



TITLE: Telecare Programs for Chronic Obstructive Pulmonary Disease, Asthma, and Hypertension: Clinical Effectiveness and Guidelines

DATE: 30 May 2011

RESEARCH QUESTIONS

1. What is the clinical effectiveness of telecare programs for the management of chronic obstructive pulmonary disease, asthma, or hypertension?
2. What are the evidence-based guidelines regarding the use of telecare programs for the management of chronic obstructive pulmonary disease, asthma, or hypertension?

KEY MESSAGE

Telecare programs appear to be effective for the management of hypertension. The effectiveness of these programs for the management of asthma and chronic obstructive pulmonary disease is varied.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2011, Issue 4), 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 and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between Jan 1, 2008 and May 13, 2011. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

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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 and evidence-based guidelines.

Eight systematic reviews, 16 randomized controlled trials, and one evidence-based guideline were identified regarding the effectiveness of telecare programs for the management of chronic obstructive pulmonary disease (COPD), asthma, or hypertension. No relevant health technology assessments were identified. Additional articles of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

The results regarding telecare for COPD were mixed. Three reports^{2,9,10} concluded that there were no negative effects on patients resulting from the use of telecare. The authors of one systematic review¹ determined that individual studies appeared to show improvement with telecare, but there was a potential for bias within the studies. A review that focused on respiratory conditions concluded that telemonitoring resulted in early identification of changes in symptoms and patient condition.⁸ Another review that covered multiple conditions⁶ reported significant improvements across patient outcomes and quality of life for patients receiving telecare. Finally, one systematic review suggested that the use of telecare may help reduce demands on healthcare resources in patients with diabetes, pulmonary and cardiovascular diseases.⁷

For patients with asthma, the use of telecare did not result in significant improvements or changes to health-related quality of life.^{3,11,12,14} One study observed a decrease in hospital readmissions for patients receiving telephone self-management.¹³

The results regarding telecare for the management of hypertension were also varied. The majority of included studies^{4-7,16-18} reported greater reductions in blood pressure in patients in the telemonitoring groups. One study¹⁵ found no change in effectiveness between treatment regimens, and one study²⁴ found the blood pressure values to be similar between groups. Patients receiving telecare showed improved adherence to lifestyle changes¹⁹ and were better able to control their blood pressure.^{21,22} Some individuals require more support than others when using these types of systems.²⁰

The results of the included studies are summarized in Table 1.

Table 1: Summary of Included Studies			
Authors	Study type	Interventions	Author's conclusions or recommendations
COPD			
Bolton et al. ¹	SR	Various telemonitoring interventions	Telemonitoring interventions studied were quite varied among studies. Individual study results were positive but the authors concluded there was insufficient evidence to prove a benefit of telemonitoring for COPD. More study is required.
Polisena et al. ²	SR	Home telehealth (telemonitoring)	Home telehealth reduced rates of hospitalization and ED visits. Mortality rate was greater in the

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Authors	Study type	Interventions	Author's conclusions or recommendations
		and telephone support) vs usual care	telephone-support group. The authors concluded home telehealth was similar to or better than usual care for QoL and patient satisfaction outcomes
Lewis et al. ⁹	RCT	Standard care vs standard care + home telemonitoring	Significant improvements in QoL scores were observed immediately after rehabilitation but these improvements maintained in either group over time. The authors concluded telemonitoring was safe but did not result in any lasting changes in QoL.
Vitacca et al. ¹⁰	RCT	Tele-assistance vs usual care	The tele-assistance group experienced slightly fewer hospitalizations, urgent GP calls, and acute exacerbations. The average cost of treatment in this group was 33% less.
Asthma			
McLean et al. ³	SR and MA	Telephone, video conference, internet, networked communications, text messaging	MA showed no clinically important improvements to asthma QoL. Interventions did result in a significant reduction in hospitalizations. The authors conclude these interventions may be most useful for patients with more severe asthma who are at high risk of hospitalization.
Xu et al. ¹¹	RCT	Interactive voice response system vs nurse education vs usual care (children)	There was no significant difference observed between intervention groups for rescue therapy, resource use, or QoL when compared to the control group. Both interventions may be cost-saving as compared to usual care. More study is needed.
De Jongste et al. ¹²	RCT	Telemonitoring + symptom monitoring vs symptom monitoring (children)	Steroid use was adapted based on telemonitoring and symptoms or symptoms alone. Both groups showed improvements in clinical outcomes and QoL. The authors found no value added by the use of telemonitoring with symptom monitoring.
Donald et al. ¹³	RCT	Monthly telephone education vs usual care (adults)	Hospital readmission rates were much lower for patients receiving telephone assisted self-management.
Willems et al. ¹⁴	RCT	Nurse-led telemonitoring vs usual care (children and adults)	There was no statistically significant difference observed between groups in regards to follow-up. The authors concluded the asthma program did not result in significant improvements to patient symptoms or QoL.
Hypertension			
Agarwal et al. ⁴	SR	Home BP monitoring with or without telemonitoring	Home BP monitoring resulted in more frequent medication reductions than clinic BP monitoring. Reductions in home BP monitoring were greater when using telemonitoring.
Verberk et al. ⁵	SR and MA	Telecare vs usual care	Systolic and diastolic BP showed significantly larger reductions in the telecare group. The authors concluded telecare may be a useful tool for hypertension management.
Bove et al. ¹⁵	RCT	Nurse management vs	BP and blood lipids were reduced in high and intermediate-risk patients. The addition of

