Evidence for Effective and Accessible Online Patient Education to Cope with Chronic Disease

Amy Hoberg

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Evidence for Effective and Accessible Online Patient Education to Cope with Chronic Disease

By

Amy E. Hoberg

Bachelor of Science in Nursing, University of Minnesota, 2009

An Independent Study
Submitted to Graduate Faculty
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University of North Dakota
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Title: Evidence for Effective and Accessible Online Patient Education to Cope with Chronic Disease

Department Nursing

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Date: January 10th, 2017
Abstract

Objective: Chronic disease is a leading cause of disability and death. It is estimated that 117 million Americans suffer from at least one chronic disease and one in four Americans suffer from multiple chronic diseases (Centers for Disease Control and Prevention, 2016). For those individuals suffering from chronic disease, the Internet allows for easy access to health information. Online communities and self-management programs have been shown to have a positive impact (van Kruiissen et al, 2015). However, there is little information about what makes this education effective or how the education is designed to fit the unique learning styles of the individual.

Design: A comprehensive literature review evaluating the strengths and weaknesses of the evidence for effective and accessible patient education online related to chronic diseases and the need for self-care to manage these complex conditions.

Data Sources: A search of the literature focusing on accessibility of online patient education specifically focused on self-care in individuals suffering from chronic disease published in English using the electronic databases of CINAHL, PubMed and Google Scholar. Limitations of the review included evidence published between 2002-2016 using the following key words “patient education,” “chronic disease,” “learning styles/preferences,” and “online health education”

Results: The methodology and results of 30 peer-reviewed articles have been critically analyzed with 11 articles meeting the inclusion criteria. The literature is organized by the Melnyk Pyramid and further classified by the concept of self-efficacy. The current evidence indicates that online delivery is an effective and convenient modality for individuals to find health information including those suffering from chronic diseases. Education specific to learning styles is effective in traditional education settings. However, there is no current evidence that addressed this topic in online settings.

Conclusions: Although there is widespread availability of health information online, this literature review has currently found lacking evidence to determine the influence of learning styles on the effectiveness of online patient education. The inclusion of learning style specific education could improve online educational material for those suffering from chronic conditions. This is an area that needs further research.
Introduction

The ability to care for one’s self is essential to those who suffer from a chronic illness (Riegel, Jaarsma, Strömber, 2012). Motivation and confidence can influence the ability for self-care (Riegel et al., 2012). Equally as important, is access to information necessary for an individual to gain essential knowledge and skills to engage in self-care (Reigel et al., 2012). Online patient education can offer access to information to support learning needs of individuals suffering from chronic diseases and conditions. Yet the effect of the structure and organization of online patient education, relative to learning styles and educational needs is unclear. This project sought to critically analyze available evidence for best practices that result in effective online patient education. Through the lens of self-efficacy, recommendations are made to improve the delivery of patient education and the resulting learning outcomes.

Self-Care and Self-Management in Chronic Illness

Chronic disease is a leading cause of disability and death. Due to increases in life expectancy, the number of individuals suffering from these diseases is expected to rise (DuGoff, Canudas-Romo, Buttorff, Leff & Anderson, 2014). In the United States, it is estimated that 117 million Americans suffer from at least one chronic disease and one in four Americans suffer from multiple chronic diseases (Centers for Disease Control and Prevention, 2016). According to the Centers for Disease Control and Prevention (CDC), in 2010, approximately 86% of all healthcare dollars spent in the United States was to care for those suffering from one or more chronic diseases (CDC, 2016).

Self-care is crucial for patients faced with chronic disease (Riegel et al., 2012). The benefits of effective self-care have been shown in a variety of chronic conditions including diabetes, coronary heart disease, heart failure and rheumatoid arthritis. The actions taken to
improve self-care have shown advances in individual self-efficacy, patient satisfaction, coping skills and opinions of social support (Adams, 2010).

Kralik, Price & Telford (2010) defined self-care as the “process of people learning ways to adapt to the changes that are taking place in their life because of illness and to learn ways to deal with all that living with a chronic disease entails, including symptoms, treatment, physical and social consequences and lifestyle changes and disruptions” (p. 198). The goals of self-care in the management of chronic disease include not only reducing physical symptoms and enhancing treatment, but also to manage the changes in lifestyle and resultant psychosocial impact (van Kruissen, 2015).

Self-management requires a person to have the ability to participate in self-monitoring. Self-monitoring involves monitoring individual physical and emotional symptoms to determine if action is necessary (Riegel et al, 2012). Self-management also involves appraisal of the identified changes in symptoms and to make decisions about needed action (Riegel et al., 2012). Self-management and preventative health programs for individuals with chronic diseases concentrate on encouraging knowledgeable and healthy lifestyle choices, controlling potential risk factors, and encouraging active patient involvement in chronic disease management (Adams, 2010).

**Barriers to Self-Care and Self-Management in Chronic Illness**

Patients must be educated about diseases and treatments to be prepared for self-care and management (Riegel et al., 2012). However, accessibility to patient education presents another consideration for those whose daily lives are consumed by trying to cope with a chronic disease. Barriers to self-care in chronic disease are multifactorial and also impede learning about self-care. These barriers include physical ailments associated with the disease process, psychological
issues including lack of self-efficacy, cognitive barriers such as low health literacy, low socioeconomic status and lack of family support (Baumann & Dang, 2012).

Health literacy is a consideration when studying the barriers of self-care and self-management in individuals suffering from a chronic disease (Sarkar et al, 2010). Although the scope of this paper does not focus on health literacy, the definition of this concept is important to include when examining potential barriers for effective patient education. The World Health Organization (2016) defines health literacy as 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” (para. 1). This concept includes being able to read information, but also involves the ability to comprehend educational information and subsequently influence decisions based on an individual’s lifestyle (World Health Organization, 2016).

A lack of health literacy in an individual has been identified as a possible obstacle to active participation in health care. Low levels of health literacy have also been linked to less effective self-care and increased difficulty learning new skills and new information. For an individual to participate in self-care, there needs to be a knowledge base of the disease or condition. Health literacy affects the ability to acquire this knowledge (Baumann & Dang, 2012) and inadequate health literacy can hinder access to valid and factual information related to patient education (Sarkar et al, 2010).

Individuals attempt to overcome access barriers by searching for information online and on the Internet. It is estimated that nearly 8 million people utilize the Internet to obtain information related to health education on a daily basis (Eltorai, Sharma, Wang & Daniels, 2015). On the other hand, older adults, African Americans and Hispanics and those that live in
rural areas are less likely to utilize the Internet (Perrin & Duggan, 2015). Although, the “digital gap” has narrowed and access to the Internet is becoming more common in all populations (Perrin & Duggan, 2015), individuals with chronic disease are less likely to have access to the Internet (Fox & Purcell, 2010).

