ConnectedHealth

November 1, 2017

Director, Regulation Policy and Management (ooREG)
United States Department of Veterans Affairs
810 Vermont Avenue NW, Room 1063B
Washington, District of Columbia 20420

RE: Comments of the Connected Health Initiative Regarding the Department of Veterans Affairs Proposed Rulemaking on its Authority of Health Care Providers to Practice Telehealth – 82 FR 45756

The Connected Health Initiative (CHI) respectfully provides comments to the U.S. Department of Veterans Affairs (VA) in support of its proposed rule to expand its telehealth programs to VA hospitals nationwide.[1]

Convened by ACT | The App Association, CHI is the leading effort representing the consensus views of stakeholders across the connected health ecosystem to clarify outdated health regulations, encourage the use of remote monitoring (RM), and support an environment in which patients and consumers can see improvement in their health. Guided by a Steering Committee of leading mobile health companies, academic medical centers, caregivers, and others, CHI regularly works with Congress, the VA, the Office of the National Coordinator for Health Information Technology (ONC), the Food and Drug Administration (FDA), the Center for Medicare & Medicaid Services (CMS), and other regulators, policymakers, and researchers to create frameworks that encourage health systems to leverage connected health technologies.

CHI's members lead the effort to champion connected health innovations to improve care for America's veterans. For example, roughly one in four veterans receiving care from the VA have diabetes, and VA hospitals around the country have used the SmartMat™ from CHI member Podimetrics to monitor and address the symptoms. SmartMat™ is an FDA-approved remote temperature monitoring technology that monitors diabetes patients' feet to identify temperature asymmetries that signal the development of a foot ulcer. Coupled with the Podimetrics Remote Temperature Monitoring System™, the SmartMat™ notifies clinicians of the first signs of foot ulcers so they can provide treatment and prevent amputations. In fact, the Podimetrics SmartMat™ detected 97 percent of developing non-traumatic plantar foot ulcers five

[1] *Authority of Health Care Providers to Practice Telehealth*, Proposed Rule, VA-2017-VHA-0021, 82 FR 45756, *available at* https://www.federalregister.gov/documents/2017/10/02/2017-20951/authority-of-health-care-providers-to-practice-telehealth (2017).

weeks before they presented clinically, according to data published in *Diabetics Care.* Studies have also found that 88 percent of patients reported the mat as easy to use, with 86 percent of patients using the SmartMat™ at least three times per week. This innovative technology provides a practical tool for veterans to treat the symptoms of diabetes and prevent debilitating, costly amputations that often follow.

Whether termed "telehealth," "mHealth," "store and forward," "remote patient monitoring," or "remote monitoring," a growing body of evidence demonstrates the benefits of connected health technologies to improve patient care, reduce hospitalizations, avoid complications, and increase patient engagement, especially for the chronically ill.[2] Connected health tools include wireless health products, mobile medical device data systems, telemonitoring converged medical devices, and cloud-based patient portals that are revolutionizing the medical care industry by incorporating patient-generated health data into the continuum of care. These tools bring particular benefits to the veteran community and to illustrate the effectiveness of connected health solutions, we have appended to this comment a non-exclusive list of studies for consideration.

We commend the VA's leadership and commitment to advance veteran care and engagement through connected health innovations, such as the VA Office of Rural Health's support for 24/7 tele-ICU and remote monitoring.[3] However, the glacial pace at which the healthcare system is being modernized to incorporate connected health technologies leaves countless Americans, including millions of Medicare beneficiaries, with outdated, inefficient, and less effective treatment options. More work remains to be done to leverage connected health innovations for our country's veterans. We strongly encourage the VA to build upon these initial steps, including through the Anywhere to Anywhere VA Health Care initiative, to utilize every opportunity to achieve a truly connected continuum of care.

We support the VA's telehealth rulemaking proposal to allow VA physicians and healthcare providers, with a valid state license for at least one year, to extend telehealth programs like VA Telehealth, VA Video Connect, and Veteran Appointment Request to VA medical centers (VAMC) nationwide. When 45 percent of veterans live in rural areas, oftentimes hundreds of miles from the nearest VAMC, this proposed rulemaking ensures VA healthcare providers can reach veterans in need through telehealth-enabled technologies.

