

Is there a connection between telehomecare technology and health literacy?

Lisa Korsbakke Emtækær Hæsum^a, Lars Ehlers^b, Ole K Hejlesen^{a,c,d}

^a Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Denmark

^b Centre of Improvement in Health Care, Faculty of Social Sciences and Faculty of Medicine, Aalborg University, Denmark

^c Department of Health and Nursing Science, University of Agder, Kristiansand, Norway

^d Department of Computer Science, University of Tromsø, Tromsø, Norway

Abstract

Chronic obstructive pulmonary disease (COPD) is a chronic disease characterised by a gradual decline of pulmonary function and it constitutes a provable burden on both society and patients. Patient empowerment is recognised as an essential part in the management of COPD, as there is a strong connection between this concept and a reduction in the utilisation of various healthcare services. Telehomecare technology has been shown to enhance the level of empowerment among COPD patients. Patient empowerment is strongly associated with health literacy, so if telehomecare technologies are used to improve the level of health literacy among COPD patients it may be possible to provide a better and more individual care for COPD patients and at the same time reducing healthcare costs. Both health literacy and telehomecare technologies have shown great potential in terms of reducing healthcare costs and improving quality of life for COPD patients, so the aim of this paper is actually to raise awareness regarding the potential of using telehomecare technology to improve the level of health literacy among COPD patients.

Keywords: Health literacy, patient empowerment, education, patient-centered care, COPD, quality of life.

Introduction

During the last decade, there has been an increase in the transition from acute to chronic health problems in the society - thereby producing a need for new skills in the healthcare system. The chronic patient is a complex case due to progressive functional decline, a high risk of hospitalisations, multiple co morbidities and difficult individualised diagnoses and prognoses. This raises a need for making existing treatment more individual and preventive - urging the healthcare system to try and meet the needs of chronic patients (1).

Chronic obstructive pulmonary disease (COPD) is a chronic disease characterised by a gradual decline of pulmonary function and it constitutes a provable burden on healthcare professionals and healthcare systems (2) (3). The Global Burden of Disease study, conducted under the auspices of the World Health Organisation (WHO) and the World Bank, states that COPD was the fourth leading cause of death in the world in 2007 with almost 2.8 million deaths worldwide (3). In 2004, WHO estimated that 64 million people suffered from COPD and 3 million people died of the disease. In their estimations from 2004, WHO also predicts that COPD will become the third leading cause of death worldwide by 2030 (4).

In Denmark approximately 400.000 people suffer from COPD, and COPD patients account for about 20% of acute admissions to medical wards. The readmissions rate for COPD patients within the first month is 24% (5). COPD is primarily seen in the elder part of the population, and due to development and improvement in science and technology and enhancement of social conditions in general, the life expectancy is increasing around the world (6). This leads to an ageing population all over the world, which in turn contributes to an increase in the prevalence of COPD. The changing age structure combined with an increasing use of cigarettes has led to the estimation that the global burden of COPD will increase over the coming years (7), which is in accordance with prior predictions made by WHO in 2004.

It is because of frequent and lengthy hospital admissions that COPD comprise such a serious increasing burden on society and healthcare resources. Lengthy hospital admissions increase the risk of acquiring a secondary hospital infection, and hence the possibility of escalating treatment costs (2). An investigation from 2002 estimated the costs related to COPD to get a picture of how heavily COPD weights on the Danish healthcare budget. These costs were estimated to be approximately 3 billion Danish kroner corresponding to about 10 % of the total hospital and national health insurance costs when treating persons at 40 years or above in Denmark – so COPD weights heavily on the healthcare resources (8).

COPD does not only place a burden on society and healthcare resources, but also on the COPD patients. COPD patients experience a gradual deterioration in their health, resulting in a limitation of activity of daily living and decrease in their health-related quality of life (HRQoL) – especially due to exacerbations (9). The increasing burden and massive costs, COPD places on society, provide a strong motivation to develop less costly and more effective ways to care for COPD patients (6).

