Bachelor Thesis

Health Literacy and its Influence on Self-care in Heart Failure Patients: A Literature Review

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26.03.2019 Karin Hinterbuchner

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List of Abbreviations

ACE	Angiotensin Converting Enzyme
ESC	European Society of Cardiology
HF	Heart Failure
HL	Health Literacy
ICICE	Improving Chronic Illness Care Evaluation
NYHA	New York Heart Association
REALM	The Rapid Estimate of Adult Literacy in Medicine
SCHFI	Self-Care of Heart Failure Index
S-TOFHLA	Test of Functional Health Literacy in Adults, Short-form
TOFHLA	Test of Functional Health Literacy in Adults
WHO	World Health Organisation

Abstract

Background: Heart failure is a major public health concern leading to increased morbidity, mortality and health care costs. Successes for heart failure management were identified by high self-care skills of concerned patients. A barrier to follow through with self-care regimes is low health literacy, which healthcare providers need to recognize to adopt strategies to provide better health outcomes. According to the authors' knowledge, no review has been performed investigating health literacy and its influence on self-care behaviour in heart failure patients. This review aims to determine the effects of health literacy on self-care of patients with heart failure.

Method: A literature review was conducted using the databases CINAHL and PUBMED. A well-defined search strategy with selected keywords and MeSH-terms was used. Articles in English and German published in the last ten years were searched in the databases. Further eligibility criteria for inclusion in the review was decided using the PICOS framework. A total of 164 studies were found in the databases. Title and abstract screening were performed together to avoid exclusion of potential articles. A total of 23 full-text articles were assessed for quality using the Hawker et al (2002) criteria instrument.

Results: 11 articles met the criteria for the review. Different scales were used to measure self-care behaviours, most using a version of The Self-Care Heart Failure Index (SCHFI). The results showed that low health literacy may influence self-care behaviours with a trend towards poorer self-care adherence. Furthermore, patients were more likely to perform fewer self-care interventions and confidence was an influencer in the self-care process. Intensive self-care intervention can be of benefit for low literacy patients.

Conclusion: Based on this literature review it is inconsistent what effect low health literacy has on self-care. Most of the studies do not allow the investigation of causal associations due to their cross-sectional design. Furthermore, the results are hard to compare since the studies used different instruments for measuring the patient's literacy and self-care behaviour. It is recommended to design self-care interventions

related to the patient’s previous knowledge, skills and level of self-care training regardless of literacy level, to be certain to provide the best outcome for the patient.

Key Words: Health Literacy, Heart Failure, Self-care

Zusammenfassung

Hintergrund: Herzinsuffizienz zählt zu den wichtigsten Angelegenheiten der öffentlichen Gesundheit, da dieses Erkrankungsbild zu erhöhter Morbidität-, und Mortalität und zu enormen Gesundheitskosten führt. Hohe Selbstpflege der PatientInnen wurden als Erfolg der Behandlung von Herzinsuffizienz ermittelt. Ein Hindernis der Selbstpflege stellt eine geringe Gesundheitskompetenz dar, welche Gesundheitsdienste erkennen sollten, um fördernde Strategien zu ergreifen und somit bessere Gesundheitsergebnisse zu erzielen. Nach Kenntnisstand der Autorin wurde bisher kein Literaturreview zur Untersuchung der Gesundheitskompetenz und deren Einflusses auf die Selbstpflege bei PatientInnen mit Herzinsuffizienz durchgeführt. Ziel dieses Literatureviews war es daher die Auswirkungen der Gesundheitskompetenz auf die Selbstpflege von PatientInnen mit Herzinsuffizienz zu ermitteln.

Methode: Eine Literaturrecherche wurde in den Datenbanken CINAHL und PUBMED durchgeführt. Eine ausführliche Suchstrategie mit ausgewählten Schlüsselwörtern und MeSH-Begriffen wurde angewendet. Es wurde nach deutsch- und englischsprachigen Artikeln der letzten zehn Jahre recherchiert. Weitere Einschlusskriterien der ausgewählten Studien wurden anhand des PICOS-Schemas festgelegt. In den Datenbanken wurden insgesamt 164 Studien identifiziert. Titel- und Abstract-Screenings wurden gleichzeitig durchgeführt, um den Ausschluss potenzieller Artikel zu vermeiden. Insgesamt prüfte die Autorin 23 Volltextartikel anhand von Hawker et al. (2002) auf Qualität hin.

Ergebnisse: 11 Artikel erfüllten die Kriterien und wurden eingeschlossen. Zur Messung des Verhaltens der Selbstpflege wurden verschiedene Skalen verwendet, eine Version des Self-Care-Heart Failure Index (SCHFI) wurde dabei am häufigsten angewandt. Die Ergebnisse zeigen, dass eine geringe Gesundheitskompetenz das Verhalten der Selbstpflege beeinflussen kann, sodass diese weniger stark ausgeprägt ist. Weiters führten PatientInnen mit geringer Gesundheitskompetenz weniger Maßnahmen zur Selbstpflege durch und das Selbstbewusstsein beeinflusste den Selbstpflegeprozess. Umfangreiche fördernde Interventionen zur Selbstpflege können für PatientInnen mit geringer Gesundheitskompetenz von wesentlichem Nutzen sein.

Schlussfolgerung: Aufgrund dieser Literaturrecherche ist es inkonsistent, welche Auswirkungen tatsächlich die geringe Gesundheitskompetenz auf die Selbstpflege hat. Die meisten Studien erlaubten aufgrund ihres Querschnittsdesigns keine Untersuchung kausaler Zusammenhänge. Darüber hinaus sind die Ergebnisse schwer zu vergleichen, da in den Studien verschiedene Instrumente zur Messung der Gesundheitskompetenz und der Selbstpflege der PatientInnen verwendet wurden. Es wird empfohlen, Interventionsmaßnahmen für die Selbstpflege zu entwickeln, die sich auf das Vorwissen der PatientInnen, die Fertigkeiten und das Ausbildungsniveau der Selbstpflege unabhängig von der Gesundheitskompetenz beziehen, um sicher zu gehen, dass die PatientInnen das beste Gesundheits-Outcome erzielen.

