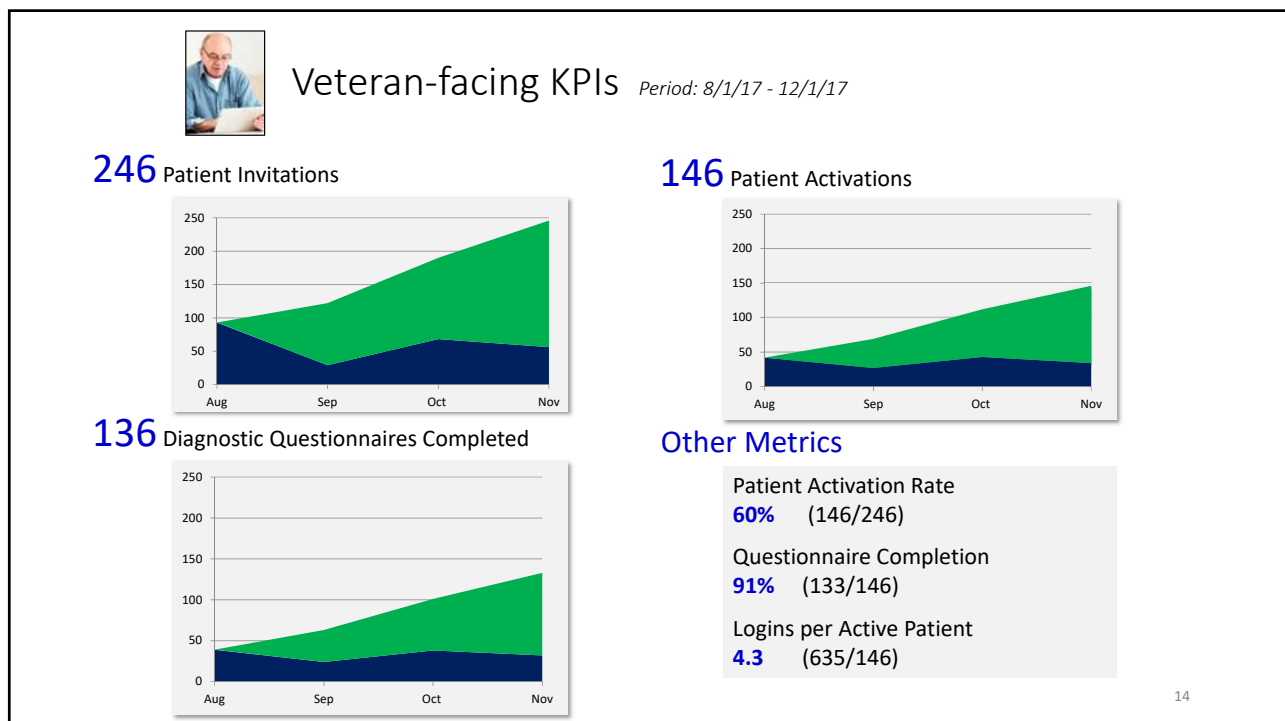
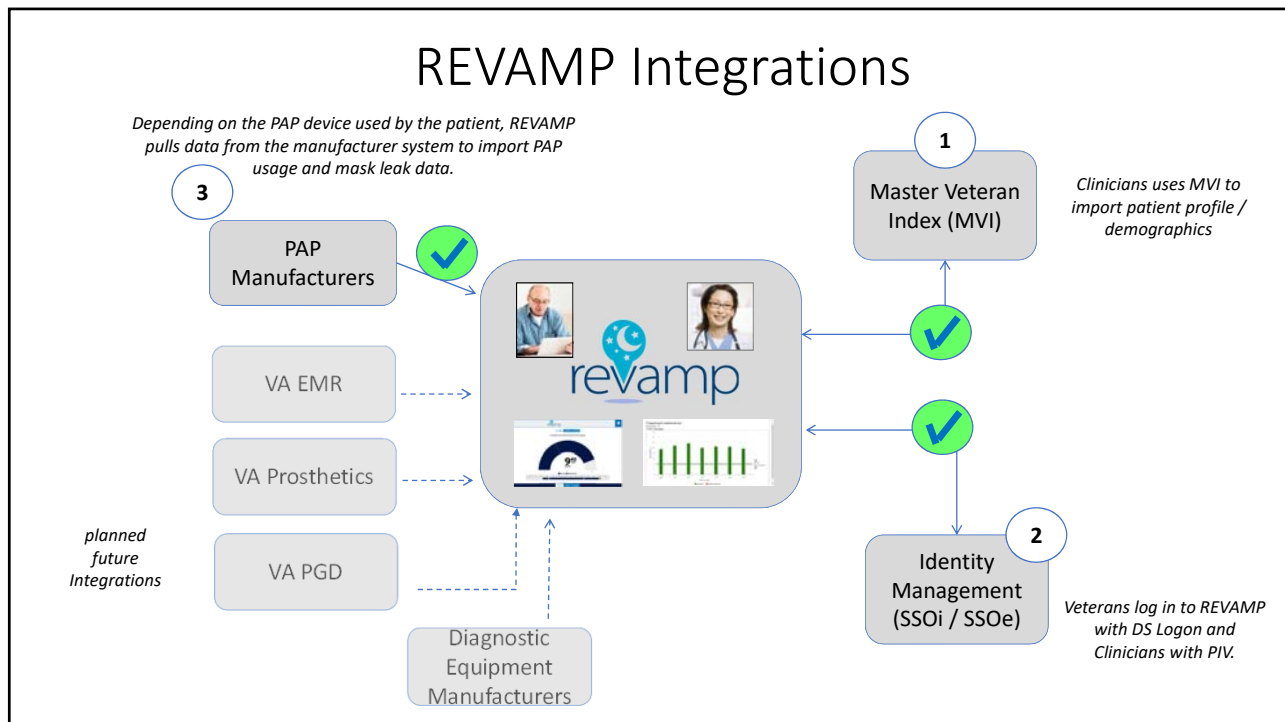
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## About revamp

REVAMP is a Veteran and provider-facing web application designed to help facilitate the remote diagnosis and management of obstructive sleep apnea.