**Confidence, Motivation and Online Access to Patient Education and Support**

Confidence is related to self-efficacy and refers to a personal ability and belief that a behavior can be performed or maintained regardless of barriers (Riegel et al, 2012). Motivation, regarding chronic illness, can be intrinsic or extrinsic in nature. Intrinsic motivation comes from inside of an individual. In contrast, extrinsic motivation results in a behavior change for achieving an external outcome. In the early stages of behavior change, self-care actions are primarily initiated by extrinsic motivation (Riegel et al, 2012). Individuals with chronic diseases cite lack of access to the Internet, not a lack of interest in a health-related topic as affecting their ability to get health information (Fox & Purcell, 2010). Easy access to reliable health information could serve as an extrinsic motivator for acquiring sufficient information to stimulate action. A survey-designed study found that after getting access to the Internet, individuals with chronic disease, were more likely to share information related to their disease processes, as well as learning from others suffering from similar illness (Fox & Purcell, 2010).

Online resources allow individuals suffering from chronic disease to search for health-related information. The goals of online communities and self-management programs coupled with online peer support with health information are to guide behavior change and support effective decision-making processes (Adams, 2010). Online communities and self-management programs have demonstrated a positive impact on disease progression and support for self-care for those with chronic diseases (van Kruiissen et al, 2015). Ultimately, evidence-based health
programs for those with chronic illness have resulted in improved health outcomes and reduced hospitalizations (Glanz, Rimer & Wiswanath, 2008). For online communities to be relevant, individuals with chronic diseases need to have confidence, motivation and access for seeking out educational information related to their respective conditions.

**Self-Efficacy**

The Social Cognitive Theory asserts that human behavior is influenced by the environment and behavior, but is also learned by observing others (Bandura, 1977). Self-efficacy is a main tenant of this theory and is defined as “the foundation for motivation and accomplishment; unless a person believes that his or her actions will produce the desired outcomes, that person has little incentive to act or to overcome obstacles” (Willis, 2016, p. 300).

According to Bandura (1977), self-efficacy is primarily derived from four areas: (a) performance accomplishments, (b) vicarious experience, (c) verbal persuasion and (d) psychological states. Performance accomplishments refer to personal experiences, such that previous successes will result in gaining motivation to perform the behavior again. Conversely, negative associations with a behavior will decrease motivation to engage in it in the future. Vicarious experience suggests that witnessing another person successfully performing a behavior can increase the self-efficacy in the observer. Conversely, observing another person unsuccessfully attempting to reach a goal will decrease self-efficacy in the witness and hinder the belief that he or she might successfully achieve the same goal. Verbal persuasion is the effect of positive and negative feedback from support systems such that positive feedback will improve the perception of self-efficacy. Negative feedback, in contrast, will reduce self-efficacy. The fourth area affecting self-efficacy is psychological factors. These include a person’s unique emotions and the effect on behavior. For example, self-efficacy may be decreased when an
individual is frustrated or dealing with other emotional obstacles. Conversely, an overall feeling of happiness can increase self-efficacy and result in more effective performance of health behaviors (Bandura, 1977).

**Self-Efficacy, Learning Styles and Online Patient Education**

Patient characteristics that are necessary to drive an individual to seek education online include motivation, confidence and self-efficacy. For education to be effective, the values and unique characteristics, including the level of self-efficacy of the patient need to be considered in planning education. For example, self-efficacy can have positive or negative effects on whether or not an individual will engage in healthy behaviors. It can also influence the termination of negative health behaviors and have an impact on the maintenance of learned health behavior (Glanz et al, 2008; Riegel et al., 2012). Similarly, self-efficacy may be especially important to determine if an individual will seek out and utilize online health information related to chronic disease (Willis, 2016). Self-efficacy in the individual learner drives motivation to learn. If an individual has positive experiences with online health information, it is possible that he or she is more likely to continue to search for health education online, while on the other hand a negative experience accessing health education will make the patient less likely to utilize that resource in the future (Bandura, 1977).

Self-efficacy in education promotes independent and engaged learning when changing behaviors (Artino, 2012). However, engagement on behalf of the individual is crucial to ensure understanding of the benefits of health education (Adams, 2010). This is the point that the individual preference for learning or learning styles becomes critical to add to the equation of effective online patient education. Research has indicated that the adult learner prefers active involvement in the learning process. Active participation in the adult learner results in “longer
term recall, synthesis, and problem solving skills than learning with verbal instruction only” (Russell, 2006, p. 352). Along with being actively involved, it is crucial to provide practical and useful information that the adult learner can apply to real life situations. Although there are consistent characteristics and approaches to educating the adult learner, individual differences and learning styles and preferences can also influence the learning outcome (Russell, 2006).

Learning styles describe the different ways in which individuals learn. The concept of learning styles was defined as “characteristic cognitive, effective and psychosocial behaviors that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment” (Romanelli, Bird & Ryan, 2009, pg. 1). Research found that education tailored to individual learning styles is effective in traditional education settings (Russell, 2006; Lecroy, 2009; Gudnadottir et al, 2013; Koonce, Guise, Kusnoor, Hurley & Ye, 2015). The purpose of education tailored to individual learning styles is to maximize the impact of the education that is delivered. Educational offerings can be adapted for learning styles if an individual learning style is known (Romanelli et al, 2009). Additionally, if the person is aware of his or her individual learning preference, they can positively impact their own learning by gravitating toward activities that complement their unique style or preference (Romanelli et al, 2009). These positive educational experiences could subsequently improve individual self-efficacy and increase an individual’s overall confidence level.

**Literature Review**

The comprehensive search of the literature related to online patient education specifically focused on self-care in individuals suffering from chronic disease published in English using the electronic databases of CINAHL, PubMed and Google Scholar. Limitations of the review included evidence published between 2002-2016 using the following key words “patient
education,” “chronic disease,” “learning styles/preferences,” and “online health education.” The search resulted in identifying 30 peer-reviewed studies of which 11 met the inclusion criteria. The levels of evidence in this literature review ranged from Level 1 through Level 7 (Melnyk & Fine-Overholt, 2011). There were no studies identified at Level 3 or Level 5. See Table 1 for description of each level of evidence and the number of studies categorized at each level.

Table 1: Levels of Evidence

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Description of Evidence</th>
<th>Number of Studies Identified in Each Level</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Systematic review of randomized controlled trials</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>One or more randomized controlled trials</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Controlled trial without randomization</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Case control or cohort study</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Systematic review of descriptive &amp; qualitative studies</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Single descriptive or qualitative study</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Expert Opinion</td>
<td>1</td>
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Adapted from Melnyk & Fine-Overholt (2011)

The comprehensive literature review identified evidence related to characteristics of patient education that improved self-efficacy of patients with chronic disease, with an emphasis on online patient education. This evidence was organized based on the Melnyk Pyramid to assist in analyzing the strength of the evidence for this project. The highest level of evidence is initially presented followed by the lower levels of evidence. The four influences of self-efficacy are integrated into analysis of the evidence. As previously discussed, self-efficacy consists of four components including performance accomplishments, vicarious experience, verbal persuasion
and psychological states (Bandura, 1977). These components can have a powerful influence on potential behavior changes.