Schlüsselwörter: Gesundheitskompetenz, Herzinsuffizienz, Selbstpflege

1. Introduction

Cardiovascular disease is the number one cause of death globally and more people die annually than from any other disease (WHO, 2013). The prevalence of heart failure is 1-2% of the adult population in developed countries, rising to over 10% among people over the age of 70 (Ponikowski et al., 2016). In addition, the prevalence of heart failure is going to increase in the future due to the aging population and improved therapy and management of cardiovascular disease (Cowie, 2013, p. 1). It is predicted that in the United States more than 8 million Americans will be living with heart failure by the year 2030 and medical costs are estimated to increase from 31 billion dollars in 2012 to approximately 70 billion dollars in 2030 (Heidenreich et al., 2013). Heart failure is a major public concern because of a high association with high morbidity, mortality and high cost (Sedlar et al., 2017). The goal of treatment for patients with heart failure is improving their health status, functional capacity and quality of life. Guidelines have been established providing up-to-date information for patients and supporting health experts in selecting the best strategy for an individual patient with heart failure. The guidelines of the European Society of Cardiology (ESC) underlines the importance of self-care adherence and management, which can be complicated especially with age due to factors such as co-morbidity, cognitive impairment, frailty and limited social support (Ponikowski et al., 2016). Furthermore, heart failure is the leading cause of hospitalisation for patients older than 65 years and the prognosis of heart failure is quite poor being the end stage of most heart diseases (Cowie, 2013, p.1-9). The desired health outcomes depend on clear communication and education between health care professionals and their patients. The ESC guidelines have identified many successes in the area of heart failure management and improvements in the care of heart failure patients (Ponikowski et al., 2016). Moreover, the ESC created the website “www.heartfailurematters.org” with the aim to provide advice for patients living with heart failure and their caregivers and health professionals, which is available in nine languages. The website provides education in several formats such as short informative videos, animations, short texts and downloadable tools for a diverse population so that they can better understand their treatment options and make

appropriate lifestyle choices (Wagenaar et al., 2017). The prognosis for heart failure patients has improved over the past 30 years, the consequence being that these patients will live with heart failure syndromes for many years and not all are guaranteed high quality treatment or have access to optimal care (Cowie, 2013, p. 1-9).

1.1 Heart Failure

The ESC published a heart failure guideline in 2016 for the diagnosis and treatment of acute and chronic heart failure. In this evidenced-based guideline, there is an adequate definition of heart failure, which includes the symptoms, signs and the cause of heart failure (Ponikowski et al., 2016).

> *"HF is a clinical syndrome characterized by typical symptoms (e.g. breathlessness, ankle swelling and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) caused by a structural and/or functional cardiac abnormality, resulting in a reduced cardiac output and/or elevated intracardiac pressures at rest or during stress (Ponikowski et al., 2016, p. 2136)."*

The typical symptoms of heart failure are described as breathlessness, orthopnoea, nocturnal dyspnoea, reduced exercise tolerance, fatigue, tiredness, increased time to recover after exercise and ankle swelling and more specific symptoms such as elevated jugular venous pressure or third heart sound/gallop rhythm (Ponikowski et al., 2016). The causes of heart failure as shortly described in the definition are ischaemic heart disease, toxic damage for instance from medication or radiation, inflammatory disease due to infection, infiltration, genetic abnormalities, metabolic derangements, abnormal loading conditions for instance hypertension or volume overload and arrythmias (Ponikowski et al., 2016). The symptoms are non-specific and are often hard to differentiate between other clinical conditions. At each medical visit, it is important to monitor the signs and symptoms to recognise the patient's response to treatment and stability over time and if symptoms reoccur despite treatment, then an indication for additional therapy is needed (Ponikowski et al., 2016). The assessment for heart failure probability begins with a clinical history then

the physical examination and an electrocardiogram. If there are any abnormalities shown in the electrocardiogram, then an echocardiography will be performed (Ponikowski et al., 2016). Next to echocardiographic abnormality, symptoms and exercise capacity are used to classify the severity of heart failure by using the New York Heart Association (NYHA) functional classification, which is widely used to determine heart failure outcome (Cowie, 2013).

1.1.1 New York Heart Association (NYHA) Functional Classification

NYHA functional classification is an evaluation method using a scale from one to four (I-IV) to determine the severity of a patient's heart failure condition with the symptoms that occur during activity. In class one patients show no limitation of physical activity, ordinary physical activity does not lead to fatigue, palpitation or shortness of breath. In class two patients have a slight limitation of physical activity, which means they are comfortable at rest, but ordinary physical activity results in fatigue, palpitation and shortness of breath. In class three there is a marked limitation of physical activity, where the patients are still comfortable at rest, but less than ordinary activity causes fatigue, palpitation or shortness of breath. In the last class patients are unable to perform any physical activity without discomfort (Zhang et al., 2018). Depending on the functional class, different therapy and medical attention is needed and should be correctly attended as a nurse or healthcare provider (Ponikowski et al., 2016). The treatment of heart failure consists primarily of pharmacological therapy and secondarily of non-pharmacological involving education devices, lifestyle and exercise (Cowie, 2013).

1.1.2 Pharmacological Therapy

Standard treatment of heart failure includes the following medication: diuretics, angiotensin converting enzyme (ACE) inhibitors and ß-blockers. Both ß-blockers and ACE inhibitors should be started as soon as possible in patients with heart failure to lower the risk of sudden cardiac death. Diuretics is a symptomatic treatment that should be introduced in a low dose and then increased according to response. There are loop diuretics, thiazide diuretics and potassium sparing diuretics all having the effect to reduce symptoms such as breathlessness and

oedema. ACE inhibitors are potentially used in all patients with heart failure, they are useful for asymptomatic heart failure to slow the rate of progression and improve symptoms, exercise tolerance and survival with chronic heart failure.
ß-blockers are used in all patients with mild or moderate heart failure to reverse the effects of the sympathetic nervous system, reduce arrythmia, sympathetic tone and ischaemic. There are many other medications that can benefit the quality of life and treat symptoms. Patients should be advised how and when to correctly take the prescribed medications, what effect and what contraindications exist (Cowie, 2013).

1.1.3 Non-Pharmacological Therapy

Device therapy is an optimal medical treatment to improve prognosis and symptoms, the implantable cardioverter-defibrillators (ICD´s) is used to treat arrythmias to prevent sudden cardiac death (Cowie, 2014).
Education and counselling are important strategies to secure a patient's well-being. This can be done frequently by lecturing the patients on symptom management, signs of heart failure, treatment therapy and self-care strategies. Appropriate lifestyle management should be encouraged and if possible altered. Sodium restriction may help control the symptoms and signs of heart failure, which is why advising the patients to avoid food with high content salt is recommended. Furthermore, fluid restriction should be limited to 1,5 litres to 2 litres a day, especially those on high doses of diuretics and severe symptoms or fluid retention. Smoking and alcohol should be strongly discouraged to reduce adverse outcomes. An adequate nutritional balance is a major focus for chronic heart failure due to the increased risk of malnutrition. Exercise training can improve the quality of life and deters chronic immobility which can lead to problems, such as loss of muscle and thromboembolism (Cowie, 2014).
These are patient skills and self-care behaviours that patients themselves or with support of family members or caregivers must achieve to have better health outcomes for an improvement in their quality of life (Riegel et al., 2009).