A variety of guidelines have been developed with the purpose of improving the management of COPD – but have we succeeded in finding a possible solution that can lift the burden of COPD – both from a societal and patient point of view?

Patient empowerment concerns the ability of patients' to be an active part of their own health care process, and thus be well informed about all aspects of their health (29). Currently, there is a focus on patient empowerment and giving the patients' somewhat more control over their own disease. Patient education with the purpose of enhancing the level of empowerment is recognised as an essential part of the management of COPD, as it is recommended in various articles as well as both national and international guidelines (5, 7, 15).

It is beneficial to focus on enhancing the level of empowerment among COPD patients, since there is a strong connection between this concept and a reduction in the utilisation of various healthcare services (3, 10, 11). Furthermore, there is a connection between enhanced patient empowerment and improved HRQoL (11, 12).

Disease knowledge is often an overused outcome when evaluating self-management education programmes for COPD patients. Disease knowledge is a weak less effective outcome measure compared to comprehensive patient empowerment interventions addressing patient education, health literacy, motivation and behavioural changes (10).

Telehomecare technology is a field of research that is kind of unexplored, but it has shown some potential with regards to enhancing the level of empowerment among COPD patients (6, 17).

Health literacy is a concept closely connected to empowerment and it is defined as following by WHO: *“Health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health. Health literacy implies the achievement of a level of knowledge, personal skills and confidence to take action to improve personal and community health by changing personal lifestyles and living conditions. Health literacy means more than being able to read pamphlets and successfully make appointments. By improving people’s access to health information and their capacity to use it effectively, health literacy is critical to empowerment. Health literacy is itself dependent upon more general levels of literacy. Poor literacy can affect people’s health directly by limiting their personal, social and cultural development, as well as hindering the development of health literacy.”* (23).

This knowledge has given rise to the purpose of this paper: to increase awareness about the importance of focusing more on the level of health literacy among COPD patients, as this may hold some potential in terms of reducing utilisation of healthcare services. The use of telehomecare technologies has been shown to improve the level of empowerment among COPD patients, leading to the hypothesis: ***If telehomecare technologies are able to enhance the level of patient empowerment, it could have the potential to improve the level of health literacy among COPD patients as well.***

Materials and Methods

Systematic literature search

A literature search was conducted in two electronic medical databases: PubMed (Medline) and the Cochrane Library (only reviews).

The references, identified by the search strategy, were screened by title and abstract. In order for the articles to be selected for further reading, their abstracts had to clearly identify the study design, an appropriate population and relevant components of the intervention as described above. Clearly irrelevant references were excluded.

The full-text reports of all remaining trials obtained and assessed independently for eligibility. The literature search was centred on three fields:

Search 1: COPD and patient empowerment (health literacy)

PubMed: 82, selected 6; Cochrane: 15, selected 1; other: 5.

Search 2: Telehomecare technologies and patient empowerment

PubMed: 16 selected 5; Cochrane 1, selected 0.

Search 3: Telehomecare technologies and health outcomes

PubMed: 6 selected 4; Cochrane 3, selected 0; other: 4.

Criteria for selected articles and reviews in all three searches

- Literature published from 2002-2012
- COPD patients as target group
- Language: English, Scandinavian
- Meta-analysis, reviews, RCT studies or original research

Search 1: COPD and patient empowerment (health literacy)

The purpose of the search

To get a picture of the tendency in the literature with regards to the importance of enhancing empowerment among COPD patients. How does current literature evaluate the importance of patient empowerment in the management of COPD? The clinical guidelines concerning the management of COPD were investigated to see how empowerment is incorporated in these. As patient empowerment is associated with the concept of health literacy, this search also explored the relationship between COPD and health literacy with the purpose of determining if COPD patients has some characteristics that influences their level of health literacy.