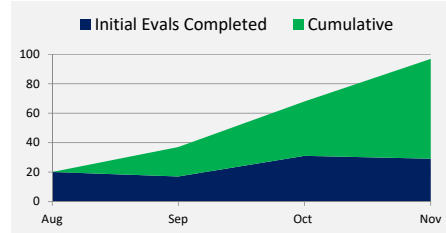
- Complete Diagnostic Questionnaires from Home
- View PAP device data
  - *2 Manufacturers initially*
- Access OSA Education
- Message Their Provider (encrypted)
- Remotely Collect & Score Patient Questionnaires
- Generates Templated Progress Notes
- One-stop shop for PAP data review
- Develop Reports





## Clinician-facing KPIs Period: 8/1/17 - 12/1/17

**97** Initial Evals Completed



Active Sleep Centers

**7** (7/10)

Total Clinician Accounts

**87**

Active Clinician Users

**21** (24%)

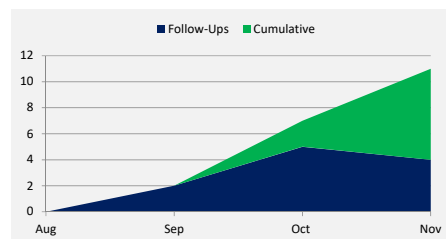
Patients Diagnosed with OSA

**44%**

Patients Prescribed PAP

**65%**

**11** Follow-up Visits Completed



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## Recent Blog Posts

FEBRUARY 6, 2018 BY ALAN GREILSAMER

### Army Veteran Finds Sleep Apnea Relief with REVAMP App

<http://vaww.blog.va.gov/CCM/?p=2360>

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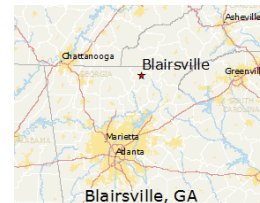


The VA Sleep Care Team at the Corporal Michael J. Crescenz VAMC teaches Army Veteran Walter Broadnax (seated) about the benefits of the REVAMP application.

### Blind Veteran Navigates REVAMP with Ease

<http://vaww.blog.va.gov/CCM/?p=2184>

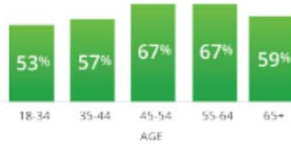
- Rural blind Veteran based in rural GA completed diagnostic questionnaires seamlessly
- Avoided trip to Atlanta VAMC
- Received a negative diagnosis





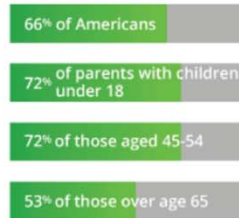
## Patient Interest in Telehealth

Consumers willing to use video visits to manage a chronic condition



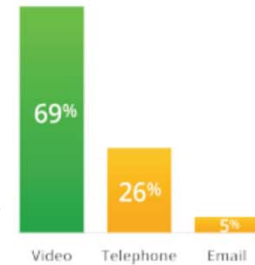
Base: Very/somewhat willing to have an online video visit with a doctor, n=1,376

Who's willing to see a doctor over video?



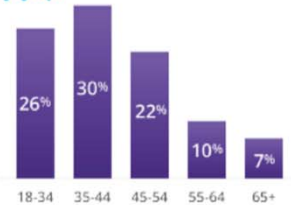
Base: n=2,100

Consumers' opinion on what method results in the most accurate diagnosis by a doctor



n=2,100

Willingness to switch PCPs for video visits across age groups



Base: n=2,007

Willingness of U.S. adults to switch PCPs for video visits



American Well Telehealth Index:  
2017 Consumer Survey

## Knowledge Gaps

- Implementation evaluations
  - Studies of barriers to spreading telemedicine
- Primary studies in sleep consultations
  - Replacement of face-to-face initial care for medical sleep evaluation
  - Specialty surgical and dental evaluations
- Defining value-based care in sleep that includes telemedicine
  - Cost of Care = Patient Experience = Clinical Outcomes
  - Assessing the value of telemedicine both as an addition and replacement to traditional in-person care

## Conclusions

- Telemedicine works for remote monitoring
- Video teleconferencing is as effective as in-person initial evaluations
- Effectiveness of a TM program is influenced by multiple factors
  - Study population (severity of the condition, disease trajectory of the participants)
  - Function of the intervention (monitoring a chronic condition, or to provide access to diagnostic services)
  - Healthcare provider
  - Healthcare system involved in delivering the intervention.
- Value-based care for Sleep
  - Incorporate Sleep TM alone and as a complement to in-person care
  - Consider cost avoidance with TM
  - Factor in Utilization of acute and outpatient care, touchpoints with lower cost providers, or use of automated technologies such as messaging services or apps for patient self-management

## Resources

- American Telemedicine Association
  - [www.americantelemed.org](http://www.americantelemed.org)
- Medicare billing
  - <https://www.cms.gov/Medicare/Medicare-General-Information/Telehealth/index.html>
- Telemedicine and Health IT
  - [http://www.who.int/goe/policies/countries/usa\\_support\\_tele.pdf](http://www.who.int/goe/policies/countries/usa_support_tele.pdf)
- VA TeleSleep Program [TeleSleep@va.gov](mailto:TeleSleep@va.gov)
- VA REVAMP [REVAMP@va.gov](mailto:REVAMP@va.gov)