1.2 Self-Care

The World Health Organization defines self-care in health as
‘‘…*activities individuals, families, and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health. These activities are derived from knowledge and skills from the pool of both professional and lay experience. They are undertaken by lay people on their own behalf, either separately or in participative collaboration with professionals (WHO, 1984, p.2)*.’’

Self-care can be defined differently depending on the population. Riegel and Dickson et al (2008) have managed to describe a definition of self-care for the population with heart failure.

> *“…self-care is defined as a naturalistic decision-making process involving the choice of behaviors that maintain physiologic stability (maintenance) and the response to symptoms when they occur (management). Self-care maintenance is further defined to encompass routine symptom monitoring and treatment adherence. Self-care management is characterized as a process initiated by symptom recognition and evaluation, which stimulates the use of self-care treatments and treatment evaluation. Confidence in self-care is thought to moderate and/or mediate the effect of self-care on various outcomes (Riegel and Dickson, 2008, p. 190).”*

In this definition, self-care is described as naturalistic decision-making, with the intertwined factors being self-care management, self-care maintenance and self-care confidence. Naturalistic decision-making mirrors the process by which people make choices in real-world settings. The main influencers of naturalistic decision-making are knowledge, experience, skill and compatibility with values. Self-care management requires the recognition of change. Treatment adherence is a key component of self-care, whereas confidence serves as an influencer of self-care outcomes (Riegel and Dickson, 2008). The patient should be able to evaluate the change, decide to act appropriately by implementing an adequate treatment strategy and then evaluate the response to the treatment (Riegel et al., 2009). This complex process of self-care is demonstrated in the self-care heart failure model in Figure 1.

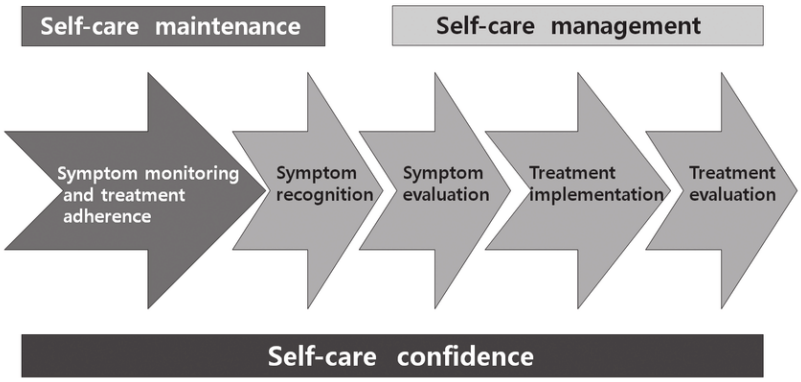

Figure 1: Self-Care Process (Riegel and Dickson, 2008)

A confusing component of self-care is the many different terminologies used as synonym to describe self-care such as, self-management, self-monitoring or self-regulation. Adherence and compliance are also mutual components of self-care (Riegel and Dickson, 2008).

Riegel et al. (2009) refers to specific self-care behaviours necessary for heart failure patients such as medication taking, symptom monitoring, dietary adherence, fluid restriction, alcohol restriction, weight loss, exercise, smoking cessation and non-prescription medication. The advice from health care providers is significant and important for patients to follow these specific behaviours as mentioned above. Furthermore, Riegel et al. (2009) describes interventions that can promote self-care: Skill development, which requires focusing on skill deficits and helping patients learn how to manage complex situations, behavior change by altering patient`s perception of their self-care, family support which can lead to better self-care outcomes and systems of care such as disease management and care coordination.

There are many challenging factors of self-care for heart failure patients, for instance comorbidity, depression, anxiety, age related issues, impaired cognition, sleep disturbance, problem with the health care system and poor health literacy (Riegel et al., 2009). The article “Conceptualizing Self-care in Heart Failure” also underlines factors in a model affecting self-care decision making in heart failure by including aging status, psychosocial status, current symptom status and prior experiences is and health literacy (Moser and Watkins, 2008).

Without guidance from a nurse it would be difficult to manage self-care, as a result of nurses helping patients understand how to monitor and interpret symptoms, set priorities and make choices concerning therapy (Riegel and Dickson, 2008). An

effective barrier to follow through with self-care regimes is low health literacy, which nurses and healthcare providers need to recognize to adopt strategies to provide better health outcomes. According to a recent review, an average of 39% of heart failure patients have low health literacy (Cajita et al., 2016).

1.3 Health Literacy

Health literacy has been defined in diverse literature since 1970 and in recent years has developed as an important factor for public health and healthcare. A progress of various definitions can be seen within international literature. The World Health Organisation (WHO), the American Medical Association and the Institute of Medicine have a similar definition, which focuses on obtaining, processing and understanding health information and services to make responsible health decisions (Sorensen et al., 2012). In 2012 Sorenson et al. published a systematic review on different definitions and models of health literacy with the aim of identifying an integrated concept to gain the possibility to measure and compare further literature. In this review Sorenson et al. (2012) determines a definition including the health care, disease prevention and health promotion as the key components of health literacy.

> *"Health literacy is linked to literacy and entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course (Sorensen et al., 2012, p.3)."*

Sorenson et al. (2012) describes health literacy as a multidimensional concept as seen in Figure 2 concerning cognitive capabilities, skills and behaviours which also replicates an individual`s capacity to function in the role of a patient within the healthcare system. The competencies to access, understand, appraise and apply the health information enable the patient to take control of their health status.