**Systematic Review of Randomized Controlled Trial (Level 1)**

In the only systematic review identified in this literature search, researchers sought to determine how e-health compared to traditional face-to-face care specific to cost, patient satisfaction, quality of life and health outcomes in individuals affected by chronic disease. Electronic health, or e-health is defined as utilizing communication technologies, usually the Internet, to communicate with nurses or physicians regarding health information (Eland-de Kok et al, 2011). For individuals suffering from chronic illness, e-health offers flexibility for asking questions related to their illness as well as solicit advice related to illness exacerbations (Car & Sheikh, 2004). In this study, a variety of databases were utilized to find articles published between 2000 and 2009 with a total of 12 randomized controlled trials (RCT) included in the final literature review analysis. Small positive effects were shown in health outcomes in those individuals that utilized e-health. In these instances, e-health was offered in place of or in addition to traditional care. The other factors including patient satisfaction, cost effectiveness and quality of life were not adequately investigated in the studies included in the literature review. Strengths of this review include strong design of the RCT based on Cochrane criteria. However, there were a limited number of studies included and many of the intended outcomes were not addressed in the evidence (Eland-de Kok et al, 2011).

**Randomized Controlled Trial (Level 2)**

There were three RTC’s identified in this literature search. The first was an Internet based intervention based on the Chronic Disease Self-Management Program (CDSMP). The CDSMP was developed to improve the health of those with chronic conditions. The original CDSMP program consisted of a seven-week, small group, face-to-face program attended by
individuals with a variety of chronic conditions (Lorig, Sobel, Ritter, Laurent & Hobbs, 2001). In the randomized controlled trial (RCT), researchers adapted the CDSMP and implemented it in the online environment. The Internet Based Chronic Disease Self-Management Program enrolled 958 patients suffering from chronic diseases, specifically those with heart and lung conditions and Type 2 Diabetes Mellitus. The researchers randomized 457 participants into the intervention group that consisted of continuation of usual care routines along with participation in an online discussion group. The 501 participants randomized to the control group continued their usual care routine, with no participation in the online discussion group (Lorig, Ritter, Laurent & Plant, 2006).

Like the original CDSMP, self-efficacy improved in participants and these improvements continued for one-year post intervention (Lorig et al, 2006). Improved self-efficacy because of participation in the online version of this intervention resulted in a positive experience for the individuals, thus impacting performance accomplishments. The findings of this study were important because of the successful use of the Internet to allow participation by those individuals that cannot or will not attend face-to-face small group sessions. The primary strength was the RCT study design, coupled with the moderately large sample size. The generalizability of the results were limited because only those with Internet access were able to participate thus excluding some individuals that might have been helped by this intervention. In addition, the noted improvements in health behavior were minimal at the one-year follow up (Lorig et al, 2006).

Another RCT focused on an online intervention specific to verbal persuasion. This study used a closed e-mail discussion group specific to individuals suffering from chronic back pain. The researchers hypothesized that this intervention would improve the utilization of health care
resources. The 580 total participants were randomized with 296 assigned to the intervention group and 284 assigned to the control group. The intervention group was enrolled in a closed e-mail discussion group and received a videotape and book specific to chronic back pain. The control group did not have access to the e-mail discussion group. This RCT found that health care utilization decreased in those that participated in the closed e-mail discussion group (Lorig et al, 2002). This study included participants from a wide range of geographical areas and ages. However, few minorities were included in the intervention and those without access to the Internet were excluded from the research (Lorig et al, 2002).

Koonce, Guise, Kusnoor, Hurley and Ye (2015) used a RCT design to conduct a study to determine whether individualized education was effective for diabetes education in the community setting. This study does not relate to online education; however, it was included in the literature review to explore the importance of learning styles to the effectiveness of patient education.

The researchers randomized 79 participants to the control group and to whom were given standard discharge instructions related to diabetes. Eighty-one participants in the intervention group were given discharge instructions tailored to their individual learning style. Researchers also created materials that were adapted to different reading levels. One set was developed at the fifth-grade reading level and one to an eighth-grade reading level. The materials were also developed in each of the four learning styles (i.e. visual, read/write, auditory or kinesthetic). Participants choose the available format according to personal preference. The effectiveness of the intervention was measured during two week and 6-week follow up assessments. The assessment used was the Diabetes Knowledge Test (DKT) consisting of 23 questions assessing general diabetes knowledge. Although there were no significant changes in the DKT assessment
results between the control and intervention groups, persons in the intervention group reported an overall higher rate of satisfaction with the education they received. A higher rate of satisfaction reported by an individual can affect a person’s psychological state and potentially increase self-efficacy (Koonce et al, 2015.)

**Case-control or Cohort (Level 4)**

A longitudinal study looked at the effects of a web based, interactive discussion group on seven specific health indicators including health distress, self-rated health, illness intrusiveness, disability, fatigue, pain and shortness of breath. A total of 568 participants were enrolled with questionnaire data collected at entry into the study as the baseline measure and at 6 months and 12-month intervals. The intervention consisted of an online self-management program related to chronic disease over a six-week period. Participants were enrolled in the Expert Patients Programme (EPP). The EPP consisted of bulletin board discussion groups, interactive tools focused on self-management of chronic disease, a book related to chronic disease management and interactive instructions for self-management. Self-efficacy and satisfaction with the health care system was also measured. Self-efficacy was measured using a six-item, validated instrument looking specifically at self-efficacy in chronic disease management (Stanford Patient Education Resource Center, n.d). Satisfaction with the health care system was assessed using six questions specifically designed for the study. Participants acknowledged improved health behaviors and decreased symptoms because of participation in the online self-management program. In other words, participants reported that reading and interacting with others in discussion postings had positive verbal persuasion and increased self-efficacy for successfully caring for themselves. Limitations of this study included lack of randomization and lack of diversity in participants (Lorig et al, 2008).
Single Descriptive or Qualitative Study (Level 6)

The greatest number of articles identified in this literature search represented evidence at this level. This level of evidence is important because it provides a foundation for future research that could be designed with stronger rigor.

A qualitative study analyzed 8,231 postings in an online health community to look at how self-efficacy impacted discussions surrounding individuals affected with arthritis. Of the postings included in the study, approximately 70% related to self-management behaviors. The main themes identified from the study included sharing disease experiences, suffering related to disease symptoms and asking for advice from other participants. This study was limited to only those who suffer from arthritis and the results cannot be generalized outside of the four online communities included in the study (Willis, 2016). These concepts are related to tenants of self-efficacy including performance accomplishments, vicarious experience, verbal persuasion and psychological factors (Bandura, 1977).

Another qualitative study examined participation in online communities by 42 participants. Researchers sought to determine what the term “self-care” meant to individuals living with chronic disease. Conversational data was gathered and analyzed as a part of this longitudinal, participatory research program. The study concluded that participants could communicate with other individuals to discuss and learn about self-care through vicarious experience, as opposed to suffering from chronic disease alone. Although this study had limited participants and only included those with Internet access, individuals with a wide range of chronic illnesses were included (Kralik, Price & Telford, 2010).