[2] *See* Hindricks, et al., The Lancet, Volume 384, Issue 9943, Pages 583 - 590, 16 August 2014 doi:10.1016/S0140-6736(14)61176-4.

[3] *E.g.*, https://mhealthintelligence.com/news/va-hospitals-connect-via-tele-icu-remote-patient-monitoring.

This proposed rule provides an important service to those who have served our country, and makes clear that it will only apply to physicians and healthcare providers directly employed by the VA. This distinction is important because it assures veterans located in rural and remote communities can access VA-approved quality care. The rule also places the VA in a good position to better promote the health and well-being of its patients. We support the rule as proposed to uphold the mission and effectiveness of VA physicians and healthcare providers.

We appreciate the opportunity to submit comments to the VA and look forward to working on these issues in more depth. Thank you for your consideration.

Sincerely,

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ConnectedHealth

Key Clinical Studies Demonstrating the Benefits of Connected Health Technologies

CHRONIC CONDITION MANAGEMENT

Audit of the Veterans Health Administration Home Telehealth Program: Over 15,000 patients

On March 09, 2015 the VA Office of Inspector General released an Audit which showed that the Home Telehealth Program increase patient access and reduced costs by reducing the number of admissions. For example, before the program there were 2,365 admissions over six months by the over 15,000 patients who participated in the Home Telehealth Program. After the program there were 1,773 admissions for the following six months. This equates to about 8 fewer hospital admissions for every 100 patients in this program.

http://www.va.gov/oig/pubs/VAOIG-13-00716-101.pdf

Telehealth and the VA - FY2013 Report

In FY2013, **608,900 (11%)** of veterans received some element of their health care via telehealth. This amounted to **1,793,496** telehealth episodes of care. **45%** of these patients lived in rural areas.

Home Telehealth Services: Helps patients with chronic conditions

- Provided care for 144,520 veterans
- 59% reduction in bed days of care
- 35% reduction in hospital readmissions
- Saves $1,999 per annum per patient
- 84% patient satisfaction

Store-and-Forward Telehealth: Remote scanning, then send to specialist

- Served 311,396 veterans
- 95% patient satisfaction
- Saves $38.41 per consultation

Clinical Video Telehealth: Real-time video consultation that covers over 44 specialties

- 94% patient satisfaction
- Saves $34.45 per consultation

TeleMental Health

- Over 278,000 encounters to 91,000 patients
- 1.1 million patient encounters since FY2003
- Reduced bed days of care by 38%
- Nearly 7,500 patients with chronic mental health conditions are now living independently thanks to TeleMental Health

The number of veterans receiving care through telehealth is climbing by **22%** each year.

http://ehrintelligence.com/2014/06/23/va-reduces-admissions-by-35-due-to-telemedicine-services/
http://c.ymcdn.com/sites/www.hisa.org.au/resource/resmgr/telehealth2014/Adam-Darkins.pdf
http://www.va.gov/health/NewsFeatures/2014/June/Connecting-Veterans-with-Telehealth.asp

Veterans Administration: Study Size: Over 17,000 patients

"Routine analysis of data obtained for quality and performance purposes from a cohort of 17,025 CCHT patients shows the benefits of a 25% reduction in numbers of bed days of care, 19% reduction in numbers of hospital admissions, and mean satisfaction score rating of 86% after enrolment into the program. The cost of CCHT is $1,600 per patient per annum, substantially less than other NIC programs and nursing home care. VHA's experience is that an enterprise-wide home telehealth implementation is an appropriate and cost-effective way of managing chronic care patients in both urban and rural settings." "Care Coordination/Home Telehealth: the systematic implementation of health informatics, home telehealth, and disease management to support the care of veteran patients with chronic condition"