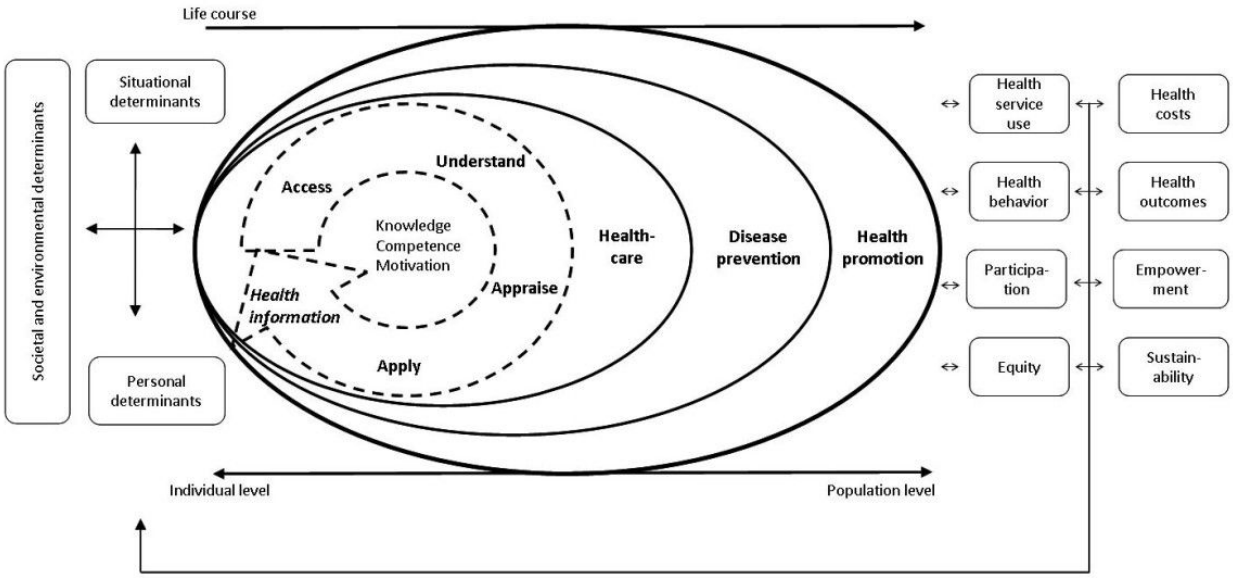

Figure 2: Model of Health Literacy (Sorensen et al., 2012)

Furthermore, the author emphasizes the so-called antecedents of health literacy such as general literacy, individual characteristics, prior experience with illness, the healthcare system, demographics and social factors. Demographic and social factors such as occupation, employment, income, financial status, culture, language, media use, parental and peer influence, environment and political view. This includes also Individual characteristics such as age, race, gender and cultural background as for the ability to hear, listen, see and memorize (Sorensen et al., 2012).

Evangelista et al. (2010) summarizes implications for clinical practice to address health literacy. Health care providers should address low health literacy by using these five steps: recognizing the impact of low health literacy on patient care and health outcomes, identifying patients at risk, screening the patients who are at risk, documenting literacy levels and learning preferences and lastly integrate effective strategies with educational materials such as CDs, books, tapes or pictures to enhance patients' ability to perform disease management. Health literacy can be assessed by informally screening patients by asking questions about written instructions or medications. Differences in behaviours such as failing to follow medication instructions or missing appointments or pointing to words as they read may be signs of low health literacy. Several tools have also been used to assess health literacy.

1.3.1 Tools of Health Literacy

Literacy can be measured by differentiating between those who can read and write basic text and by assessing the skill differences between adults (Nutbeam, 2009). There are different literacy tools such as the Test of Functional Health Literacy in Adults (TOFHLA), which consists of a 50-item reading comprehension and 17-item numerical ability test, taking up to 22 minutes to administer (Parker et al., 1995) and the S-TOFHLA (test of functional health literacy in adults: short-form) which is a short form of the TOFHLA consisting of 36-item reading comprehension and 4 numeracy items to complete in up to 12 minutes time. The S-TOFHLA has shown to be a reliable and valid measure of health literacy (Baker et al., 1999) and widely used in assessment of health literacy in heart failure (Cajita et al., 2016). The REALM (Rapid Estimate of Adult Literacy in Medicine) is a quick reading test which consists of a 66 word pronunciation that is performed within three minutes time, having adequate reliability and validity which has been measured with other health literacy measurements (Davis et al., 1993). These three tools have been useful screening tools in clinical environments (Nutbeam, 2009). Many other assessment tools have evolved over the past years (Altin et al., 2014, Nutbeam, 2009), the most widely used and validated being the TOHFLA and its shortened version S-TOHFLA (Westlake et al., 2013) and the REALM, which has been validated and used for research (Davis et al., 1993, Wu et al., 2017).

The European Health Literacy Survey Questionnaire (HLS-EU-Q) is a comprehensive tool to measure health literacy in populations which entail two sections, a core health literacy section with 47 items and a section on determinants and outcomes associated to health literacy (Sorensen et al., 2013). This survey tool, which was used in the first project to provide population data on health literacy levels in Europe can be very useful to identify strengths from weaknesses in health literacy levels to be able to compare with other countries and have the possibility to exchange and learn from others. By integrating this tool in different countries in Europe, data and results can significantly support political and professional decision-making for further health implications (Sorensen et al., 2015).

1.3.2 Health Literacy in Europe and in Austria

Health literacy is being researched within different disciplines receiving a broader awareness in the field of health. Health literacy has become a priority asset in the European Commission's Health Strategy 2008-2013 by involving the promotion of health literacy programs for different health groups (Sorensen et al., 2012). The recognition of health literacy is increasingly becoming more attractive as a public health goal (Sorensen et al., 2012) and evolving into an important priority on the European agenda, since monitoring health literacy can support professional and political decision making to enhance health literacy and in the long term serve as a benefit to the population's health (Sorensen et al., 2015). The European Health Literacy Survey measured health literacy in eight countries and on average, every second person surveyed showed limited health literacy and 1 in 10 people had inadequate health literacy. The health literacy scores varied between the countries substantially, with the highest scores being in the Netherlands and lowest in Bulgaria and second lowest in Austria (Sorensen et al., 2015).

A study, which measured health literacy for the first time with heart disease patients in Austria, used a table established with questions of the European Health Literacy Survey to judge the health literacy of the respondents. Patients had to indicate how well they gained, understood or implemented their health information on their specific disease. Regarding the assessment of the advantages and disadvantages of different treatment options 45.4% said it would be difficult to evaluate and many people stated that they had problems understanding what was written in their prescriptions of their medication. Furthermore, the proportion of patients questioned health literacy as difficult or very difficult to assess was relatively high and showed that a higher health literacy with more information transfer and satisfaction went hand in hand. In conclusion the study emphasized the importance of informing patients better on behavioural management and implementing behavioural change, strengthening health literacy and securing the participation of patients in their decision-making processes (Großschädl et al., 2014).

1.4 Problem Statement

According to recent literature adequate health literacy had a lower risk of hospitalisation for heart failure (Murray et al., 2009) and low health literacy was associated with a significantly increased risk of all-cause mortality (Peterson et al., 2011). Furthermore, low health literacy can compromise the education of self-care and communication leading to non-optimal care. Health care providers are unaware of the absence of patients understanding health information and recommend misleading educational strategies. Health care providers need to assess health literacy of their patients. The difficulty of interpreting health care providers instructions effects self-care decision making (Evangelista et al., 2010). For instance, symptom monitoring behaviours are not performed frequently by heart failure patients due to the inability to recognize and interpret symptoms when they occur. Patients seek care for symptoms too late. Heart failure patients take multiple medications a day, however, do not understand the purpose or effect of their prescriptions (Riegel et al., 2009). Nurses and other healthcare professionals should recognize that low health literacy is prevalent and start implementing adjusted strategies for low health literacy patients when communicating (Cajita et al., 2016). The effect of medical implementations will be compromised if health literacy is not addressed in patients with heart failure. Furthermore, patients self-care will be minimized and health care resources will be wasted (Evangelista et al., 2010).