The use of telehomecare technologies is said to enhance the level of empowerment among COPD patients, but it is relevant to get a sense of how important empowerment actually is in the management of COPD according to the literature.

The search was based on the following words

[“Chronic obstructive pulmonary disease” or “chronic obstructive lung disease” or COPD] and [“health literacy” or “literacy” or “patient education” or “self-management” or “patient empowerment”]

Criteria for selected articles and reviews

The studies had to include a patient education with the purpose of enhancing the level of empowerment among COPD patients.

Studies that assessed how the level of health literacy affects the course and management of disease among COPD patients were also selected for inclusion.

Search 2: The use of telehomecare technologies and patient empowerment

The purpose of the search

The purpose was to explore the literature with regards to the effect of telehomecare technologies in terms of enhancing the level of patient empowerment. Patient empowerment was found to be important in the management of COPD in the previous search (**Search 1**), so now it is relevant to investigate if the use of telehomecare technologies has the potential to enhance the level of patient empowerment among COPD

patients.

The search was based on the following words

[telemedicine or telehomecare or “home telehealth” or telemonito? or “home healthcare”] and [“chronic obstructive lung” or “chronic obstructive pulmonary” or COPD] and [“patient education” or “self-management” or “empowerment”]

Criteria for selected articles and reviews

The intervention had to fall in the landscape of telehomecare technologies. There is no sharp defined differentiation between patient empowerment and self-management in the literature, so both concepts are included in the search.

Outcomes of interest in this line of studies:

- Patient education programmes with the purpose of enhancing the level of empowerment among COPD patients.

Search 3: The use of telehomecare technologies among and health outcomes

The purpose of the search

To identify articles and reviews that assessed how telehomecare technologies affect health outcomes among COPD patients. This line of investigation was relevant due to the hypothesis that there is a connection between the use of telehomecare technologies and health outcomes in terms of reduced utilisation of healthcare services and improved quality of life among COPD patients.

The search was based on the following words

[telemedicine or telehomecare or “home telehealth” or telemonito? or “home healthcare”] and [“chronic obstructive pulmonary” or “chronic obstructive lung” or COPD] and [“economic evaluation” or “economic assessment” or “cost minimization analysis” or “cost effectiveness analysis” or “cost utility analysis” or “cost benefit analysis”].

Criteria for selected articles and reviews

Articles and reviews that included an economic evaluation with following **outcomes of interest**:

- Hospital admissions
- Visits to the emergency room
- Health-related quality of life (HRQoL)

Results

The result section is based on an analysis of selected articles and reviews identified through the three literature searches:

1. *COPD and patient empowerment (health literacy).*
2. *The use of telehomecare technologies and patient empowerment.*
3. *The use of telehomecare technologies and health outcomes.*

COPD and patient empowerment (health literacy)

Health literacy is shown to be strongly associated with healthcare outcomes. The overall tendency in the literature is that a low level of health literacy is associated with poorer health outcomes and poorer use of healthcare services (25).

Additionally, as implied in the definition, patient empowerment is a key component when discussing health literacy, as there is a strong connection between these concepts - health literacy is crucial to empower COPD patients in the management of their own disease and course of rehabilitation. COPD patients experience great impairment in their everyday life in terms of deterioration in cognitive function, increasing isolation, difficulties with walking and performing everyday activities resulting in a decrease in their quality of life (24). Therefore, patient empowerment has become an important term when discussing management of COPD. Over time, patient education, with the purpose of enhancing patient empowerment, has been incorporated into various clinical guidelines describing the management of COPD (9).

WHO recognises patient education as an essential part in the management of COPD; they state that both COPD patients and healthcare professionals need to learn more about the disease (15).

The Global Initiative for Chronic Obstructive Lung Disease (GOLD), established in the 1990's with the purpose of raising awareness of COPD and encouraging renewed research interest in this very prevalent disease, also emphasises patient education as a part of their global strategy for the diagnosis, management, and prevention of COPD (7).