Table 1: Summary of Included Studies

Authors	Study type	Interventions	Author's conclusions or recommendations
		nurse management + telemedicine	telemedicine did not change the effectiveness of the nursing management.
Neumann et al. ¹⁶	RCT	Telemetric BP monitoring vs usual care	Systolic BP decreased more in the telemetric BP monitoring group than in the control. After 3 months, the treatment group was receiving a higher mean dose of antihypertensive drug. The authors concluded titration of the antihypertensive was faster in the telemetric BP group.
Wakefield et al. ¹⁷	RCT	Nurse-managed home telehealth vs usual care (comorbid diabetes and hypertension)	Systolic BP was reduced significantly over 12 months in patients receiving high-intensity monitoring compared to low-intensity and usual care.
Earle et al. ¹⁸	RCT	Mobile telemonitoring vs usual care (comorbid diabetes and hypertension)	Systolic BP was significantly reduced in patients in the mobile telemonitoring group and did not change in the control group.
Han et al. ¹⁹	RCT	Bi-weekly vs monthly bilingual nurse telephone counseling over 12 months	Both groups showed improvements in medication adherence, reduced alcohol consumption, and increased exercise. No clinical outcomes were reported.
McCant et al. ²⁰	RCT	Home BP telemonitoring vs usual care	BP measurements were automatically transmitted. Alerts were generated if patients did not transmit the readings as required. The authors determined certain patients require more support than others in order to make the most of the monitoring services.
Parati et al. ²¹	RCT	Teletransmitted home blood pressure vs usual office blood pressure monitoring	Patients using home blood pressure teletransmission were better able to control ambulatory blood pressure than patients receiving usual care.
Carrasco et al. ²²	RCT	Telemedicine and GP text messages, vs usual care	Hypertension control was better in the intervention group but the difference was not significant. Measured systolic and diastolic BP were similar in both groups. The patient-GP text message interaction alone had very little effect on hypertension control.
Madsen et al. ²³	RCT	Telemonitoring of home BP vs usual care	Antihypertensive treatment was based on measured BP. Adjusting treatment based on self-measured BP was as effective as usual monitoring and adjustment in the physician's office.
Santamore et al. ²⁴	RCT	Telemedicine vs usual care	Systolic and diastolic BP values were similar between the two groups. The authors concluded the use of telemedicine was accurate and inexpensive.

Table 1: Summary of Included Studies

Authors	Study type	Interventions	Author's conclusions or recommendations
Mixed			
Pare et al. ⁶	SR	Home telemonitoring for management of chronic diseases (diabetes, asthma, heart failure, hypertension)	Studies investigating telemonitoring for asthma showed significant improvements across patient outcomes and QoL. Most studies involving telemonitoring for hypertension showed a reduction in systolic or diastolic BP.
AETMIS ⁷	SR	Home telemonitoring for management of diabetes, pulmonary diseases, and cardiovascular diseases	The studies included in the review found telemonitoring to be effective for hypertension and asthma. Telemonitoring resulted in a lower demand on healthcare resources for patients with COPD.
Jaana et al. ⁸	SR	Home telemonitoring for respiratory conditions	Telemonitoring resulted in early identification of changes in patient symptoms and disease control.

BP = blood pressure; COPD = chronic obstructive pulmonary disease; ED = emergency department; MA = meta-analysis; QoL = quality of life; RCT = randomized controlled trial; SR = systematic review

No guidelines were identified regarding the use of telecare for the management of COPD or hypertension. One guideline²⁵ for the management of asthma recommends adults and children be monitored by routine clinical review, at least once a year. Routine review via telephone may be considered. Improved communication between patient and care provider may improve compliance. The use of computers, web-based self-management programs, and nurse-led telephone-based self-management education may help to increase the regular use of medication.

REFERENCES SUMMARIZED

Health technology assessments

No literature identified.

