

## Evidence Review

### Telehomecare for Chronic Obstructive Pulmonary Disease Patients – Executive Summary

The World Health Organization (WHO) predicts that chronic obstructive pulmonary disease (COPD) will become the third leading cause of death worldwide by 2030.<sup>1</sup> In Canada, the cost of COPD hospitalizations is an estimated \$1.5 billion per year.<sup>2</sup> COPD significantly impacts patients in terms of their overall health, mobility and in their daily work and leisure activities.<sup>3</sup> Along with these demanding physical needs, COPD patients have major psychological and emotional needs, which are rarely met with the current model of care.<sup>4</sup> Exacerbations, “or periodic worsening of symptoms and lung function,”<sup>5</sup> negatively affect the patient’s quality of life.<sup>6</sup> Early treatment of COPD exacerbations can greatly improve patient outcomes<sup>7</sup>; therefore a model of care that allows for early recognition of exacerbations and timely delivery of effective treatments is needed.<sup>8</sup> A growing body of literature is endorsing that the use of Telehomecare (THC) may be practicable for providing care to COPD patients.<sup>5,8-13</sup>

#### Potential Benefits

THC has generated many benefits when used for patients with COPD (when compared to usual home care). The intervention has been shown to reduce:

- hospitalization days<sup>10</sup>
- hospitalization rates<sup>5,13</sup>
- clinic visits<sup>10</sup>
- emergency department (ED) visits<sup>13</sup>
- total number of exacerbations<sup>5</sup>
- and showed a trend of decreasing hospitalization days and outpatient visits.<sup>5</sup>

THC has also:

- increased patient attitude toward self-management<sup>11,14</sup>
- improved quality of life<sup>8,10,11</sup>
- improved and/or maintained patient functional status<sup>15</sup>
- potentially improved patient’s disease self-knowledge, self-management and medication compliance.<sup>5</sup>

In addition, both patients and healthcare providers are accepting of the technology<sup>5,10,11,12</sup> and are satisfied with the THC intervention.<sup>5,11</sup> The intervention gives patients better access to accurate health information<sup>14</sup>, while care providers can keep up-to-date records of all patient interactions, providing valuable information to the patient’s care team.<sup>12</sup> Another benefit attributed to THC is that more patients can receive quality care without necessarily increasing the workload of the care provider.<sup>12</sup>

Furthermore, a cost-minimization analysis of a THC program for patients with COPD found that THC resulted in 15% savings when compared to usual home care.<sup>16</sup> A randomized clinical trial reported that the overall cost per COPD patient was more than 50% cheaper when compared to usual home care.<sup>17</sup> Two other studies suggested that THC interventions have the potential to reduce healthcare costs, generally because of the reduction in hospitalizations due to the early recognition and treatment of exacerbations.<sup>8,11</sup>

### Potential Issues

Not all aspects of the THC interventions studied were completely successful. Some studies found varying results in terms of bed days of care<sup>11,13</sup> and no difference in terms of health related quality of life<sup>5</sup> and ED visits.<sup>11</sup> One study found the intervention group had a fewer number of hospitalizations, but when patients in the intervention group were hospitalized, it was for a significantly longer stay.<sup>16</sup> Another study found higher mortality among THC patients.<sup>13</sup> The authors of a systematic review examining six articles concluded that there was insufficient evidence supporting telemonitoring for COPD patients “given the inherent risk of bias in research of this nature and the low quality of studies overall, with heterogeneous populations and diverse outcome measures”.<sup>18</sup> Finally, an author cautioned that because of the remote monitoring and increased contact with healthcare providers, it is likely that outcomes may be influenced, to a certain extent, by a placebo effect.<sup>8</sup>

### Factors Limiting Success

Authors have made several suggestions as to why their interventions were less successful than expected. A recurring theme was the need to restructure the organization and work processes in order to reap the full benefits of a THC intervention. One study proposed that the lack of organizational change caused a decrease in potential savings caused by the new intervention.<sup>11</sup> In order for cost-effectiveness, productivity and quality of care to be optimized, THC technology must be properly aligned and integrated within a new model of care.<sup>14,19</sup> A systematic review identified three ways in which the introduction of THC technology should impact an organization. The changes include: “a redistribution of roles and duties; changes in processes and procedures; and variations in productivity and performance (particularly related to nursing resources).”<sup>14</sup> In addition, the number of home care providers delivering evidence-based care may be deficient, which can negatively affect the quality of care.<sup>4</sup> Similarly, communication skills are needed that “promote a collaborative approach to patient care”<sup>4</sup>, consequently creating a more patient-centred model of care.