On the national level, The Danish National Board of Health published a report in 2007 that also recommends patient education with regards to early detection, treatment and rehabilitation of COPD (5). Hence, consensus exists between international and national guidelines and recommendations.

The guidelines and recommendations concerning patient education as a part of the management of COPD from the three abovementioned organisations are of course based on documentation from the literature, as the benefits and importance of patient education is widely accepted in relation to COPD (16).

Based on the review of the literature it can be said that patient empowerment is recognised as an important factor in the management of COPD. Additionally, there is a connection between patient empowerment and health literacy.

As stated by Richard Wootton: *“Telehomecare technologies have a primary function of providing education to patients”* (14) – the interesting questions are then:

- **Can telehomecare technologies affect the level of patient empowerment COPD patients?**
- **Can the use of telehomecare technologies influence the utilisation of healthcare services among COPD patients?**

The use of telehomecare technologies and patient empowerment

Richard Wootton states that one of the main functions of telehomecare technologies is to provide education to the patients, and thereby enhancing their level of empowerment (14). Furthermore, telehomecare technologies have in general been known to hold a great deal of potential when it comes to

dealing with the burden of COPD. Telehomecare technologies include various aspects: a remote exchange of data between a patient and healthcare professionals – enabling easy information transfer – as a part of the COPD patient's healthcare management. The rapid information transfer is referred to as telemonitoring in the landscape of telemedicine (13, 14). As the field of telehomecare is relatively new field of research, only a limited amount of literature exists on the subject of how it affects the level of empowerment among COPD patients. Although, no final conclusions can be made and a solid evidence base is lacking then telehomecare technologies still shows a tendency towards positive results in the literature.

The overall tendency, in the existing literature regarding telehomecare technologies and patient empowerment, is that the COPD patients benefit from using the telehomecare technology in various ways. For instance, COPD patients feel empowered in the management of their own disease due to the direct involvement in their own care process. The direct involvement improves the knowledge about their disease and contributes to the feeling of empowerment among the COPD patients (6, 17). The COPD patients' experience that the telehomecare technologies provide them with a sense of control over their disease, and at the same time inspires them to take charge and do something about their symptoms, in terms of self-monitoring, gaining better access to information about their disease and understand the level of benefit associated with being in charge (18). Another advantage by using the telehomecare technologies is a sense of improved compliance with treatment among COPD patients (19). A recent study from 2012 states that telehomecare technologies can assist the COPD patients' in a better management of their condition, resulting in a decrease in the incidence of acute exacerbations that need emergency admissions (13). An important component in the management of COPD is to provoke some behavioural changes among the COPD patients; they need to be ready to make a change in their lifestyle in order for the treatment and rehabilitation to work properly. A connection between telehomecare technologies and altered patient behaviour has been found (13, 20).

The review of the literature implied a strong association between the use of telehomecare technologies and an enhanced level of empowerment among COPD patients

The use of telehomecare technologies and health outcomes

In order for COPD patients to benefit from their treatment and rehabilitation as much as possible, they need to understand the extent and severity of their disease. Hence, understanding the information given from the healthcare sectors constitutes an important element. However, the role of health literacy in the management of COPD has not received much attention; especially how health literacy could influence health status and health outcomes among COPD patients has not been well elucidated (28).

A review with focus on chronic diseases, including COPD, finds that health literacy can influence health outcomes considerably and that improvement can be made by paying attention to the problem (26). The centre for Health Care Strategies states that patients diagnosed with a chronic disease, including COPD, are at higher risk of having a low level of health literacy and less likely to receive the needed health care (27).

It is known that telehomecare technologies do not only affect the level of empowerment among COPD patients, but they have also been shown to reduce healthcare costs. In addition,

it seems that telehomecare technologies improve or do not affect quality of life among COPD patients (19, 21, 22).