Darkins A, Ryan P, Kobb R, Foster L, Edmonson E, Wakefield B, Lancaster AEs, Telemed J E Health. 2008 Dec;14(10):1118-26. doi: 10.1089/tmj.2008.0021.
http://online.liebertpub.com/doi/pdf/10.1089/tmj.2008.0021.
Supplemented with further data by Darkins, available at
http://c.ymcdn.com/sites/www.hisa.org.au/resource/resmgr/telehealth2014/Adam-Darkins.pdf

Primary Care E-Visit v. Physician Office Visit: Study Size 8,000 Office and E-Visits

From The Washington Post, 1/21/2013: "A new study suggests that "e-visits" to health-care providers for sinus infections and urinary tract infections (UTIs) may be cheaper than in-person office visits and similarly effective."

[Ateev Mehrotra, MD; Suzanne Paone, DHA; G. Daniel Martich, MD; Steven M. Albert, PhD; Grant J. Shevchik, MD, JAMA Intern Med. 2013;173(1):72-74. doi: 10.1001/2013.jamainternmed.305] http://archinte.jamanetwork.com/article.aspx?articleid=1392490

Randomized Control Trial of Telehealth and Telecare: Study Size 6,191 patients, 238 GP practices

"The early indications show that if used correctly telehealth can deliver a 15% reduction in A&E visits, a 20% reduction in emergency admissions, a 14% reduction in elective admissions, a 14% reduction in bed days and an 8% reduction in tariff costs. More strikingly they also demonstrate a 45% reduction in mortality rates."

"Whole System Demonstrator Programme, Headline Findings – December 2011", Department of Health, United Kingdom] http://www.telecare.org.uk/sites/default/files/file-directory/secure_annual_reports/Publications/Effect%20of%20Telehealth%20on%20use%20of%20secondary%20care%20and%20mortality%20findings%20from%20the%20WSD%20cluster%20randomised%20trial.pdf

Reduced Hospitalizations of Nursing Facility Residents

A study that introduced telemedicine in a Massachusetts for-profit nursing home chain, during the period October 2009 – September 2011, demonstrates the cost-effectiveness of utilizing telemedicine to reduce potential re-hospitalizations for nursing facility patients. The study's findings show that savings to Medicare from using telemedicine to reduce re-hospitalizations for nursing facility patients exceed the investment in the telemedicine equipment.

- The findings of the study suggest that the nursing facilities that were more engaged in off-hours telemedicine coverage could generate cost savings for Medicare that exceeded the facility's investment in the telemedicine service.
- The average savings to Medicare for a nursing facility that participated and was engaged with telemedicine, was $151,000 per nursing facility per year, relative to the less-engaged facilities.
- During the two-year period, the rate of hospitalizations per 1,000 resident days declined across the pre- and post-intervention periods for both the treatment and the control groups.
- The difference in the hospitalizations in the treatment group was 4.4 percentage points lower.

David C. Grabowski and A. James O'Malley, "Use of Telemedicine Can Reduce Hospitalizations of Nursing Home Residents and Generate Savings for Medicare*," Health Affairs*, 33, no. 2 (2014): 244-250.

Integrated Telehealth And Care Management Program For Medicare Beneficiaries With Chronic Disease Linked To Savings

A study from the Health Affairs found significant savings among patients who used the Health Buddy telehealth program, which integrates a telehealth tool with care management for chronically ill Medicare beneficiaries. Specifically, patients who utilized the Health Buddy Program saw spending reductions of approximately 7.7–13.3 percent ($312–$542) per person per quarter.

September 2011: http://content.healthaffairs.org/content/30/9/1689.abstra

Rural Hospitals and Communities Save Money Through Telemedicine Program

A report from NTCA-The Rural Broadband Association explores how much money a rural hospital and community can save by using a telemedicine program. The report analyzes savings in travel costs, lost wages, hospital workers' wages, and lab and pharmacy revenues that can stay local by allowing patients to stay in their own communities rather than travel to larger metropolitan areas for care.

