TITLE: **Tele-Medicine for Patients with Chronic Obstructive Pulmonary Disease: Clinical and Cost-Effectiveness**

DATE: 10 August 2015

RESEARCH QUESTIONS

1. What is the clinical evidence regarding tele-medicine interventions for patients with chronic obstructive pulmonary disease?

2. What is the cost-effectiveness of tele-medicine interventions for patients with chronic obstructive pulmonary disease?

KEY FINDINGS

Nine systematic reviews, 25 randomized controlled trials, and six economic evaluations were identified regarding regarding tele-medicine interventions for patients with chronic obstructive pulmonary disease.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies and economic studies. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2010 and July 31, 2015. Internet links were provided, where available.

SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria	
Population	Patients with chronic pulmonary obstructive disease
Intervention	Tele-medicine interventions: • Video conferencing • Home health monitoring • Tele-health phone lines
Comparator	Usual care without tele-medicine
Outcomes	Clinical benefits (improved health outcomes, improved access to care, patient experience, travel time) Cost-effectiveness
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

Nine systematic reviews, 25 randomized controlled trials, and six economic evaluations were identified regarding regarding tele-medicine interventions for patients with chronic obstructive pulmonary disease. No relevant health technology assessments were identified. Due to the large volume of relevant literature identified, non-randomized studies have been included in the appendix.

Additional references of potential interest, along with relevant non-randomized studies, are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

1. Lundell S, Holmner A, Rehn B, Nyberg A, Wadell K. Telehealthcare in COPD: a systematic review and meta-analysis on physical outcomes and dyspnea. Respir Med. 2015 Jan;109(1):11-26.
PubMed: PM25464906

2. Cruz J, Brooks D, Marques A. Home telemonitoring in COPD: a systematic review of methodologies and patients' adherence. Int J Med Inform. 2014 Apr;83(4):249-63.
PubMed: PM24529402

3. Cruz J, Brooks D, Marques A. Home telemonitoring effectiveness in COPD: a systematic review. Int J Clin Pract. 2014 Mar;68(3):369-78.
PubMed: PM24472009

4. Udsen FW, Hejlesen O, Ehlers LH. A systematic review of the cost and cost-effectiveness of telehealth for patients suffering from chronic obstructive pulmonary disease. J Telemed Telecare. 2014 May 6;20(4):212-220.
PubMed: PM24803277

5. Kamei T, Yamamoto Y, Kajii F, Nakayama Y, Kawakami C. Systematic review and meta-analysis of studies involving telehome monitoring-based telenursing for patients with chronic obstructive pulmonary disease. Jpn J Nurs Sci. 2013 Dec;10(2):180-92.
PubMed: PM24373441

6. McLean S, Nurmatov U, Liu JL, Pagliari C, Car J, Sheikh A. Telehealthcare for chronic obstructive pulmonary disease: Cochrane Review and meta-analysis. Br J Gen Pract [Internet]. 2012 Nov [cited 2015 Aug 10];62(604):e739-e749. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3481514
PubMed: PM23211177

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PubMed: PM20846317

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PubMed: PM21735417

9. Polisena J, Tran K, Cimon K, Hutton B, McGill S, Palmer K, et al. Home telehealth for chronic obstructive pulmonary disease: a systematic review and meta-analysis. J Telemed Telecare. 2010;16(3):120-7.
PubMed: PM20197355

Randomized Controlled Trials

10. Berkhof FF, van den Berg JW, Uil SM, Kerstjens HA. Telemedicine, the effect of nurse-initiated telephone follow up, on health status and health-care utilization in COPD patients: a randomized trial. Respirology. 2015 Feb;20(2):279-85.
PubMed: PM25400242

11. Jakobsen AS, Laursen LC, Rydahl-Hansen S, Østergaard B, Gerds TA, Emme C, et al. Home-based telehealth hospitalization for exacerbation of chronic obstructive pulmonary disease: findings from "the virtual hospital" trial. Telemed J E Health. 2015 May;21(5):364-73.
PubMed: PM25654366

12. Kenealy TW, Parsons MJ, Rouse AP, Doughty RN, Sheridan NF, Hindmarsh JK, et al. Telecare for diabetes, CHF or COPD: effect on quality of life, hospital use and costs. A randomised controlled trial and qualitative evaluation. PLoS ONE [Internet]. 2015 [cited 2015 Aug 10];10(3):e0116188. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4358961
PubMed: PM25768023

13. McDowell JE, McClean S, FitzGibbon F, Tate S. A randomised clinical trial of the effectiveness of home-based health care with telemonitoring in patients with COPD. J Telemed Telecare. 2015 Mar;21(2):80-7.
PubMed: PM25586812

14. Blumenthal JA, Emery CF, Smith PJ, Keefe FJ, Welty-Wolf K, Mabe S, et al. The effects of a telehealth coping skills intervention on outcomes in chronic obstructive pulmonary disease: primary results from the INSPIRE-II study. Psychosom Med [Internet]. 2014 Oct [cited 2015 Aug 10];76(8):581-92. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4197099
PubMed: PM25251888

15. Emme C, Mortensen EL, Rydahl-Hansen S, Østergaard B, Svarre Jakobsen A, Schou L, et al. The impact of virtual admission on self-efficacy in patients with chronic obstructive pulmonary disease - a randomised clinical trial. J Clin Nurs. 2014 Nov;23(21-22):3124-37.
PubMed: PM24476457