A third pilot study examined the implementation of an Internet-Based Diabetes Self-Management Workshop (IDSMW) in the American Indian/Native American (AI/AN)
population. The IDSMW consisted of a six-week workshop utilizing peer educators in the online environment. There were 27 participants included in the AI/AN pilot study. Data related to the online environment was collected using self-administered questionnaires to collect demographic data, analysis of bulletin board posts and an Internet focus group evaluation using a semi-structured interview format. The purpose of the study was to determine feasibility of an online health intervention in the AI/NI population. The researchers concluded that the Internet allowed for access to health information when it was convenient for that individual. This included convenient access according to their schedule and allowed the individual to utilize as much time as necessary. The Internet also provided an opportunity for the individual to complete the education at a pace that is comfortable for that person (Jernigan & Lorig, 2011). Participants also acknowledged that the Internet gave them supplementary information related to their chronic disease in between visits to their health care providers. The study was limited to only individuals with access to the Internet and one population, thus these results aren’t generalizable outside of the AI/AN population with diabetes mellitus and access to the Internet (Jernigan & Lorig, 2011).

Schwartz et al, (2006) conducted a study that used a convenience sample that investigated the kinds of health information patients seek out. This study used a survey method to solicit responses from 1289 total participants. The researchers found that 65% of the participants had access to the Internet and that individuals determined the reputability of a website by looking for endorsements from governmental agencies or professional organizations. The most common information searched included the following: specific diseases or conditions, medications, nutrition and exercise, illness prevention and alternative therapies. The high response rate from diverse participants strengthened this study. On the other hand, the study was limited by a non-
random convenience sample that would limit generalizability of the results (Schwartz et al, 2006).

Finally, a longitudinal study was conducted in Australia and adapted the face-to-face model CDSMP for development of the Internet Chronic Disease Self-Management Program (ICDSMP). As previously discussed the CDSMP consisted of a seven-week, small group, face-to-face program attended by individuals with a variety of chronic conditions with a goal of improving in this population (Lorig et al, 2012). The adaptation of this program for online use was similar to the format for the face-to-face model. The major difference being that the CDSMP utilized face-to-face discussions whereas the ICDSMP used online, asynchronous discussions held via bulletin boards. However, the groups in the ICDSMP were larger than the CDSMP. The study design included 254 participants suffering from chronic disease. The ICDSMP was implemented over the course of six weeks. Eight health indicator instruments were used to measure seven health-related behaviors. Specific to perceived self-efficacy, participant’s perception of his or her own confidence to cope with their health condition was measured. The scale used was a previously validated self-efficacy tool. Data was collected at baseline, at six months and at 12-month follow-up intervals. Researchers found that participation in an online community, such as ICDSMP, was successful in helping participants manage symptoms and had a positive impact on health behaviors and self-efficacy. The findings of increased self-efficacy were demonstrated at 6 month and 12-month follow-up. Self-efficacy was increased in underserved populations and the ability for a face-to-face educational intervention to be translated into the online environment was an important addition to the building body of knowledge related to effective modes of education for those suffering from chronic disease.
Limitations of this study included lack of randomization and as such the results cannot be generalized beyond those computer savvy individuals with Internet access (Lorig et al, 2012).

**Level 7 (Expert Opinion)**

According to Lu, Li & Arthur (2013), in the past 10 years, the amount of information available on the Internet related to chronic disease self-management has increased four-fold. Using the database of PubMed, articles included in this review were published between 1971 and 2012. Areas that were found to be most common in the search results included articles pertaining to diabetes, cardiac disease, vascular disease, pulmonary disease, pain relief for neoplasms and obesity. When looking specifically at the geographic data of the published articles, developed countries, including most prominently the United States and the United Kingdom were responsible for 75% of the chronic disease self-management articles. Limitations of the study include the fact that only one database was used to find articles. However, this information is important as it serves to support the importance of the online environment in the acquisition of chronic disease information and education (Lu, Li & Arthur, 2013).

**Discussion**

As evidenced by this literature review, education benefits patients suffering from chronic disease (Jernigan & Lorig, 2012; Koonce et al, 2015; Lorig et al, 2012; Lorig et al, 2008; Ringstrom et al, 2010; van Kruiissen, 2015), particularly when the education was individualized for the patients (Koonce et al, 2015). The evidence also indicated there are advantages to online education for people suffering from chronic disease. Notwithstanding that no studies of online patient education customized the education or programming according to the patient’s learning styles or any other characteristics, online modalities have demonstrated positive effects on self-
efficacy (Koonce et al, 2015; Lorig et al, 2012; Lorig et al, 2008; Lorig et al, 2006; Willis, 2016) and health outcomes.

The online environment was found to be an effective educational modality (Schwartz et al, 2006). Online resources also provide increased access to education for those with chronic disease. For example, individuals with physical ailments or disabilities secondary to a disease process can participate in an online forum more easily than a face-to-face intervention (Lorig, 2006). The Internet allows people to access educational resources at a time and place that is convenient and individuals can complete education at a comfortable pace (Lorig, 2011). Positive patient outcomes for individuals with chronic disease receiving education and support in the online environment included increased self-efficacy, decreased healthcare utilization, reduced symptoms, increased knowledge and improved quality of life (Lorig et al, 2002; Ringstrom et al, 2009).

Bandura (1977) proposed that vicarious experience could influence the behavior of another individual. Thus, individuals who share health behavior experiences increased the vicarious experience of others specific to the desired goals for health behaviors. Online educational communities have been successful in increasing self-efficacy among the participants (van Kruijssen et al, 2015). Vicarious experience in the online environment benefited individuals with chronic disease by providing a medium to be able to communicate with others suffering from the same conditions. In this environment, people can share disease experiences, learn about self-care specific to the disease process and communicate with others (Kralik et al, 2010).

Performance accomplishments emerging from an individual’s previous experiences can be impacted by online education. Participation in an online version of a chronic disease educational program showed positive results for individuals living with chronic conditions such
as improvements in health distress, fatigue, pain and shortness of breath. Specific to performance accomplishments, participation in the online self-management program showed improvement in self-efficacy resulting in constructive outcomes for participants (Lorig et al, 2006). The education and information gained in the online environment led to individual’s positive perception of the experience and improved motivation to perform the behavior again. The group environment also impacts performance accomplishments by generating positive experiences for individuals with access to online health communities (Lorig et al, 2006; Willis, 2016).

Verbal persuasion, as a means for receiving feedback was found to be particularly important to individuals’ efforts to live with chronic disease. Online health communities and online education offered verbal persuasion through interactive comments and support when discussing chronic disease (Lorig et al, 2006; Willis, 2016). By participating in online chat groups or online health communities, self-efficacy in the participants was improved (Willis, 2016). Verbal persuasion via online communities also resulted in improved health behaviors and a decrease in symptom severity (Lorig et al, 2008).

Finally, the psychological state of a person suffering from chronic disease can be impacted by providing personalized education related to a specific disease or condition. By providing individualized education, outcomes related to increased knowledge can improve. In the case of chronic disease, the improved outcomes can have a direct impact on the quality of life of an individual, also affecting psychological states (Koonce et al, 2015). Interactive health communities can also have a positive impact on a person’s psychological state. When participating in an online health community, the individual has the ability to choose a variety of factors including which site to visit, what messages to read and what format in which to access
the information. These factors potentially result in a more positive educational experience for the person thus affecting their psychological state (Cline & Hayes, 2001).