### Keys to Success

Authors also conjectured several common factors that may have combined to attribute for the varying success of their interventions. First and foremost, authors found that remote monitoring provided early warnings of deterioration or the onset of an exacerbation, which helped lead to early treatments and the prevention of unnecessary hospitalizations.<sup>4,8</sup> A pilot study has shown that once sufficient data has been collected to determine the trends of a patient’s normal physiological parameters, regular monitoring of a patient’s heart rate and oxygen saturation can help healthcare providers better recognize the onset of COPD exacerbations.<sup>20</sup> In addition, a patient’s quality of life and healthcare utilization may have been improved by an enhanced ability to self-manage their COPD.<sup>5,8</sup> The improved quality of life and

high patient satisfaction may have also been caused by the increased contact with healthcare providers<sup>5,8</sup>, as well as the COPD-specific education provided during the intervention.<sup>8</sup>

OTN has used what can be learned from the available literature and past experiences in their own pilot program to create a comprehensive, holistic THC program grounded in best-evidence. Our THC nurses are trained to specifically promote chronic disease management, self-management and evidence-based patient education; using remote monitoring technology to track the patient's health status. By targeting at-risk patients with COPD as suggested by the literature<sup>9,17</sup>, we are providing these patients with the best chance of controlling their exacerbations to achieve an independent, higher quality of life. In addition, THC nurses collaborating with the patient's primary care team will allow for the development of effective, proactive care plans and will improve chronic disease management in Ontario. Finally, OTN was recently named as a Registered Nurses' Association of Ontario Best Practice Spotlight Organization, ensuring all care plans are based on current, clinical best practices. Collectively, these factors will contribute to better health, at home for patients living with COPD in Ontario.

## References

1. World Health Organization. Chronic obstructive pulmonary disease (COPD). <http://www.who.int/respiratory/copd/en/>. Updated September 14, 2011. Accessed June 5, 2012.
2. Mittmann N, Kuramoto L, Seung SJ, Haddon JM, Bradely-Kennedy C, FitzGerald JM. The cost of moderate and severe COPD exacerbations to the Canadian healthcare system. *Respir Med*. 2008;102:413-421.
3. Public Health Agency of Canada. *Fast facts about Chronic Obstructive Pulmonary Disease (COPD): Data compiled from the 2011 Survey on Living with Chronic Disease in Canada*. Public Health Agency of Canada. 2011.
4. Suter P, Hennessey B, Florez D, Suter WN. The home-based chronic care model: Redesigning home health for high quality care delivery. *Chron Respir Dis*. 2011;8(1):43-52.
5. Trappenburg JCA, Niesink A, de Weert-van Oene GH, et al. Effects of telemonitoring in patients with chronic obstructive pulmonary disease. *Telemed J e-Health*. 2008;14(2):138-146.
6. Seemungal TAR, Donaldson GC, Paul EA, Bestall JC, Jeffries DJ, Wedzicha JA. Effect of exacerbation on quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*. 1998;157:1418-1422.
7. Wilkinson TMA, Donaldson GC, Hurst JR, Seemungal TAR, Wedzicha JA. Early therapy improves outcomes of chronic obstructive pulmonary disease. *Am J Respir Crit Care Med*. 2004;169:1298-1303.
8. Koff PB, Jones RH, Cashman JM, Voelkel NF, Vandivier RW. Proactive integrated care improves quality of life in patients with COPD. *Eur Respir J*. 2009;33(5):1031-1038.
9. Bowles KH, Baugh AC. Applying Research Evidence to Optimize Telehomecare. *J Cardiovasc Nurs*. 2007;22(1):5-15.

10. Stachura ME, Khasanshina EV. Telehomecare and Remote Monitoring: An Outcomes Overview. Partners Healthcare Web site. <http://www.advamed.org/NR/rdonlyres/2250724C-5005-45CD-A3C9-0EC0CD3132A1/0/TelehomecarereportFNL103107.pdf>. October 31, 2007. Accessed May 24, 2012.
11. Sicotte C, Paré G, Morin S, Potvin J, Moreault MP. Effects of home telemonitoring to support improved care for chronic obstructive pulmonary diseases. *Telemed J e-Health*. 2011;17(2):95-103.
12. De Toledo P, Jiménez S, del Pozo F, Roca J, Alonso A, Hernandez C. Telemedicine experience for chronic care in COPD. *IEEE Trans. Inf. Technol. Biomed.* 2006;10(3):567-573. *J Telemed Telecare*. 2010;16(3):120-127.
13. Polisen J, Tran K, Cimon K, et al. Home telehealth for chronic obstructive pulmonary disease: a systematic review and meta-analysis.
14. 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;15(9):877-883.
15. Reis D. Daily home telemonitoring: an interdisciplinary model. Abstract. *Telemed J e-Health*. 2004;10(1):S-51.
16. Paré G, Sicotte C, St-Jules D, Gauthier R. Cost-minimization analysis of a telehomecare program for patients with chronic obstructive pulmonary disease. *Telemed J e-Health*. 2006;12(2):114-121.
17. Vitacca M, Bianchi L, Guerra A, et al. Tele-assistance in chronic respiratory failure patients: a randomized clinical trial. *Eur Respir J*. 2009;33(2):411-418.
18. Bolton CE, Waters CS, Peirce S, Elwyn G. Insufficient evidence of benefit: a systematic review of home telemonitoring for COPD. *J Eval Clin Pract*. 2011;17(6):1216-1222.
19. Dal Negro R. Optimizing economic outcomes in management of COPD. *Int J Chron Obstruct Pulmon Dis*. 2008;3(1):1-10.
20. Hurst JR, Donaldson GC, Quint JK, Goldring JJP, Patel ARC, Wedzicha JA. Domiciliary pulse-oximetry at exacerbation of chronic obstructive pulmonary disease: prospective pilot study. *BMC Pulm Med*. 2010;10(1):52-62.