1.5 Research Gap and Aim

It is essential to find an appropriate approach and several interventions to improve self-care in further research, especially among those with low literacy (Riegel et al., 2009, Evangelista et al., 2010). During the first literature review performed, studies did address research education interventions to compare self-care with patients with heart failure. However, many studies with educational interventions did not measure health literacy to compare the effect on self-care and no review was found focusing on the effect of a high or low health literacy on self-care with heart failure patients. This leads to the purpose of the thesis: to examine the effect of health literacy on self-care of patients with heart failure.

Consequently, this resulted in the following research question:
What effect does health literacy have on self-care for patients with heart failure?

The hypothesis is that: low health literacy has a negative effect on self-care for patients with heart failure.

2. Method

A literature review was performed to answer the research question. This review summarizes the evidence related to a problem in research by analysing and interpreting the information. The study findings are the main focus of the review and a research critique is the appraisal of the studies limitations and strengths (Polit and Beck, 2017). The studies reviewed vary in their quality and the contents of information, where the author must decide what to include in the written review to be able to summarize the findings and contribute to existing evidence for instance by finding gaps or discrepancies (Polit and Beck, 2017). First, a literature research was conducted in specific databases, then the studies were evaluated for eligibility according to inclusion and exclusion criteria's using the PICOS and then the selected studies were rated for quality according to the Hawker et al. (2002) criteria.

2.1. Literature Research

A literature review was conducted with a search of the databases Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Public Medical Literature OnLine (PUBMED) as both are medical databases, which have been completed in October and November 2018. The combination of the following keywords and synonyms were used for the search strategy: health literacy, literacy, health education, health knowledge, heart failure knowledge, self-care, self-management, self-care behavior and heart failure. These words were used as key words or for Medical Subject Headings Terms (MeSH) / Subject Headings, if available and connected with the Boolean operators “OR” and “AND” (Table 1). To receive only the relevant articles “title/abstract-search” was used as an additional filter and the limits were set to studies not older than 10 years and written in English or German.

Table 1: Search Strategy

Database	Terms	Limits	Results
PUBMED	(((((((health literacy[MeSH Terms]) OR "health knowledge"[Title/Abstract]) OR "heart failure knowledge"[Title/Abstract]) OR "literacy"[Title/Abstract]) OR "health education"[Title/Abstract]) AND self care[MeSH Terms]) OR "self care behavior"[Title/Abstract]) AND heart failure[MeSH Terms]	10 years Humans English, German	96
CINAHL	(MM "Health Literacy" OR "health education" OR "health knowledge" OR "heart failure knowledge") AND (MM "Heart Failure") AND (MM "Self Care" OR "self management")	10 years Humans English, German	68

2.2. Inclusion and Exclusion Criteria

The literature reviewed included no qualitative studies, due to the fact that the literature review was based on the effect of health literacy and this can only be defined in quantative studies. Furthermore, measurements and statistics of empirical observational and mathematical relations are central for quantative research as for models and theories that explain behavior (Wayne and Curt, 2015, p. 1). Eligibility criteria for inclusion in the review was decided using the PICOS Framework to perform a more sensitive and effective research and also a better comparison of the selected studies (Table 2) (Methley et al., 2014). PICOS is the abbreviation for the process used for evidence-based literature search, used to answer a health-related question: orginally published by Richardson et al. (1995), however more variation of the framework have been developed to guide one`s research (Richardson et al., 1995, Methley et al., 2014).

Table 2: Study Selection Eligibility Criteria using PICOS Framework

Population	Patients age ≥ 18, with heart failure, all health care settings, any socioeconomic group
Intervention	A study with heart failure patients examining health literacy and whether there is an effect or a relationship on self-care, measurements/tools used to define level of health literacy
Control	Comparison of low/high literacy, low/high economics, education program or no education program
Outcome	*Primary*: No hospitalisation, re-hospilitation due to heart failure no deaths *Secondary*: Improved self-care
Study design	All quantitative studies and any type of review

P – patient, problem or population, I – intervention, C – comparison, control, O – outcome, S – study design

The selected literature was imported into the reference management software endnote x8, where the duplicates were removed. Subsequently, a preselection of screening the title and abstracts took place. Title and abstract screening were performed together to avoid exclusion of potential articles.

When screening the title and abstract it was important to include only the studies consisting with at least two key words as mentioned above. A large amount of studies was eliminated during abstract screening, as they did not fall into the criteria of the PICOS Framework. During full text screening, the criteria of the articles was based on their contents and their suitability for answering the research question.

During the appraisal process of the selected studies it was realised, that to evaluate health literacy, only studies that used a dedicated health literacy measurement tool should be included. The study selection process is detailed in a PRISMA flow diagram (Figure 2). A total of 164 studies were found in the databases with the following search terms, after the duplicates were removed 146 studies were title and abstract screened, during this process 123 studies were excluded, with the remaining of 23 studies eligible for full-text screening. 11 studies were included for the literature review after following all determined criteria.