Conclusions & Recommendations

Patient education is fundamental to improved health outcomes in individuals with chronic conditions (Glanz et al., 2008; van Kruijssen et al., 2015). Self-care in patients with chronic disease also affects positive patient outcomes. In individuals suffering from chronic disease, benefits of self-care include the patients expressing a transformational experience resulting in an improved sense of self and regaining order in their lives (Kralik et al., 2010). The feeling of empowerment and motivation gained through effective self-care can be thought of as an improvement in self-efficacy (Willis, 2016). Self-efficacy, as described by the SCT, involves motivation and accomplishment including the internal and external factors that determine the likelihood of an individual attempting or continuing a behavior (Willis, 2016). Utilizing online resources for health education can be a way to increase self-efficacy in individuals suffering from chronic disease diagnoses.

Access to the Internet has expanded and the so-called “digital gap” is closing (Perrin & Duggan, 2015). The amount of available online information related to chronic disease has also exploded in the recent past (Lu, Li & Arthur, 2013). This has the potential to increase the availability of the Internet as an educational modality. Digital media, such as online health resources, has the potential to deliver education in the form of individualized health information, social support, as well as to provide certain psychological benefits (Cline & Haynes, 2001). The Internet can also increase access of health education to individuals living in rural areas. This access would offer a way that the isolated rural individuals might interact with find support among an increased number of people who suffer from the same or a similar chronic condition.
with which they identify. Thus, along with increased access, the Internet also provides an opportunity to eliminate any potential geographical barriers (Lorig et al., 2006). Online communities or educational forums provide individuals suffering from chronic diseases a way to connect and learn from other people around the globe and thus to expand their personal support network (Kralik et al., 2010). The Internet also allows for convenient access determined by the patient seeking out the education. Convenient access includes when and where the individual can access the education, as well as engaging in the education at a pace that is comfortable and determined by the individual (Jernigan & Lorig, 2011).

The inclusion of learning styles has been shown to be an effective tool to provide individualized and effective education. Knowledge of learning styles improves retention of learned information and resulted in patients reporting higher satisfaction with provided education when tailored to learning style (Koonce et al., 2011). Nonetheless, there is little evidence that online education has been designed to accommodate personal learning styles or preferences.

This literature review has identified a gap in the literature and an important area that needs further research. Despite easy and continually increasing access to online health information, the search of literature identified a lack of consistent, high quality evidence about the characteristics of online health education that are effective for promoting self-efficacy and improved health outcomes in individuals suffering from a chronic illness. The available evidence consisted primarily of descriptive and qualitative studies and three randomized controlled trial. Recommendations for future research include improving the rigor of the research related to value of online patient education, but also the investigation the influence of learning styles and other unique individual characteristics on the effectiveness of online patient education.
References


EVIDENCE FOR EFFECTIVE ONLINE PATIENT EDUCATION


## Appendix A

<table>
<thead>
<tr>
<th>Authors/Publication Year</th>
<th>Purpose</th>
<th>Design</th>
<th>Sample</th>
<th>Data Collection &amp; Measurement</th>
<th>Findings</th>
<th>Strengths</th>
<th>Limitations</th>
<th>Level of Evidence (Melynk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schmidt, M.R. &amp; Camacho, V.M (2014)</td>
<td>Impact of determining patient learning style on that individuals’ capacity to learn and assist in the overall outcome of that patient</td>
<td>Researchers screened for differences in preferred learning styles to adapt interventions. Existing resources were gathered to educate after learning style was identified</td>
<td>Pre-prosthetic patients seen in clinic where authors were employed as occupational therapists. No actual number given</td>
<td>Kolb’s Learning Style Inventory (LSI) was used to determine learning style. Convergers, divergers, assimilators and accommodators were identified in line with this theory</td>
<td>The pre-prosthetic training protocol was developed using LSI being administered on first day of treatment. The learning strategies helped to adapt the way to teach skills to pre-prosthetic patients</td>
<td>Learning styles were identified prior to choosing resources; specialized toward patient</td>
<td>No mention of Internet specific learning resources. Existing resources were used; no new resources</td>
<td>5</td>
</tr>
<tr>
<td>Yildirim, Y. &amp; Soyunov, S. (2010)</td>
<td>Assessing the Learning Strategies of Adults (ATLAS) tool was used</td>
<td>Randomized controlled trial</td>
<td>26 patients included with low back pain. These participants</td>
<td>ATLAS tool categorized participants into one of three levels: navigators,</td>
<td>When the wording and/or explanation style was used in collaboration with ATLAS,</td>
<td>All demographic factors were uniform in the two groups</td>
<td>Only looked at chronic low back pain, only one learning scale used</td>
<td>2</td>
</tr>
<tr>
<td>Study</td>
<td>Research Design</td>
<td>Sample Size</td>
<td>Intervention</td>
<td>Outcome</td>
<td>Limitations</td>
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<tr>
<td>Ringstrom, G.; Storsrud, S.; Posserud, I.; Lundqvist, S.; Westman, B.; &amp; Simren, M (2010)</td>
<td>Randomized controlled trial</td>
<td>71 patients were randomized to receive the IBS guidebook and 72</td>
<td>IBS school based on self-efficacy theory and general theory of nursing. The participants who were enrolled in the IBS school increased perceived knowledge of controlling for those variables</td>
<td>No mention of specific learning styles</td>
<td>No way to check for compliance in the guidebook group. Lack of blinding</td>
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</tbody>
</table>

Researchers studied the effects of a structured educational program for patients with low back pain. They randomly assigned patients to experimental and control groups. In the experimental group, the instructor tailored the program to the patients' learning styles utilizing the ATLAS tool. The patients would be better able to understand the home exercise program.
| Patients suffering from irritable bowel syndrome (IBS) and compared that to simply giving written information about the condition | School took place over six, 2-hour sessions held once a week in a group setting. The IBS guidebook was two separate books addressing many common symptoms and issues associated with IBS. Changes in knowledge, measured by the Perceived Knowledge Questionnaire and GI symptom severity, measured by the IBS Severity Scoring System | IBS more than those who were in the guidebook group. IBS school also reduced GI specific anxiety. Results showed a potential benefit of the IBS school with long term outcomes up to 6 months after attendance | and no control for the time that participants spend with health care professionals during the study. Limited generalization |
EVIDENCE FOR EFFECTIVE ONLINE PATIENT EDUCATION