16. Gellis ZD, Kenaley BL, Ten Have T. Integrated telehealth care for chronic illness and depression in geriatric home care patients: the Integrated Telehealth Education and Activation of Mood (I-TEAM) study. J Am Geriatr Soc. 2014 May;62(5):889-95.
PubMed: PM24655228

17. Jakobsen AS, Laursen LC, Ostergaard B, Rydahl-Hansen S, Phanareth KV. Hospital-admitted COPD patients treated at home using telemedicine technology in The Virtual Hospital Trial: methods of a randomized effectiveness trial. Trials [Internet]. 2013 Sep 3 [cited 2015 Aug 10];14:280. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3766220
PubMed: PM24139548

18. Schou L, Østergaard B, Rasmussen LS, Rydahl-Hansen S, Jakobsen AS, Emme C, et al. Telemedicine-based treatment versus hospitalization in patients with severe chronic obstructive pulmonary disease and exacerbation: effect on cognitive function. A randomized clinical trial. Telemed J E Health. 2014 Jul;20(7):640-6.
PubMed: PM24820535

19. Tabak M, Brusse-Keizer M, van d, V, Hermens H, Vollenbroek-Hutten M. A telehealth program for self-management of COPD exacerbations and promotion of an active lifestyle: a pilot randomized controlled trial. Int J Chron Obstruct Pulmon Dis [Internet]. 2014 Sep 9 [cited 2015 Aug 10];9:935-44. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4166347
PubMed: PM25246781

20. Cartwright M, Hirani SP, Rixon L, Beynon M, Doll H, Bower P, et al. Effect of telehealth on quality of life and psychological outcomes over 12 months (Whole Systems Demonstrator telehealth questionnaire study): nested study of patient reported outcomes in a pragmatic, cluster randomised controlled trial. BMJ [Internet]. 2013 Feb 26 [cited 2015 Aug 10];346:f653. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3582704
PubMed: PM23444424

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PubMed: PM23808885

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PubMed: PM23663801

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PubMed: PM23393057

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PubMed: PM23497109

25. Pinnock H, Hanley J, McCloughan L, Todd A, Krishan A, Lewis S, et al. Effectiveness of telemonitoring integrated into existing clinical services on hospital admission for exacerbation of chronic obstructive pulmonary disease: researcher blind, multicentre, randomised controlled trial. BMJ [Internet]. 2013 Oct 17 [cited 2015 Aug 10];347:f6070. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3805483
PubMed: PM24136634

26. Schou L, Østergaard B, Rydahl-Hansen S, Rasmussen LS, Emme C, Jakobsen AS, et al. A randomised trial of telemedicine-based treatment versus conventional hospitalisation in patients with severe COPD and exacerbation - effect on self-reported outcome. J Telemed Telecare. 2013 Apr 23;19:160-5.
PubMed: PM23612519

27. Sorknaes AD, Bech M, Madsen H, Titlestad IL, Hounsgaard L, Hansen-Nord M, et al. The effect of real-time teleconsultations between hospital-based nurses and patients with severe COPD discharged after an exacerbation. J Telemed Telecare. 2013 Dec;19(8):466-74.
PubMed: PM24227799

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PubMed: PM22653618

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PubMed: PM22241810

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PubMed: PM22946768

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PubMed: PM22723612

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PubMed: PM20483881

Economic Evaluations

35. Stoddart A, van der Pol M, Pinnock H, Hanley J, McCloughan L, Todd A, et al. Telemonitoring for chronic obstructive pulmonary disease: a cost and cost-utility analysis of a randomised controlled trial. J Telemed Telecare. 2015 Mar;21(2):108-18.
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PubMed: PM25052387

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PubMed: PM24236679

38. Henderson C, Knapp M, Fernandez JL, Beecham J, Hirani SP, Cartwright M, et al. Cost effectiveness of telehealth for patients with long term conditions (Whole Systems Demonstrator telehealth questionnaire study): nested economic evaluation in a pragmatic, cluster randomised controlled trial. BMJ [Internet]. 2013 Mar 20 [cited 2015 Aug 10];346:f1035. Available from: http://www.bmj.com/content/346/bmj.f1035.long
PubMed: PM23520339

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PubMed: PM23848542

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PubMed: PM23020647

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies

41. Au DH, Macaulay DS, Jarvis JL, Desai US, Birnbaum HG. 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.
PubMed: PM25642649

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PubMed: PM25955129

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PubMed: PM25980711

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PubMed: PM25093419

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http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4336686
PubMed: PM25886014

46. Saleh S, Larsen JP, Bergsaker-Aspoy J, Grundt H. Re-admissions to hospital and patient satisfaction among patients with chronic obstructive pulmonary disease after telemedicine video consultation - a retrospective pilot study. Multidiscip Respir Med [Internet]. 2014 Jan 30 [cited 2015 Aug 10];9(1):6. Available from:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3912479
PubMed: PM24475774

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PubMed: PM25340279

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PubMed: PM24433744

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PubMed: PM24447522

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PubMed: PM25283625

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PubMed: PM24028359

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PubMed: PM23082792

53. Kim J, Kim S, Kim HC, Kim KH, Yang SC, Lee CT, et al. Effects of consumer-centered u-health service for the knowledge, skill, and attitude of the patients with chronic obstructive pulmonary disease. Comput Inform Nurs. 2012 Dec;30(12):661-71.
PubMed: PM23266537

54. Jarad NA, Sund ZM. Telemonitoring in chronic obstructive airway disease and adult patients with cystic fibrosis. J Telemed Telecare. 2011;17(3):127-32.
PubMed: PM21163811

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PubMed: PM21159138

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PubMed: PM22059179