The review of the literature indicates that the use of telehomecare technologies is associated with a reduction in the consumption of health utilities among COPD patients.

Discussion

Patient education is an essential component in the management of COPD in terms of enhancing the level of empowerment among COPD patients. Existing literature implies that the use of telehomecare technologies have the potential to empower and enhance the level of empowerment among COPD patients, with regards to being more in control of their own disease, behavioural changes, compliance etc. These are important findings in relation to reducing the massive burden COPD poses on both society and the patients. On the basis of these findings it can be said that it is essential to focus on initiatives that enhances the level of empowerment among COPD patients. The definition of health literacy includes components of empowerment; therefore it could be beneficial both from a societal and patient point of view to focus more on the concept of health literacy in relation to COPD patients, as both the concept itself and enhanced patient empowerment have been shown to have a positive effect on the utilisation of healthcare resources. The use of various telehomecare technologies have been shown to reduce the healthcare costs and increase quality of life among COPD patients, and since telehomecare technologies also have shown to enhance the level of patient empowerment among COPD patients maybe connecting all of this to the concept of health literacy could be very beneficial.

It can be said that as the use of telehomecare technologies enhance the level of empowerment among COPD patients, they may also hold a great potential in terms of enhancing the level of health literacy among COPD patients. Health literacy has been shown to be strongly associated with health outcomes in the existing literature, just as telehomecare technologies. So by combining these two concepts – meaning if telehomecare technologies is used to improve the level of health literacy among COPD patients it may be possible to provide a better more individual care for the COPD patients and at the same time reducing the healthcare costs. Both health literacy and telehomecare technologies has shown great potential in terms of reducing healthcare costs and improving quality of life for COPD patients, so the objective of this paper is actually to raise awareness regarding the potential a combination of the two could hold.

Conclusion

Patient empowerment is recognised as a key component in the management of COPD. There is a strong association between telehomecare technology and an enhanced level of empowerment among COPD patients. Telehomecare technology has been shown to reduce healthcare costs. A poor level of health literacy leads to poor health outcomes. Hence, if telehomecare technology is used to improve the level of health literacy among COPD patients it could increase their quality of life and reduce healthcare costs for society

Implications for future research

Currently no studies have investigated the connection between health literacy and telehomecare technologies, but the findings

regarding the two concepts separately indicates that it may be beneficial to investigate this connection.

Conducting research about the connection between health literacy and telehomecare technologies could comprise an important key point in solving the puzzle of managing COPD in a less costly and patient satisfactory way.