<table>
<thead>
<tr>
<th>Authors</th>
<th>Article Description</th>
<th>Literature Review</th>
<th>Outcome Variables</th>
<th>Barriers and Considerations</th>
<th>Learning Styles Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beagley, L (2011)</td>
<td>This article examines common barriers to patient education. Identified barriers include literacy, language, culture and physiological obstacles. The identified barriers are analyzed and tactics to best provide patient education are presented.</td>
<td>No sample identified for literature review</td>
<td>(IBS-SSS) were the primary outcome variables.</td>
<td>Educators must understand the fact that adults learn differently than child. Knowles found five assumptions about adult learning: self-concept, experience, readiness to learn, orientation to learning, and motivation to learn. Literacy barrier refers to an individual’s ability to read, write and speak English. Low literacy and low health literacy are not interchangeable.</td>
<td>No specific theory for learning styles application utilized (i.e. VARK).</td>
</tr>
</tbody>
</table>
and culture barrier means that health care providers need a general knowledge of cultural competence including biases and prejudices. For a person to learn, one must be able to process the information. Physiologic conditions such as limited mobility or memory problems or environmental barriers like poor lighting or noise can affect learning. Learning styles: visual, auditory, kinesthetic addressed.
<table>
<thead>
<tr>
<th>Reference</th>
<th>Methodology</th>
<th>Sample Description</th>
<th>Key Findings</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shinnick, M.A. &amp; Woo, M.A (2015).</td>
<td>Comparative research design</td>
<td>Convenience sample of 4 cohorts of nursing students (N=161).</td>
<td>Kolb Learning Style Inventory chosen as assessment tool. Per Kolb, the most common learning style most aligned with a nursing career is the accommodator. Participants completed clinical cases in a simulation environment and assessment of learning styles was conducted.</td>
<td>Patient simulation was found to be an effective teaching method regardless of identified learning style. Determined that simulation is a useful tool for educating if there isn’t time or resources to assess learning styles.</td>
</tr>
<tr>
<td>Boyde, M.; Tuckett, A.; Peters, R.; Thompson, D.R.;</td>
<td>Qualitative/Questionnaire</td>
<td>55 patients included in the study. Age ranged from 33-83</td>
<td>Questionnaires used was Heart Failure Learning Style and 64% of participants were found to be multimodal learners per the</td>
<td>Identifies how specific population prefers to learn Small sample size. “VARK is a simple technique that promotes</td>
</tr>
<tr>
<td>Turner, C.; &amp; Stewart, S. (2009)</td>
<td>heart failure to inspire them to better manage the disease. Secondary purpose is to look at the relationship between learning needs, age and educational level</td>
<td>years; mean of 64.25 years. Approximately ½ of patients had heart failure diagnosis for more than 4 years</td>
<td>Needs Inventory (HFLSNI), which combine the VARK questionnaire with a validated assessment of learning style OHFLNI.</td>
<td>VARK assessment followed by 18% as read/write learners, 11% auditory and 7% were kinesthetic learners. No visual learners noted. Using OHFLNI, signs and symptoms of heart failure was most important topic for learning followed by prognosis, risk factors, medications, general information, diet, psychological factors, and activity.</td>
</tr>
<tr>
<td>Russell, S.S. (2006)</td>
<td>Article discusses why and how “adults learn and discusses</td>
<td>Literature review</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Author</td>
<td>Summary</td>
<td>Method</td>
<td>Ratings</td>
<td>Notes</td>
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<tr>
<td>McNeill, B.E. (2012)</td>
<td>Give nurses the basic principles related to patient education so that the RN can promote strategies are a combination of visual, auditory, and kinesthetic methods. Taking the time to assess the individual learner’s preference will make a difference. Active participation is key as it results in “longer term recall, synthesis, and problems solving skills than learning with verbal instruction only” (p. 352).</td>
<td>N/A</td>
<td>N/A</td>
<td>Author reviews the responsibilities related to teaching and counseling as specified by the North</td>
</tr>
</tbody>
</table>
patient safety and teach effectively

Carolina nursing practice document. Also, reviews VAKT (visual, auditory, kinesthetic/tactile) method and discusses what is meant by each of these categories. Finally, discusses health literacy and “red flags” that can signify low literacy and developing the learning plan based on basic adult learning principles. Evaluation using teach-back is also discussed

LeCroy, C. (2009) Review of teaching strategies related to N/A Adult learning principles, learning Self-directed, internally motivated, preference N/A Only addressed three learning styles, no 7
<table>
<thead>
<tr>
<th>Authors</th>
<th>Study type</th>
<th>Data collection measures</th>
<th>Identified patient preference in the educational process</th>
<th>Construct validity of the measure of preference” (p. 190). Limited generalizability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laszewski, Zelko, Andrits, Cruz, Bauer &amp; Magnan (2015)</td>
<td>Descriptive study</td>
<td>Parent study results were used to gather sample for this study; convenience</td>
<td>Patients consistently chose verbal and video instructional methods as opposed to</td>
<td>“Construct validity of the measure of preference” (p. 190). Limited generalizability</td>
</tr>
<tr>
<td>Study</td>
<td>Examine patient willingness to learn about MDRO’s and hospital acquired infections</td>
<td>Interviewer administered questionnaire</td>
<td>200 patients were screening, 109 were eligible but final N=100. Ages ranged 18-87 years</td>
<td>Interviewer administered questionnaire developed as a part of the study</td>
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<tr>
<td>Gudnadottir, Fritz, Zerbel, Bernado, Sethi &amp; Safdar (2013)</td>
<td>Video, when receiving education about self-care with radiation dermatitis</td>
<td>Sample. N=58</td>
<td>Instruction with three teaching methods before first treatment. Educational reinforcement provided at 1 &amp; 3 weeks of treatment. Patients could choose one of the 3 teaching methods. Four point faces scale used to determine patient satisfaction with teaching style</td>
<td>Written instruction</td>
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</table>
(HAI’s) and look at preferred ways to be educated above the topics.

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Participants</th>
<th>Design</th>
<th>Intervention</th>
<th>Outcome</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koonce, Giuse &amp; Storrow (2011)</td>
<td>“Investigate whether learning style-tailored information prescriptions can increase ED patient’s knowledge of issues related to hypertension” (p.281).</td>
<td>N=76 randomized to control or intervention group</td>
<td>Randomized controlled trial</td>
<td>Control group received standard discharge instructions; intervention group received discharge instructions with information tailored to learning style</td>
<td>No significant change between control and intervention groups. Patients with tailored learning reported higher satisfaction with education.</td>
<td>Most research on the topic focus on literacy levels while this one looked at learning preferences. Possible issues with hypertension knowledge assessment; higher patient satisfaction scores might be “confounded by the method of delivery rather than information itself” (p.957). focused only on MDRO and HAI’s. No specification about what the internet based materials consisted of.</td>
</tr>
</tbody>
</table>

HAI’s and most thought that this involvement would help make better health care choices. 70% preferred written materials, 57% verbal materials, 53% information video and 50% internet based material.