The report finds that on average a rural community can save $31,000 in travel costs and lost wages, per hospital per year. Rural hospitals can on average save more than $81,000 a year in doctors' wages, while generating revenue through local MRIs, and other lab and pharmacy work.

March 2017:
http://www.frs.org/images/AnticipatingEconomicReturnsOfRuralTelehealth.pdf

Telemedicine Saves Patients Time and Money

Scholars at the University of California Davis studied results and data of 18 years of inpatient and outpatient visits, ending in 2013. The scholars found that the 19,246 interactive video visits over 18 years saved patients approximately nine years of travel time, 5 million miles, and $3 million in related costs. Each patient using telemedicine for treatment saved on average four hours driving time, 278 miles and $156 in travel costs over the period studied.

Impact of a University-Based Outpatient Telemedicine Program on Time Savings, Travel Costs, and Environmental Pollutants
Dullet, Navjit W. et al.
Value in Health , Volume 0 , Issue 0 ,
http://www.valueinhealthjournal.com/article/S1098-3015(17)30083-9/fulltext

Telehealth Clinical Studies pettaining to Home Dialysis

For patients receiving dialysis, almost $3 billion is spent annually on transportation. Teleconsultation was conducted in a shorter average period of time (22 versus 33 min), was effective, significantly reduced hospitalization rates, but slightly more expensive

(198 versus 177 euro or $233 versus $208) when compared with hospital consultation. However, annual savings of $46,613 USD and annual cost of $79,489 when videoconferencing for daily visits.

Perspectives from the Kidney Health Initiatibe on Advancing Technologies to Facilitate Remote Monitoring of Patient Self-Care in RRT
(Remote Monitoring of Dialysis Patients)
Mitchell H. Rosner, et al.
Clinical Journal of the American Society of Nephrology
https://www.asn-online.org/membership/BlastEmails/files/KHI_RemoteMonitoring_Publication_July2017.pdf

Dementia Care in an Underserved Retirement Community, thanks to Telemedicine Sample Size: 78 total with 33 Completing Satisfaction Exit-Interviews

"Prior to 2013, a neurologist from USC commuted every weekend from Los Angeles to Palm Desert (120 miles, 2 h each way) to asses and manage patients. It became apparent that this setup was not sustainable as clinic wait0time lengthened to 6+ months."
"In our experience, over the past 3 years, telemedicine poses no barrier to accurate evaluation and is as effective as a meeting in person."

In 2012, USC-EMC MAC was only able to bring in under 20 people. After telemedicine was implemented, by 2014, they were able to increase intake to around 85 new patients per year.

Satisfaction:
- Overall Satisfaction with the clinic of 4.84 out of 5
- General satisfaction with the neurologist at 4.88 out of 5
- Satisfaction with the telemedicine system at 4.65 out of 5

A Multidisciplinary Model of Dementia Care in an Underserved Retirement Community, Made Possible by Telemedicine
Jason V. Tso, Roxanna Farinpour, Helena C. Chui and Collin Y. Liu
Frontiers in Neurology
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5179531/

Cleveland Alzheimer's Managed Care Outcomes: Study Size: 89 Patients

"The Cleveland Alzheimer's Managed Care Demonstration is one of the few studies of dementia care that gather data directly from patients, particularly information regarding their perception of symptoms and care".

“Overall, findings show that care consultation delivered within a partnership between Kaiser Permanente of Ohio and the Cleveland Area Alzheimer’s Association is a promising strategy for improving outcomes for patents with memory problems”.

Outcomes for Patients with Dementia from the Cleveland Alzheimer’s Managed Care Demonstration
P.A. Clark, D.M. Bass, W.J. Looman, C.A. McCarthy & S. Eckert
Aging & Mental Health, January 2004; 8(1): 40-51
http://www.tandfonline.com/doi/abs/10.1080/13607860310001613329?journalCode=camh20

North Dakota Assistance Program For Dementia Caregivers Lowered Utilization, Produced Savings, and Increased Empowerment

“These changes saved an estimated 179,580 days in long-term care (average:7.7 years per person with dementia), which translated into $39.2 million in potential cost savings during the forty-two-month period”.