References

- [1] Vitacca, M., L. Comini, and S. Scalvini, *Is teleassistance for respiratory care valuable? Considering the case for a 'virtual hospital'*. Expert review of respiratory medicine, 2010. **4**(6): p. 695-7.
- [2] Gordoys, A., P. Scuffham, and D. Gibbons, *The cost-effectiveness of outreach respiratory care for COPD patients*. Professional nurse, 2002. **17**(8): p. 504-7.
- [3] Effing T et al. *Self-management education for patients with chronic obstructive pulmonary disease (review)*. The Cochrane Library 2007, Issue 4.
- [4] <http://www.who.int/respiratory/copd/en/index.html>
- [5] Sundhedsstyrelsen, *Anbefalinger for KOL - Kronisk obstruktiv lungesygdom Anbefalinger for tidlig opsporing, opfølgning, behandling og rehabilitering*, 2007.
- [6] Pare, G., M. Jaana, and C. Sicotte, *Systematic review of home telemonitoring for chronic diseases: the evidence base*. Journal of the American Medical Informatics Association: JAMIA, 2007. **14**(3): p. 269-77.
- [7] Global initiative for chronic obstructive lung disease, *Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease .HLBI/WHO workshop report*, 2001, National heart, lung and blood institute
- [8] Bilde, L. and A.R. Svenning, *Omkostninger ved behandling af patienter med kronisk obstruktiv lungesygdom (KOL)*, 2004, DSI institut for sundhedsvæsen.
- [9] Philip M Gold. *The 2007 GOLD Guidelines: A Comprehensive Care Framework*. August 2009. Respiratory Care, vol. 54 No8.
- [10] Fromer, Len. *Implementing chronic care for COPD: planned visits, care coordination, and patient empowerment for improved outcomes*. International journal of COPD 2011.
- [11] Labrecque, M et al. *Can a self-management education program for patients with chronic obstructive pulmonary disease improve quality of life?*. Can Respir J Vol 18 No 5 September/October 2011.
- [12] Steuten LMG et al. *Identifying potentially cost effective chronic care programs for people with COPD*. International Journal of COPD 2009;4 87 – 100.
- [13] Steventon, A et al. *Effect of telehealth on use of secondary care and mortality: findings from the Whole System Demonstrator cluster randomised trial*, 2012, BMJ
- [14] Wooton, Richard. *Twenty years of telemedicine in chronic disease management – an evidence synthesis. 2012*, Journal of Telemedicine and Telecare.
- [15] <http://www.who.int/respiratory/copd/management/en/index.html>
- [16] Gallefoss F, Bakke PS. *Cost-benefit and cost-effectiveness analysis of selfmanagement in patients with COPD – a 1-year follow-up randomised controlled trial*. Respir Med 2002;96:424 – 31.
- [17] Whitten, P. and M. Mickus, *Home telecare for COPD/CHF patients: outcomes and perceptions*. Journal of telemedicine and telecare, 2007. **13**(2): p. 69-73.
- [18] Horton, K., *The use of telecare for people with chronic obstructive pulmonary disease: implications for management*. Journal of nursing management, 2008. **16**(2): p. 173-80.
- [19] Rojas, S.V. and M.P. Gagnon, *A systematic review of the key indicators for assessing telehomecare cost-effectiveness*. Telemedicine journal and e-health : the official journal of the American Telemedicine Association, 2008. **14**(9): p. 896-904.
- [20] Pare, G., et al., *Cost-minimization analysis of a telehomecare program for patients with chronic obstructive pulmonary disease*. Telemedicine journal and e-health : the official journal of the American Telemedicine Association, 2006. **12**(2): p. 114-21.
- [21] Polisen, J., et al., *Home telehealth for chronic disease management: a systematic review and an analysis of economic evaluations*. International journal of technology assessment in health care, 2009. **25**(3): p. 339-49.
- [22] Bolton, C.E., et al., *Insufficient evidence of benefit: a systematic review of home telemonitoring for COPD*. Journal of evaluation in clinical practice, 2010.
- [23] Nutbeam D. *Health promotion glossary*. Health Promot. Int. 1998; 13(4):349- 64.
- [24] Jassem E, et al. *Integrated care for patients with advanced chronic obstructive pulmonary disease: a new approach to organization*. Medycyna Praktyczna, 2010.
- [25] Berkman N et al. *Low Health Literacy and Health Outcomes: An Updated Systematic Review*. 2011.
- [26] Roberts et al. *Health literacy in COPD*. 2008. International Journal of COPD.
- [27] Centre for Health Care Strategies. 2008. *Centre for Health Care Strategies, Health Literacy Factsheets (online)*. Assessed 10-12-2012 http://www.chcs.org/publications3960/publications_show.htm?doc_id=291711
- [28] Omachi et al. *Health Literacy and Outcomes in COPD*. 2012. J Gen Intern Med
- [29] <http://medical-dictionary.thefreedictionary.com/patient+empowerment>

Address for correspondence

Lisa Korsbakke Emtækær Hæsum
Department of Health Science and Technology
Fredrik Bajers Vej 7, bygning C1
Aalborg University
9220 Aalborg East
Email: lkeh@hst.aau.dk
Mobil: 29763619
Fax (+45) 98154008