“emphasized a need for easily understood information while viewing educational materials” (p. 957).
| Koonce, Giuse, Kusnoor, Hurley, & Ye (2015) | Using a previously published study, researchers looked at the generalizability of a validated model for hypertension medication. The researchers looked at the effects of literacy levels and learning styles on patients with diabetes in a Randomized controlled trial | Original N=160 with 79 in control group and 81 in intervention group. Final included N=128. Intervention group with higher education level and higher health literacy. 59% female and 96% spoke English | Diabetes Knowledge Test and Subjective Literacy Scale used; literacy assessment and learning style assessment (done by self-assessment) also done. Participant follow up at 2 & 6 weeks | Intervention group had significantly higher than average knowledge after exposure to targeted health education materials. No significant change in control group | Confirmed generalizability of tailored educational approach to another setting and chronic disease (DM). Learning styles addressed as part of personalized intervention | No mention of the internet. Most participants had adequate literacy levels; not necessarily generalizable to other geographical areas. No long-term evaluation of learning. | 2 |
Denby & Harvey (2003)  
A stroke education program was developed to improve caregiver and patient knowledge of secondary prevention, signs & symptoms of stroke, risk factors and ADL independence. The education program addressed patient learning styles, readiness to learn and when the education occurred. The educational program was called Healthy Literature review/expert opinion  
N/A  
N/A  
No data related to effectiveness of educational program  
Study addressed multiple areas of learning  
Learning styles indirectly addressed; article alluded to an intervention tailored toward visual and auditory learners but no mention of patient assessment of learning style. Educational program focused on specific population
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample Size</th>
<th>Description</th>
<th>Results</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravely, Hensley, Hagood-Thompson (2011)</td>
<td>Experimental descriptive study</td>
<td>N=30</td>
<td>Systematic random sampling used; 18 years and older. Mean age of 54.3 years; 87% Caucasian</td>
<td>Education with the video was more effective for participants in this study</td>
<td>Small sample size, variation in length of stay and mostly Caucasian participants limit generalizability. Topic of learning styles implied; not specifically addressed.</td>
</tr>
</tbody>
</table>
### Schwartz, Roe, Northrup, Meza, Seifeldin & Neale (2006)

Researchers looked at the type of health information sought by patients, how they search for the information and how they determine if the information is accurate.

**Cross sectional;**
- Patients were recruited from waiting room in 13 primary care offices in the Detroit area.

**1289 participants.**
- Mean age 42.9 years, 65% female and 52% Caucasian.
- 63% had education beyond high school.

**Patient survey conducted consisting of 13 questions.**

**MD survey done to assess their patients use of the Internet for health information.**

**65% of participants stated they had access to the Internet.**
- Men were less likely than women to have access to the Internet.
- Education and income positively associated with Internet access. Age negatively associated.

**Accuracy determined by looking for government or professional organization endorsements.**

**Most common topic searches:**
- specific disease or condition,
- medications,
- nutrition/exercise,
- illness prevention,
- alternative therapies.

**Diverse patient sample, high response rate.**

**Non-random convenience sample limits generalizability.**

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<tr>
<td>Schwartz, Roe, Northrup, Meza, Seifeldin &amp; Neale (2006)</td>
<td>Researchers looked at the type of health information sought by patients, how they search for the information and how they determine if the information is accurate.</td>
<td>Cross sectional; Patients were recruited from waiting room in 13 primary care offices in the Detroit area.</td>
<td>1289 participants. Mean age 42.9 years, 65% female and 52% Caucasian. 63% had education beyond high school.</td>
<td>Patient survey conducted consisting of 13 questions. MD survey done to assess their patients use of the Internet for health information. 65% of participants stated they had access to the Internet. Men were less likely than women to have access to the Internet. Education and income positively associated with Internet access. Age negatively associated. Accuracy determined by looking for government or professional organization endorsements. Most common topic searches: specific disease or condition, medications, nutrition/exercise, illness prevention, alternative therapies.</td>
<td>Diverse patient sample, high response rate.</td>
<td>Non-random convenience sample limits generalizability.</td>
<td>6</td>
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</tr>
<tr>
<td>Study References</td>
<td>Study Design</td>
<td>Intervention</td>
<td>Randomization</td>
<td>Recall Methodology</td>
<td>Findings</td>
<td>Study Strengths/Weaknesses</td>
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<tr>
<td>Astley, Chew, Aylward, Molloy &amp; Pasquale (2008)</td>
<td>Randomized into one of three groups: verbal, written or audiovisual delivery of information. Randomization was achieved by a computer program</td>
<td>Of the 99 patients initially randomized into the study, 10 were lost to follow up by the 30-day mark and 2 died (n=87). Median age of 64, 37% were female</td>
<td>Recall was measured using a 5-point investigator developed questionnaire. The questionnaire was administered immediately following information delivery, &gt;4 hours but &lt; 24 hours post angiography and 30 days post procedure</td>
<td>“No improvement in patient recall of the essential information required for informed consent was seen” (p. 28)</td>
<td>Sound research methodology, evidence based approach to patient education</td>
<td>Heterogeneous population; non-validated questionnaire</td>
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<tr>
<td>Bruce, Lorig, Laurent &amp; Ritter (2005)</td>
<td>Randomized controlled trial</td>
<td>Intervention group (n=190); control</td>
<td>Closed, moderated e-mail discussion</td>
<td>Use of the internet based discussion group didn’t</td>
<td>One of the first studies to directly examine</td>
<td>Recruitment bias, heterogeneous sample</td>
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in an e-mail discussion group would affect use of a selected CAM modality during a yearlong RCT on back pain management. No statistically significant difference between groups for intervention group. After 1 year, use of CAM over the previous 6 months was compared to affect behavior regarding the use of CAM modalities for lower back pain. Effects of intervention over e-mail discussion group limits generalizability.

INTERNET: No discussion on how the Internet is used for this information.

<p>| Jernigan &amp; Lorig (2011) | Feasibility of implementing the Stanford Internet Diabetes Self-Management Workshop in the AI/AN population | Participatory research; Qualitative | 27 AI/NI’s (pilot #1) and 27 non-AI/AN’s; Internet based recruitment | 6-week workshop for 20-25 participants; peer moderators. Participants must log in at least 3 times each week for a total of 2 hours and participate weekly. Four areas in the workshop: Learning Center, Discussion Center, Tools &amp; Help | The workshop was culturally appropriate among different tribal and geographic communities and may be a mechanism to support diabetes education programs delivered in the clinic setting. INTERNET: Receive health information during times more convenient for them and their schedules, First study to look at effectiveness of internet based, DM patient self-management program between AI/AN’s. Sample size like other internet feasibility studies | Only those with access to the Internet could participate. No information about differences in AI/NI with access to internet and those without. Sample included more reservation AI’s than urban AI’s | 6 |
| Lorig, Laurent, Deyo, Marnell, Minor &amp; Ritter (2002) | Answer the following question: “Can a behavioral intervention delivered via the Internet affect the quality of life and health care utilization among people with chronic recurrent back pain?” (p. 792) | Randomized controlled trial | 580 people from 49 states with chronic back pain with at least 1 outpatient visit in the last year and access to e-mail | Intervention was 3 parts: closed e-mail discussion group, copy of help book and videotape | INTERNET: Simple, low cost use, treatment group reduced total outpatient utilization of health care services (overall health care savings) | Wide range of subjects from 49 states with wide age range. | Participants in intervention group were select group. Few minorities; those without Internet were excluded | 2 |
| Lorig, Ritter, Laurent &amp; Plant (2006) | Determine the efficacy of an Internet based Chronic Disease Self-Management | Randomized controlled trial | 958 were randomized into intervention group (457) or usual care | Health status variables, health behaviors, utilization variables and | INTERNET: “Addition of online program gives people with chronic conditions a Internet option allows for participation for those who cannot | Only those that are computer literate can participate | 2 |</p>
<table>
<thead>
<tr>
<th>Program (CDSMP) as compared to small group interventions</th>
<th>control (501)</th>
<th>self-efficacy were the intended measures.</th>
<th>choice of delivery modes and thus increases the number of people reached by these programs” (p. 970)</th>
<th>or will not attend small group sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorig, Ritter, Dost, Plant, Laurent &amp; McNeil, (2008)</td>
<td>The Expert Patients Programme (EPP) in the UK was based on the CDSMP. This study looked at how the online version of EPP worked in the English population suffering from chronic disease</td>
<td>Baseline: 568; 6 months: 546; 443: 1 year. 94% Caucasian, 78% females. Median age 45, 51% had professional level education, 33% with full time employment. Arthritis most common chronic condition (31%), lung disease, mental disorder</td>
<td>Web based, interactive program, bulletin board discussion groups, interactive self-management tools and a book were provided to participants. This took place over 6 weeks and seven health status measures, four behaviors, and five utilization</td>
<td>Few differences between baseline data and follow up data</td>
</tr>
</tbody>
</table>