PRISMA Flow Chart

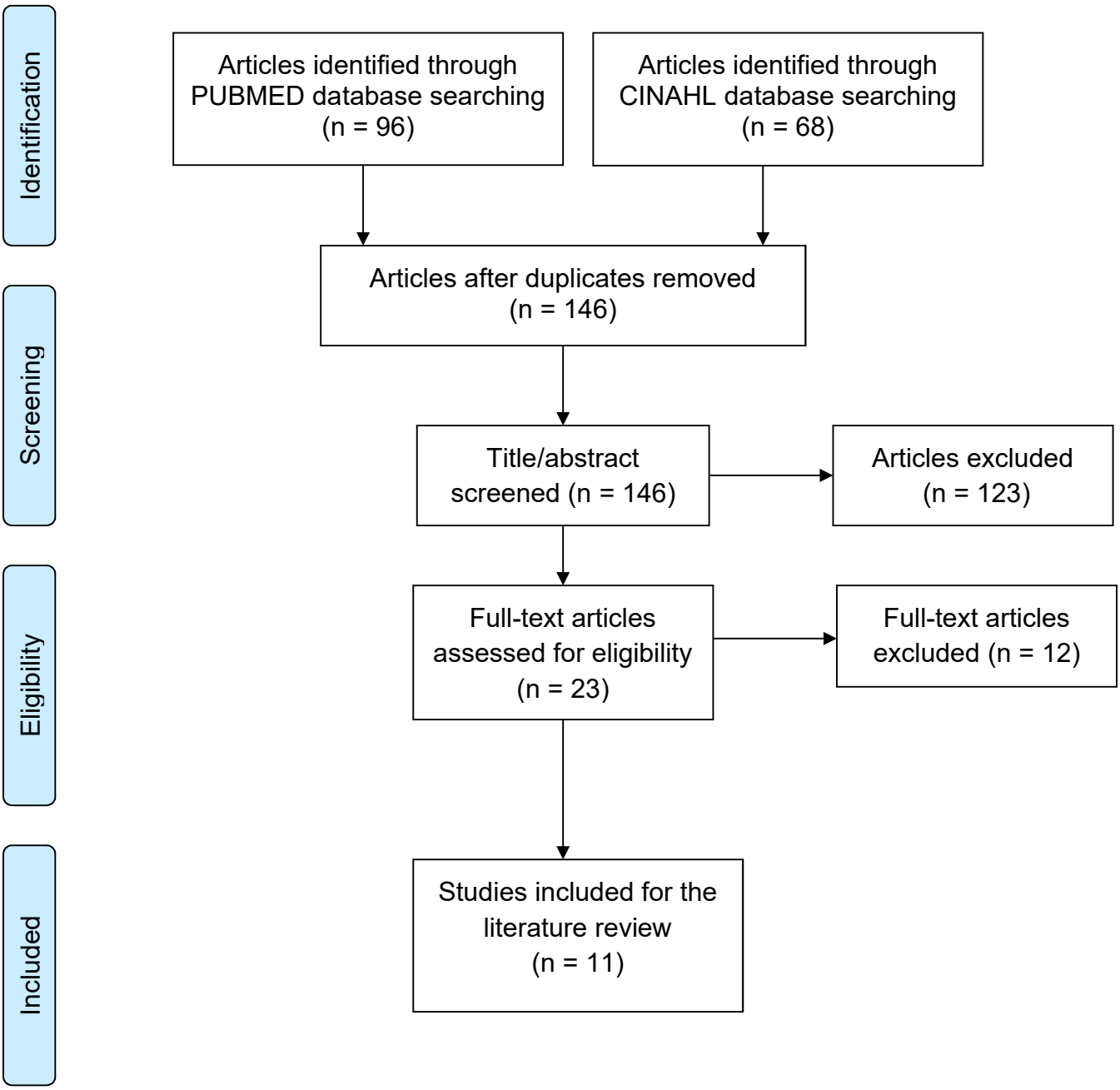

Figure 3: PRISMA FLOW CHART for the Study Inclusion

Adapted From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement

2.3. Quality Criteria

The studies found were assessed for quality only by the author of this bachelor thesis using the Hawker et al. (2002) criteria. This criteria method can be used for qualitative as well as quantitative studies to systematically review research articles. The criteria include nine different categories to appraise the quality of each study, which essentially replicate the main sections of a scientific paper. The categories start with the abstract and title, introduction and aims, method and data, sampling, data analysis, ethics and bias, results, transferability or generalizability and ending with implications and usefulness. Each category is marked with either good, fair, poor or very poor awarded with four to one point. The lower the score the poorer the quality of the paper, adding up the scores and dividing it by the sum of points to achieve, will give you the percentage (Hawker et al., 2002). The evaluation of the studies can be found in Table 3 with the characteristics in the results calculated in percent and the Hawker et al. (2002) criteria form can be found in the attachment as for the complete evaluation of each article in alphabetical order reviewed.

The results of the studies are described in detail in the next section.

3. Results

In this section the characteristics of the studies and the results are presented from eleven studies, after being reviewed, only studies that had used a health literacy measurement or tool to define literacy in their research and focusing on self-care were included in the analysis. The results of the following eleven studies were divided into three sections and summarized separately, studies using the SCHFI to describe the relations between self-care and health literacy, studies using a self-care behaviour scale and studies looking at a self-care programme.

3.1. Characteristics of the Studies

Most of the studies reviewed have a cross-sectional design and used the Test of Functional Health Literacy in Adults Short-form (S-TOFHLA) for measuring health literacy. There were two randomized control studies with the same sample size but different authors, both having different results and one cohort study was found. In the two randomized control studies they included a health literacy tool to define the literacy level of the patients before performing an intervention. Two of the studies analysed the data from a previous randomized control study looking at different variables. The sample size varied from a pilot study with only 49 participants to the two randomized control trails with 605 participants. The age of the participants varied starting on average at the age 57 to 67 with only one study looking at an older population, average age 85. Different tools were used to measure self-care behaviours, mostly using a version of The Self-Care Heart Failure Index (SCHFI). The results of this review are divided into sections using The SCHFI to describe the relations between self-care and health literacy, studies using a self-care behaviour scale and studies looking at a self-care programme with different health literacy levels and outcomes. The characteristics, method, main results and the quality of each study appraised with Hawker et al. (2002) are presented in Table 3.

Table 3: Characteristics of the Studies

Author/Year	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
Baker et al., 2011	Randomized Control Trail	N= 605, 52% male, average age 60,7, ethnically diverse, general had low education, 50% in NYHA functional class II Outpatient hospital	The S-TOFHLA was used to measure HL and a telephone survey (ICICE) to measure HF self-care behaviours with the behaviour scale range 0-10	The magnitude of the improvements in self-care behaviours and the differences between the two education (multiple and single session) groups were very similar regardless of literacy level.	88,8%
Chen et al., 2014	Cross-sectional	N= 63, 52 % male, average age 62, 85.7% Caucasian Three HF clinics	The S-TOFHLA was used to measure HL and the SCHFI was used to measure self-care	Most participants had adequate HL but were not adherent in self-care, however HL was not related to self-care	88,8%

Author/Year	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
Chen et al., 2011	Cross-sectional	N= 49, main age 65, 67.3 % male, 91.8% Caucasian, 87.8 % completed year 12 education Community and hospital	The S-TOFHLA was used to measure HL and The SCHFI version 4 was used to measure self-care.	HL was positively related to self-care maintenance (P = .006) and negatively related to self-care management (P = .001), however there was no association between HL and self-care confidence (P = .083)	77,7%
Dennison et al., 2011	Comparative descriptive	N=95, 55 % male, average age 59, 67% African American, 65% had at least high school education, hospitalized for at least 24 hours and had received prior HF education Hospital	The S-TOFHLA was used to measure HL and the SCHFI was used to measure self-care	The scores of self-care confidence varied significantly by the level of HL (p=0,005). Participants with adequate HL had higher HF self- care confidence compared to those with marginal or inadequate HL.	86,1 %