Systematic reviews and meta-analyses

COPD

1. Bolton CE, Waters CS, Peirce S, Elwyn G. Insufficient evidence of benefit: a systematic review of home telemonitoring for COPD. *J Eval Clin Pract.* 2010 Sep 16. [PubMed: PM20846317](#)
2. 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](#)

Asthma

3. McLean S, Chandler D, Nurmatov U, Liu J, Pagliari C, Car J, et al. Telehealthcare for asthma. *Cochrane Database Syst Rev.* 2010;(10):CD007717. [PubMed: PM20927763](#)

Hypertension

4. Agarwal R, Bills JE, Hecht TJ, Light RP. Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control: a systematic review and meta-analysis. *Hypertension.* 2011 Jan;57(1):29-38. [PubMed: PM21115879](#)
5. Verberk WJ, Kessels AG, Thien T. Telecare is a valuable tool for hypertension management, a systematic review and meta-analysis. *Blood Press Monit.* 2011 Jun;16(3):149-55. [PubMed: PM21527847](#)

Mixed

6. Pare G, Moqadem K, Pineau G, St-Hilaire C. Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: a systematic review. *J Med Internet Res [Internet].* 2010 [cited 2011 May 13];12(2):e21. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2956232> [PubMed: PM20554500](#)
7. Paré G, Moqadem K, Pineau G, St-Hilaire C. Systematic review of the effects of home telemonitoring in the context of diabetes, pulmonary diseases and cardiovascular diseases [Internet]. Summary. Montreal: Agence d'évaluation des technologies et des modes d'intervention en santé (AETMIS); 2009. [cited 2011 May 13]. Available from: http://www.aetmis.gouv.qc.ca/site/phpwcms_filestorage/3b71f5915e1885970d1cf484d13e347e.pdf

Note : full-text is available in French only

8. Jaana M, Pare G, Sicotte C. Home telemonitoring for respiratory conditions: a systematic review. *Am J Manag Care.* 2009 May;15(5):313-20. [PubMed: PM19435399](#)

Randomized controlled trials

COPD

9. Lewis KE, Annandale JA, Warm DL, Hurlin C, Lewis MJ, Lewis L. Home telemonitoring and quality of life in stable, optimised chronic obstructive pulmonary disease. *J Telemed Telecare*. 2010 Jul;16(5):253-9. [PubMed: PM20483881](#)
10. Vitacca M, Bianchi L, Guerra A, Fracchia C, Spanevello A, Balbi B, et al. Tele-assistance in chronic respiratory failure patients: a randomised clinical trial. *Eur Respir J*. 2009 Feb;33(2):411-8. [PubMed: PM18799512](#)

Asthma

11. Xu C, Jackson M, Scuffham PA, Wootton R, Simpson P, Whitty J, et al. A randomized controlled trial of an interactive voice response telephone system and specialist nurse support for childhood asthma management. *J Asthma*. 2010 Sep;47(7):768-73. [PubMed: PM20716014](#)
12. de Jongste JC, Carraro S, Hop WC, CHARISM Study Group, Baraldi E. Daily telemonitoring of exhaled nitric oxide and symptoms in the treatment of childhood asthma. *Am J Respir Crit Care Med*. 2009 Jan 15;179(2):93-7. [PubMed: PM18931330](#)
13. Donald KJ, McBurney H, Teichtahl H, Irving L. A pilot study of telephone based asthma management. *Aust Fam Physician*. 2008 Mar;37(3):170-3. [PubMed: PM18345369](#)
14. Willems DC, Joore MA, Hendriks JJ, Nieman FH, Severens JL, Wouters EF. The effectiveness of nurse-led telemonitoring of asthma: results of a randomized controlled trial. *J Eval Clin Pract*. 2008 Aug;14(4):600-9. [PubMed: PM19126178](#)

Hypertension

15. Bove AA, Santamore WP, Homko C, Kashem A, Cross R, McConnell TR, et al. Reducing cardiovascular disease risk in medically underserved urban and rural communities. *Am Heart J*. 2011 Feb;161(2):351-9. [PubMed: PM21315219](#)
16. Neumann CL, Menne J, Rieken EM, Fischer N, Weber MH, Haller H, et al. Blood pressure telemonitoring is useful to achieve blood pressure control in inadequately treated patients with arterial hypertension. *J Hum Hypertens*. 2011 Jan 13. [PubMed: PM21228822](#)
17. Wakefield BJ, Holman JE, Ray A, Scherubel M, Adams MR, Hillis SL, et al. Effectiveness of Home Telehealth in Comorbid Diabetes and Hypertension: A Randomized, Controlled Trial. *Telemed J E Health*. 2011 Apr 10. [PubMed: PM21476945](#)
18. Earle KA, Istepanian RS, Zitouni K, Sungoor A, Tang B. Mobile telemonitoring for achieving tighter targets of blood pressure control in patients with complicated diabetes: a pilot study. *Diabetes Technol Ther*. 2010 Jul;12(7):575-9. [PubMed: PM20597833](#)