“Participating can lead to decreases in symptoms and improve health behaviors, self-efficacy and satisfaction with health services. Health care utilization decreased and these results remained for at least 1 year” (p. 254).  
INTERNET: Effective for reaching those in rural areas,  
Not randomized, limited to those with internet access, lack of diverse sample  
3
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participant Details</th>
<th>Hypotheses</th>
<th>Findings</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorig, Ritter, Laurent, Plant, Green, Jernigan &amp; Case (2010)</td>
<td>Randomized Controlled Trial</td>
<td>Randomized into three groups: program, program with e-mail reinforcement, usual care routine (control). 110 AI/NI</td>
<td>Program may have beneficial effects in reducing A1C, AI/NI population can be engaged in and benefit from online interventions, follow up had no value</td>
<td>Strong study design, focus on population largely affected by DM</td>
<td>Low baseline A1C, no mention of why the Internet was an effective tool</td>
</tr>
<tr>
<td>Lorig, Ritter, Plant, Laurent, Kelly &amp; Rowe (2012)</td>
<td>“Evaluate the effectiveness of an online chronic disease self-management”</td>
<td>Asynchronou s 6-week chronic disease self-management</td>
<td>“The peer-led online program was both acceptable and useful for this”</td>
<td>Findings of efficacy in underserved populations and the</td>
<td>Limitations include the fact that this study wasn’t randomized</td>
</tr>
<tr>
<td>Kralik, Price &amp; Telford (2010)</td>
<td>Tell the meaning of “self-care” to those living with chronic conditions</td>
<td>Interactive participatory action research program</td>
<td>Email groups were used to gather conversation data. 42 men and women living with chronic conditions engaged in facilitated email conversation using</td>
<td>Three groups of participants; team of researchers</td>
<td>Self care considered “process of people learning ways to adapt to the changes that are taking place in their life because of illness and to learn ways to Further defined the meaning of self-care for those suffering from chronic conditions.</td>
</tr>
</tbody>
</table>
were included mailing list software deal with it all, that living with chronic illness entails, including symptoms, treatment, physical and social consequences, and lifestyle changes and disruptions” (p. 198). “People living with chronic illness describe the process of self-care as transformational in terms of feeling about their selves and reclaiming a sense of order” (p. 197).

INTERNET: Opportunity to conduct research over great period of time, convenience, at their own pace
<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Evidence</th>
<th>Disadvantages</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eland-de Kok, Os-Medendorp, Vergouwe-Meijer, Bruijnzel-Koomen, &amp; Ros (2011)</td>
<td>Literature Review</td>
<td>Evidence from literature review showed “small to moderate positive effects of primary health outcomes” (p. 2997).</td>
<td>Not fully convincing evidence supporting e-health; more research needed in the area</td>
<td></td>
</tr>
<tr>
<td>Willis (2016)</td>
<td>“Examined self-efficacy regarding performing chronic disease self-management behaviors as communicated in online health communities” (p. 299).</td>
<td>Two qualitative methods: online ethnography &amp; discourse analysis</td>
<td>8231 posts were analyzed</td>
<td>Four online arthritis related communities were identified based on popularity and frequency with engagement by participants. Field notes were collected from observation of the communities</td>
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<td>Lu, Li &amp; Arthur (2013)</td>
<td>“Examine the output of chronic disease management literature over the last 40 years in terms of sites of publication, core journals and then to literature review”</td>
<td>Literature Review</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Study</td>
<td>Research Question</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Data Collection Method</td>
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<td>Van Kruijssen, van Staa, Dwarswaard, Veen, Mennema &amp; Adams (2015)</td>
<td>“Understand health-care professionals and subject’s perceptions and behaviors related to self-management diary use” (p. 1147)</td>
<td>Qualitative</td>
<td>N=30</td>
<td>Semi-structured interviews</td>
</tr>
<tr>
<td>Romanelli, Bird, &amp; Ryan (2009)</td>
<td>Various learning style instruments reviewed including</td>
<td>Literature Review</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>potential strengths and weaknesses</td>
<td>in outcomes related to pharmacy education in the classroom setting</td>
<td>learning styles</td>
<td>online environment</td>
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</tbody>
</table>
Appendix B

Importance of Effective and Accessible Online Patient Education in Chronic Disease

Amy Hoberg BSN, RN
College of Nursing and Professional Disciplines University of North Dakota

Problem:
- Chronic disease is a leading cause of disability and death in the United States
- For individuals suffering from chronic disease, the Internet provides easy access to health information
- Online communities and self-management programs have been shown to have a positive impact (van Kruijsissen et al, 2015)
- There is little information about what makes online education effective or how education is designed to fit the unique learning styles of the individual

Purpose:
- Complete an evidence based literature review
- Determine what characteristics make online education effective for those with chronic disease
- Look at how learning styles are integrated into online education
- Categorize evidence according to Melnyk Pyramid

Conceptual Framework: Self-Efficacy
- Verbal Persuasion: Effect of positive & negative feedback
- Vicarious Experience: Seeing others successfully performing behaviors increases self-efficacy
- Performance Accomplishments: Positive experiences positively affect behavior
- Psychological Factors: Individual emotions

Search Results:
- 11 total articles met the inclusion criteria
- Levels of Evidence: Melnyk Pyramid
  - Level 1 (Systematic Review of RCT): 1 article
  - Level 2 (One or more RCT’s): 3 articles
  - Level 4 (Case Control or Cohort): 1 article
  - Level 6 (Single Descriptive or Qualitative Study): 5 articles
  - Level 7 (Expert Opinion): 1 article

Synthesis of Evidence:
- Online delivery of education is an effective & convenient modality for individuals to find health information
- Online environment is convenient and can allow for increased access to those with chronic disease
- Education specific to individual learning styles is effective in traditional learning settings; no evidence addressing this topic in the online setting

Implications for Research:
- The availability of information on the Internet is widespread, but the evidence is lacking related to the impact of learning styles on the efficacy of online education
- The inclusion of learning styles in online education could improve education for those suffering from chronic disease
- This is an area that needs further research

Linda Shanta PhD, RN, ANEF
Advisor