Author/Country	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
DeWalt et al., 2012	Randomized, controlled Trial	N=605, 52% male, average age 60,7, ethnically diverse, general had low education, 50% NYHA functional class II Four academic medical centres	S-TOFHLA and single and multiple self-care intervention; incidence of HF-related hospitalisation	The effect of multiple education sessions differed by literacy level (p= 0.005). For HF-related hospitalisation, among those with low literacy, multisession training yielded a lower incidence than those with higher literacy.	91,6%
Kumar et al., 2017	Cross-sectional	N=100, 49% male, average age 57, 94% African American, education level varied Emergency Department	The -TOFHLA was used to measure HL and the 5-item Self-Care HF Index	No correlation was found between any of the self-care adherence questions and HL, none of the self-care adherence questions were different with respect of HL level.	77,7%

Author/Year	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
Leon-Gonzalez et al., 2018	Prospective cohort study	N= 556, 62,2% women, average age 85, 73,3% had less then primary education, 44% NYHA functional class III-IV Six hospitals	Short Assessment of Health Literacy for Spanish-speaking Adults (SAHLSA) and The European Heart Failure Self-Care Behaviour Scale, including 12 items	No association was found between HL and HF self-care.	88,8 %
Macabasco-O'Connell et al., 2011	Cross-sectional of a randomized controlled trail	N= 585, 52% male, average age 60,7, ethnically diverse, general had low education, 50% in NYHA functional class II Four academic medical centres	The S-TOFHLA was used to measure literacy and a telephone survey (ICICE) to measure HF self-care behaviours with the behaviour scale range 0-10	Participants with adequate literacy reported higher behavior scores than those with low literacy.	80,5 %

Author/Year	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
Matsuoka et al., 2016	Cross-sectional, observational study	N= 227, 62% male, average age 68, 72% had at least high school level, 48% in class NYHA functional class I and 47% in II Hospital	The Heart Failure Specific Health Literacy Scale; The Japanese version of the European Heart Failure Self-Care Behaviour Scale (EHFScBS),	Patients with low HL had poorer self-care behavior than those with high HL. Patients with lower critical HL do not perform consulting behaviours as often as those with HL.	99,6%
Wu et al., 2017	A secondary data analysis of a randomized control study	N=113, 64% male, average age 56, 58% African Americans, 72% NYHA functional class II, 51% with high school education Three outpatient hospitals	The REALM was used to measure HL, a HF medication adherence scale and sodium intake (24-hr urine and 3-day food record) were assessed as the self-care behaviours after a self-care programme	Patients with low HL were more likely to have poorer medication adherence (p = .077) and higher sodium intake (p = .072).	86,1 %

Author/Country	Design	Sample characteristics/Setting	Method/Measurements	Main results	Quality
Zou et al., 2017	Cross-sectional	N= 321, 51% male, average age 64, 62% in NYHA functional class II, 65% no high school level reported, 88% had one or more comorbidities Hospital	The Chinese version of Health Literacy Scale for Patients with Chronic Disease, the Chinese version of the Self-Care of Heart Failure Index (SCHFI)	HL was directly related to self-care maintenance (p=<0,001) and self-care confidence mediates the relationship between health literacy and self-care behaviours.	88,8%

3.2. Health literacy and the Self-Care of Heart Failure Index

The research of the four studies by Chen et al. (2011), Chen et al. (2014), Zou et al. (2017) and Dennison et al. (2011) focused on examining the relationship or association between self-care and health literacy. The SCHFI measures self-care with three different subscales: self-care maintenance, management and confidence. The subscale maintenance measures self-care monitoring and treatment adherence behaviours. The subscale management measures patients` ability in symptom recognition and evaluation for treatment taking and evaluation. The subscale confidence measures the ability to engage in the process of self-care. The SCHFI is a 22-item instrument with scores on each of these subscales standardized to a 0-100 range, with a score of 70 and above used to determine adequate self-care. Each item is rated on a four-point response rate scale by the participants (Chen et al., 2014).

3.2.1. Self-care Maintenance

The maintenance subscale measures behaviours such as exercise, daily weight monitoring and diet adherence with the response range from one point being never to four points being always (Chen et al., 2011). In the study Zou et al. (2017), where the purpose of the study was to find associations of health literacy and self-care behaviours with a Chinese population that mostly had low knowledge, scores for health literacy and social support were directly related to the scores for self-care maintenance. In the pilot study by Chen et al. (2011), that examined the levels of self-care in relation to adequate health literacy, self-care maintenance was positively related to health literacy, although not statistically significant ($p< 0,006$). This shows that by having adequate health literacy one is more likely to perform better health care maintenance. In the studies Dennison et al. (2011) and Chen et al. (2014) self-care maintainace scores did not differ by health literacy level.

3.2.2. Self-care Management

The management subscale measures patient's decision-making process for implementing correct treatment for heart failure exacerbation and is only scored when participants have symptoms in the past few months. Responses range from one point being not likely to four points being very likely (Chen et al., 2011). In the pilot study by Chen et al. (2011) with mostly white/caucasian participants with good support from family or friends and adequate health literacy it was unexpected to find that patients with adequate health literacy performed less self-care management. This study suggested that lower health literacy was associated to better self-care management. However, in another study by Chen et al. (2014) with also mostly white/caucasian participants with adequate health literacy showed no significance between health literacy and self-care management. To underline the relationship between self-care management and health literacy, another study with mostly African-American participants with a varied level of literacy, self-care management did not differ in literacy level (Dennison et al., 2011). In the study by Zou et al. (2017) health literacy was found to have a positive indirect relationship with self-care management through the mediation of self-care confidence.

3.2.3. Self-care Confidence

The confidence subscale measures their ability to perform self-care behaviours and the effectiveness of the changes made with a response range from one point being not confident and four point extremely confident (Chen et al., 2011). Patients' confidence in their ability to perform self-care is a significant factor where health literacy is related to self-care behavior. Findings of this specific study by Zou et al. (2017) show very clearly that other parameters in this instance lack of confidence represents a relationship with literacy (Zou et al., 2017). In a hospitalized sample with a study population mostly inadequate and marginal health literacy, where most participants were African-American, self-care confidence scores were low ($p<.0{,}001$) and significantly higher for those with adequate health literacy. The scores of self-care confidence varied significantly by the level of health literacy ($p=0{,}005$) (Dennison et al., 2011). Furthermore, in the pilot study by Chen et al. (2011) with mostly white/caucasian participants with good support from family or friends and

adequate health literacy trended towards having a greater self-care confidence, however the finding was not significant (p= 0,083).