19. Han HR, Kim J, Kim KB, Jeong S, Levine D, Li C, et al. Implementation and success of nurse telephone counseling in linguistically isolated Korean American patients with high blood pressure. *Patient Educ Couns*. 2010 Jul;80(1):130-4. [PubMed: PM19945816](#)
20. McCant F, McKoy G, Grubber J, Olsen MK, Oddone E, Powers B, et al. Feasibility of blood pressure telemonitoring in patients with poor blood pressure control. *J Telemed Telecare*. 2009;15(6):281-5. [PubMed: PM19720764](#)
21. Parati G, Omboni S, Albini F, Piantoni L, Giuliano A, Revera M, et al. Home blood pressure telemonitoring improves hypertension control in general practice. The TeleBPCare study. *J Hypertens*. 2009 Jan;27(1):198-203. [PubMed: PM19145785](#)
22. Carrasco MP, Salvador CH, Sagredo PG, Marquez-Montes J, Gonzalez de Mingo MA, Fragua JA, et al. Impact of patient-general practitioner short-messages-based interaction on the control of hypertension in a follow-up service for low-to-medium risk hypertensive patients: a randomized controlled trial. *IEEE Trans Inf Technol Biomed*. 2008 Nov;12(6):780-91. [PubMed: PM19000959](#)
23. Madsen LB, Kirkegaard P, Pedersen EB. Blood pressure control during telemonitoring of home blood pressure. A randomized controlled trial during 6 months. *Blood Press*. 2008;17(2):78-86. [PubMed: PM18568696](#)
24. Santamore WP, Homko CJ, Kashem A, McConnell TR, Menapace FJ, Bove AA. Accuracy of blood pressure measurements transmitted through a telemedicine system in underserved populations. *Telemed J E Health*. 2008 May;14(4):333-8. [PubMed: PM18570561](#)

Guidelines and recommendations

25. British guideline on the management of asthma a national clinical guideline [Internet]. Edinburgh: Scottish Intercollegiate Guidelines Network; 2008 May. [cited 2011 May 13]. Available from: <http://www.sign.ac.uk/pdf/sign101.pdf>
See: 8.1.2 Structured Review, B, page 92, 9.2.2 Interventions to Improve Compliance and Concordance, page 99

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APPENDIX – FURTHER INFORMATION:

Systematic reviews – patient outcomes not reported

26. Bartoli L, Zanaboni P, Masella C, Ursini N. Systematic review of telemedicine services for patients affected by chronic obstructive pulmonary disease (COPD). *Telemed J E Health*. 2009 Nov;15(9):877-83. [PubMed: PM19919194](#)

Non-randomized studies

27. Madsen LB, Kirkegaard P, Pedersen EB. Health-related quality of life (SF-36) during telemonitoring of home blood pressure in hypertensive patients: a randomized, controlled study. *Blood Press*. 2008;17(4):227-32. [PubMed: PM18815937](#)
28. Mair FS, Hiscock J, Beaton SC. Understanding factors that inhibit or promote the utilization of telecare in chronic lung disease. *Chronic Illn*. 2008 Jun;4(2):110-7. [PubMed: PM18583448](#)

Policies and procedures

29. Telehealth monitoring of patients with heart failure and chronic obstructive pulmonary disease [Internet]. Dudley (UK): National Health Service, NHS Dudley; 2009. [cited 2011 May 13]. Available from: <http://www.nhsdudley.nhs.uk/sections/publications/documents%5CFOI30063939373.pdf>

Review articles

30. Huniche L, Dinesen B, Grann O, Toft E, Nielsen C. Empowering patients with COPD using Tele-homecare technology. *Stud Health Technol Inform*. 2010;155:48-54. [PubMed: PM20543309](#)
31. Garside P. Lessons from the US: using technology and homecare to improve chronic disease management [Internet]. Burton on Trent (UK): Healthcare at Home; 2010 May. [cited 2011 May 13]. Available from: <http://www.sw-atlanticone-hch.co.uk/Media/Assets/hah%20lessons%20from%20the%20us%20-%20for%20web.pdf>
32. Parati G, Omboni S. Role of home blood pressure telemonitoring in hypertension management: an update. *Blood Press Monit*. 2010 Dec;15(6):285-95. [PubMed: PM21084882](#)
33. Bibliography: home telehealth [Internet]. Boston (MA): VA Technology Assessment Program, Office of Patient Care Services ; 2011 Jun. [cited 2011 May 13]. Available from: <http://www.va.gov/VATAP/docs/Hometelehealth2010.pdf>
34. Haughney J, Small I. COPD in Scotland: the possible roles for telehealth [Internet]. Aberdeen (UK): The Scottish Centre for Telehealth; 2008. [cited 2011 May 13]. Available from: <http://www.sct.scot.nhs.uk/pdf/copd.pdf>