This program also drastically decreased hospital stays, ambulance uses, emergency department visits and 911 calls at a relatively steady rate over a year and a half.

- For example, Hospital stays – in months 1-3, the rate of event per person was .754 and when the months reached 16-18, the rate was a measly .071.

North Dakota Assistance Program For Dementia Caregivers Lowered Utilization, Produced Savings, And Increased Empowerment
Marilyn G. Klug, Gwen Wagstrom Halaas, and Mandi-Leigh Peterson
Health Affairs 33, no. 4 (2014): 605-612
http://content.healthaffairs.org/content/33/4/605.abstract

HEART FAILURE MANAGAGEMENT

Remote Patient Monitoring of Heart Failure Patients, Meta analysis: Study Size 4,264 patients

“Remote monitoring programmes reduced rates of admission to hospital for chronic heart failure by 21% (95% confidence interval 11% to 31%) and all-cause mortality by 20% (8% to 31%); of the six trials evaluating health related quality of life three reported significant benefits with remote monitoring.”

Telemonitoring or structured telephone support programmes for patients with chronic heart failure: systematic review and meta-analysis, Robyn Clark, Sally Inglis, Finlay McAlister, John Cleland, Simon Stewart, MJ (British Medical Journal), doi:10.1136/bmj.39156.536968.55 (published 10 April 2007)]
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1865411/

Remote Patient Monitoring of Heart Failure Patients: Meta analysis: Study Size 6,258/ 2,354 Patients

“RPM convers a significant protective clinical effect in patients with chronic HF compared with usual care.”

J Am Coll Cardio: 2009;54:1683-94
http://content.onlinejacc.org/article.aspx?articleid=1140154

Telehome Monitoring Program: 1,000 Patients Enrolled

“Research at the Heart Institute has shown telehome monitoring at the Heart Institute has cut hospital readmission for heart failure by 54 percent with savings up to $20,000 for each patient safely diverted from an emergency department visit, readmission and hospital stay.”

University of Ottawa Heart Institute, February 24, 2011, Press Release.
http://www.heartandlung.org/article/S0147-9563(07)00084-2/fulltext

Remote Patient Monitoring at St. Vincent's Hospital

"Impact: In less than two years, preliminary results show that the care management program implemented by St. Vincent Health and facilitated by the Guide platform reduced hospital readmissions to 5 percent for patients participating in the program – a 75 percent reduction compared to the control group (20 percent), and to the national average (20 percent)."

St. Vincent's Hospital Reduces Readmissions by 75 percent with a Remote Patient Monitoring-Enabled Program, Case Study by Care Innovations, an Intel GE Company] http://www.careinnovations.com/data/sites/1/downloads/Guide_product/guide_stvincent_profile.pdf

Program Evaluation of Remote Heart Failure Monitoring: Healthcare Utilization Analysis in a Rural Regional Medical Center

Background: Remote monitoring for heart failure (HF) has had mixed and heterogeneous effects across studies, necessitating further evaluation of remote monitoring systems within specific healthcare systems and their patient populations. ''Care Beyond Walls and Wires,'' a wireless remote monitoring program to facilitate patient and care team co-management of HF patients, served by a rural regional medical center, provided the opportunity to evaluate the effects of this program on healthcare utilization.

Materials and Methods: Fifty HF patients admitted to Flagstaff Medical Center (Flagstaff, AZ) participated in the project. Many of these patients lived in underserved and rural communities, including Native American reservations. Enrolled patients received mobile, broadband-enabled remote monitoring devices. A matched cohort was identified for comparison.

Results: HF patients enrolled in this program showed substantial and statistically significant reductions in healthcare utilization during the 6 months following enrollment, and these reductions were significantly greater compared with those who declined to participate but not when compared with a matched cohort. Conclusions: The findings from this project indicate that a remote HF monitoring program can be successfully implemented in a rural, underserved area. Reductions in healthcare utilization were observed among program participants, but reductions were also observed among a matched cohort, illustrating the need for rigorous assessment of the effects of HF remote monitoring programs in healthcare systems.

William T. Riley, PhD., et al. DOI: 10.1089/tmj.2014.0093. Vol. 21 No. 3, March 2015

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4365431/

DIABETES MANAGEMENT

Early Results Support Efficacy and Clinical efficiency of Diabetes Management Decision support software for Blood Glucose Control: Two cohorts of 43 comparative cases

Preliminary results from an ongoing study by Rimidi indicate that the decision support software, Diabetes+Me, helps to ensure a safe but meaningful reduction in A1c and therefore reduction in event rate as well as overall healthcare costs. Diabetes+Me has not only lead to improved benefits to patients, but has also allowed Desert Oasis healthcare, the facility who is conducting the study, to expand the scalability of its already successful diabetes management program without having to make the expensive investment of hiring additional healthcare providers.

Mobile Phone Personalized Behavior Coaching for Diabetes: Study Size 163 patients over 26 Practices

"Conclusions – The combination of behavioral mobile coaching with blood glucose data, lifestyle behaviors, and patient self-management individually analyzed and presented with evidence-based guidelines to providers substantially reduced glycated hemoglobin level over 1 year."

Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control, Charlene Quinn, Michelle Shardelll, Michael Terrin, Eric Barr, Soshana Ballew, Ann Gruber-Baldini, Diabetes Care. Published Online July 25, 2011: http://care.diabetesjournals.org/content/34/9/1934.long

Mobile Phone Diabetes Management: Study Size 30 patients from 3 group practices

"Conclusions: Adults with type 2 diabetes using WellDoc's software achieved statistically significant improvements in A1c. HCP and patient satisfaction with the system was clinically and statistically significant."

WellDoc™ Mobile Diabetes Management Randomized Controlled Trial: Change in Clinical and Behavioral Outcomes and Patient and Physician Satisfaction, Charlene Quinn, Suzanne Sysko Clough, James Minor, Dan Lender, Maria Okafor, Ann Gruber-Baldini, Diabetes Technology & Therapeutics, Vol 10, Number 3, 2008, pps 160-168. http://online.liebertpub.com/doi/pdf/10.1089/dia.2008.0283

Testing Diabetic Retinopathy with Telemedicine Found Successful

A study in *JAMA Internal Medicine* finds that telemedicine is an effective method to test for diabetic retinopathy (DR) in Los Angeles. The practice of teleretinal DR screening was applied in the Los Angeles County Department of Health Services, the largest publicly operated county safety net in the United States. The use of telemedicine for DR screening kept patients from needing approximately 14,000 specialist visits, wait times decreased by 89.2 percent and DR screening annual rates increased by more than 16 percent.

Daskivich LP, Vasquez C, Martinez C, Tseng C, Mangione CM. Implementation and Evaluation of a Large-Scale Teleretinal Diabetic Retinopathy Screening Program in the Los Angeles County Department of Health Services. *JAMA Intern Med.* Published online March 27, 2017. doi:10.1001/jamainternmed.2017.0204 http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2612116

RESPIRATORY AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE MANAGEMENT

Content-Driven Telehealth System Coupled with Care Management: Study Size Medicare patients enrolled in CMS' Health Buddy Program demonstration from 2006-2010

The Health Buddy Program is a content-driven telehealth system combined with care management designed to enhance patient education, self-management, and timely access to care. "The Health Buddy Program was associated with 23% lower quarterly all-cause hospital admissions and 40% lower quarterly respiratory-related hospital admissions compared to baseline for intervention beneficiaries vs. controls. In subgroup analyses, patients who engaged in the intervention during the study period (n=247) demonstrated significantly lower quarterly hospital admissions for chronic obstructive pulmonary disease exacerbations.

CONCLUSIONS: A content-driven telehealth system combined with care management has the potential to improve health outcomes in Medicare beneficiaries with chronic obstructive pulmonary disease."

Au, DH, Macaulay, DS, et al. Impact of a telehealth and care management program for patients with chronic obstructive pulmonary disease. *Ann Am Thorac Soc.* 2015 Mar;12(3):323-31. Doi: 10.1513/AnnalsATS.201501-042OC. http://www.ncbi.nlm.nih.gov/pubmed/25642649

Home Telehealth for Patients with Severe COPD: 60 patients

Telehealth is an important part of the need for innovative models of care for patients with severe COPD and frequent acute exacerbations. In a cluster assignment, controlled trial study design, 60 patients were recruited: 30 in home telehealth (TH) and 30 in conventional care (CC). Results: "After 7-months of monitoring and follow-up, there was significant reduction in ER visits (20 in HT vs 57 in CC), hospitalizations (12 vs 33), length of hospital stay in (105 vs 276 days), and even need for non-invasive mechanical ventilation (0 vs 8, all $p < 0.05$)

Segrelles CG, et al. A home telehealth program for patients with severe COPD: the PROMETE study. *Respir Med.* 2014 Mar; 108(3):453-62. Doi: 10.1016/j.med.2013. 12.003. Epub 2013 Dec 16. http://www.ncbi.nlm.nih.gov/pubmed/?term=A+home+telehealth+program+for+patients+with+COPD%3A+The+PROMETE+study

Tele-assistance (TA) in chronic respiratory failure patients: 240 patients (101 with COPD)

Chronic respiratory patients requiring oxygen or home mechanical ventilation experience frequent exacerbations and hospitalizations with related costs. Patients were randomized into two groups: an intervention group (1-year TA) and control group (conventional care). “Compared with controls, the TA group experienced significantly fewer hospitalizations (-36%), fewer GP calls (-65%) and acute exacerbations (-71%). After deduction of TA costs, the average overall cost for each patient was 33% less than for usual care.”

Vitacca M, Bianchi L, et al. Tele-assistance in chronic respiratory failure patients: a randomized clinical trial. *Eur Respir J.* 2009 Fed:33(2):411-8. Doi: 10.1183/09031936.00005608. Epub 2008 Sep 17. http://www.ncbi.nlm.nih.gov/pubmed/18799512

Home telemonitoring program: 369 patients with at least one COPD exacerbation per year prior to enrollment

The study was designed to evaluate the effects of home telemonitoring on healthcare utilization in patients with COPD. “Of these, 71.5% had a reduction in number of ED visits and exacerbations requiring hospitalization after enrollment in the program. The average number of hospital admissions, ED visits, and total exacerbations were all reduced (0.41 ± 1.68, 0.15 ± 1.65, and 0.56 ± 2.3, respectively; all with $p < 0.01$).”

Alrajab S, Smith TR, et al. A home telemonitoring program reduced exacerbation and healthcare utilization rates in COPD patients with frequent exacerbations. *Telemed J E Health.* 2012 Dec; 18(10):772-6. Doi: 10.1089/tmj.2012.0005. Epub 2012 Oct 19. http://www.ncbi.nlm.nih.gov/pubmed/?term=Alrajab+S%2C+Smith+TR%2C+et+al

Telehealth Program for CPAP Adherence: 122 patients

This study evaluated the effectiveness of coaching labor requirements of a web-based automated telehealth (TH) messaging program compared with standard of care (SOC) in newly diagnosed patients with obstructive sleep apnea. “There was a significant reduction in the number of minutes coaching [by respiratory therapists] required per patient in the TH vs SOC group (23.9 ± 26 vs. 58.3 ± 25, 59% reduction; $p < 0.0001$).”

More than 2 million patients on continuous positive airway pressure (CPAP) for obstructive sleep apnea (OSA) are being monitored at home using AirView. Key parameters of treatment effectiveness can be determined remotely at the patient level to adjust therapy or troubleshoot and correct device problems, or at the population level to efficiently measure adherence levels and track frequency of complications like mask leak. Adherence to therapy can be significantly improved through the use of remote patient monitoring and patient engagement technologies.[1,2,3]

1 Munafo D, Hevener W, et al. A telehealth program for CPAP adherence reduces labor and yields similar adherence and efficacy when compared to standard of care. *Sleep Breath.* 2016 May;20(2): 777-85. doi: 10 10.1007/s11325-015-1298-4. Epub 2016 Jan 11.
http://www.ncbi.nlm.nih.gov/pubmed/?term=Munafo+D%2C+Hevener+W%2C+et+al.

2 Crocker M, Lynch S, Willes L, *et al.* A Propensity-Adjusted Comparative Analysis of PAP Adherence Associated With Use of Myair. CHESTAnnual Meeting 2016.

3 Chang J, Liang J, Becker K, *et al.* Impact of Interactive Web-based Education and Automated Feedback Program on CPAP Adherence for the Treatment of Obstructive Sleep Apnea (Tele OSA). SLEEP Annual Meeting 2016

Telemedicine Versus Face-to-Face Evaluations by Respiratory Therapists

The study aimed to determine how well respiratory assessments for ventilated neonates and children correlated when performed simultaneously by 2 RTs face-to-face and via telemedicine.

"Telemedicine evaluations highly correlated with face-to-face for 10 of 14 aspects of standard bedside respiratory assessment."

Bell, RC, Yager PH, et al. Telemedicine Versus Face-to-Face Evaluations by Respiratory Therapists of Mechanically Ventilated Neonates and Children: A Pilot Study. http://rc.rejournal.com/content/61/2/149:abstract

MEDICATION ADHERENCE FOR CHRONIC CONDITIONS

Case Study: Mobilizing Your Medications: An Automated Medication Reminder Application for Mobile Phones and Hypertension Medication Adherence in a High-Risk Urban Population

Background: Hypertension frequently accompanies diabetes mellitus, worsening prognosis and complicating medical care for patients. Low medication adherence with multiple medications is a major factor in the inadequate achievement of blood pressure treatment goals. Widespread access to mobile phones offers a new opportunity to communicate with patients and enhance disease self-management.

Methods: We recruited 50 high-risk urban patients with hypertension, who are using at least two prescription medications for hypertension, into an open-label trial using medication reminder software on a mobile phone. Medication adherence was assessed by review of pharmacy refill rates before, during, and after availability of the medication reminder software (pre-activation, activation, and post-activation phase, respectively).

Results: Forty-eight patients completed the study. All subjects were insured by Medicaid, 96% were African-American, and the majority had diabetes mellitus. The proportion of days covered for each study phase was as follows: pre-activation phase =

0.54, activation phase = 0.58, and post-activation phase = 0.46. A significant difference was found between the activation and post-activation phases (p = .001). The increase in measured adherence between the pre-activation and activation phases approached significance (p = .057). Forty-six patients completed the pre- and post-Morisky medication adherence survey. The median score rose from 2.0 at baseline to 3.0 at study completion (p < .001). Average blood pressure and level of control during study period improved significantly after initiation of the study and remained improved from baseline through the course of the study. The 48 subjects who completed the study reported a high level of satisfaction with the medication reminder application at the final study visit.

Conclusions: A mobile-phone-based automated medication reminder system shows promise in improving medication adherence and blood pressure in high-cardiovascular-risk individuals.

Samir Patel, M.D., et al. Journal of Diabetes Science and Technology Volume 7, Issue 3, May 2013

https://www.ncbi.nlm.nih.gov/pubmed/23759395

BLOOD PRESSURE MANAGEMENT

Using simple telehealth in primary care to reduce blood pressure: a service evaluation (n=364) with 124 intervention patients. “Conclusions: Simple telehealth is acceptable and effective in reducing patients’ BP. In future, poorly controlled patients could be targeted to maximize BP reductions or broader use could improve diagnostic accuracy and accessibility for patients who struggle to regularly attend their GP surgery.”

[Elizabeth Cottrell, Ruth Chambers, Phil Connell. BMJ Open. 2012;2:e001391. Doi:10.1136/bmjopen-2012-001391]
http://bmjopen.bmj.com/content/2/6/e001391