3.3. Health literacy and Self-care Behaviour

Three studies used a form of self-care behavior scale to measure the differences in literacy level. The Heart Failure Self-Care Behaviour Scale includes 12 items such as weight monitoring, symptoms and signs recognition, fluid and salt restriction, exercise and drug treatment, where participants rate their self-care behaviour on a 5-point scale, where the total score adds up to 60. A higher score indicates a poorer self-care behaviour (Matsuoka et al., 2016).
One prospective cohort study by Leon-Gonzalez et al. (2014) in Spain with a significant elderly population with a very low education level, mostly women and NYHA class III to IV, assessed the association of health literacy and self-care behaviours. In this population, no association was found between health literacy and self-care behaviour.

In contrast, another cross-sectional study by Matsuoka et al. (2016) determined to find a relationship between health literacy and self-care behaviour in a study population with the average age of 68, with NYHA class I to II. With the different results than other studies, they determined three levels of literacy: functional, critical and communicative health literacy. The findings of this study showed, that patients with lower communicative and lower critically health literacy had poorer adherence to daily weighing, fluid restriction as for taking it easy and stopping when short of breath. Moreover, lower critical literacy patients were less likely to contact the hospital or medical staff when their body weight or fatigue increased than those with higher critical literacy. Matsuoka et al. (2016) demonstrated that fewer self-care behavior correlated with low literacy patients. The main finding of this study was, that especially patients with lower critical health literacy performed less self-care behaviour and consulting behavior. Critical literacy is needed to analyse information critically and using this information for a better outcome and communicative literacy is important to be able to apply new information to change a situation.

Kumar et al. (2017) focused on finding a relation of health literacy and self-care adherence by using the 5-item the Self-Care Heart Failure Behavior Index, instead as the previous studies using the 12-item European Heart Failure Self-Care Behavior instrument. This cross-sectional study had a sample with mostly African-Americans and varied literacy level. The findings of this study showed there was no correlation between health literacy and self-care adherence by comparing adherence responses to the questions such as: “How often do you weigh yourself?” “How often did you forget or skip doses of medications?” None of the adherence questions were significantly different with respect to health literacy (Kumar et al., 2017).

3.4. Self-Care Programme: Differences in Literacy Level

DeWalt et al. (2017), Baker et al. (2011) and Macabasco-O'Connell et al (2011) focused on a randomized control study with the same sample size, different aims and results. A selfcare education with a single in-person education session versus a more intensive educational programme, which also included follow-up education phone calls, was conducted. The participants varied in ethnicity, average age of 61 years and the randomized control trail focused on comparing the effects of a single session or multiple session self-care training by health literacy group on the incidence of heart failure related hospitalisation (DeWalt et al., 2012). The article by Baker et al. (2011) examined whether benefits of two different self-care interventions differed by literacy level. The secondary cross-sectional design focused on analysing the data of the same randomized control trail to examine the relationship between literacy and self-efficacy such as self-care behaviours (Macabasco-O'Connell et al., 2011).

The study by DeWalt et al. (2012) had significant findings, reporting that in the patients with lower health literacy, the multisession training with follow-up phone calls yielded a lower incidence of all-caused hospitalisation and death. Participants in the multiple session had more intensive education, such as more specific instructions using daily weights to guide an adjusted diuretic implementation, whereas those in a single session completed only one session and continued with their usual care. The effect of the multiple sessions differed significantly by literacy level ($p= 0.005$). Among lower literacy participants in a multisession training a lower

incidence of heart failure hospitalisation was uncovered. Participants with higher literacy level favoured a single-session group and did not benefit from a multisession intervention in respect to hospitalisation incidence.

In the cross-sectional analysis from Macabasco-O'Connell et al. (2011) it was found that participants with adequate literacy reported higher behavior scores than those with low literacy. Self-care was measured by using an adapted version of the Improving Chronic Illness Care Evaluation (ICICE) by assessing weight monitoring, weight adherence and salt restriction. Participants with adequate literacy reported having a scale at home, reported weighing themselve daily and changed diuretics when needed. Additionally, patients with adequate literacy knew what to do if their weight went up compared with low literacy patients. Participants with adequate literacy had higher overall self-efficacy.

In the study by Baker et al. (2011), the scale of the improvements in self-care behaviours and the differences between the two intervention groups were very similar regardless of literacy level, however most of the participants had adequate literacy, only 37% had low literacy. The multisession programme was equally successful for patients with inadequate/marginal literacy as for those with adequate literacy regarding self-care behavior (Baker et al., 2011).

Another secondary data analysis by Wu et al. (2017), which was however collected 10 years after the trail, focused on a self-care intervention, where patients were given instructions and equipment for obtaining 24-hour urine sample and a 3-day food record. More than half of the participants were African-American and 34% had low literacy. Patients with low literacy level were more likely to have a lower medication adherence (P=0,077) and a higher sodium intake (P=0,072), although both were not statistically significant. Another finding in this study was, if both patient and a caregiver had low literacy, poorer medication adherence ($p< 0,026$) and increased salt intake of the patient per day was observed (Wu et al., 2017).

4. Discussion

The aim of this review was to examine the effect of health literacy on self-care of patients with heart failure. The findings of the studies are divided into studies using The SCHFI to describe the relations between self-care and health literacy, studies using a self-care behaviour scale and studies assessing a self-care programme with a population with different health literacy levels. In all the studies included in the review, health literacy did not have a significant effect on self-care. However, health literacy may serve as an influencer on self-care behaviours. By trying to compare results of the studies, it became apparent that health literacy did not have the same significance in all self-care behaviours as the relationships differed. Different ethnicity, educational level, knowledge and income differed in each study, showing to also influence self-care behaviour, making it hard to recognize the results of health literacy.

The S-TOFHLA was most widely used as the health literacy tool, making it easy to compare the results with the following studies. However, S-TOFHLA only measures the functional domain of health literacy, not considering other factors besides reading comprehension and writing. Furthermore, these questionnaires are self-reported, leading to a possible bias in each study, thus the results are subjective. Furthermore, there was minimal information on the administration of the health literacy or self-care surveys, where one must assume an appropriate performance and distribution by specialized and schooled health professionals was done. The studies analysed had an approximately balanced gender ratio and were mostly conducted in hospital settings, making it easier to compare results. The studies were mostly conducted in the United States of America and only one study was performed in Europe, in Spain.

One of the findings is the relationship between patient's health literacy and self-care confidence (Zou et al., 2017, Dennison et al., 2011). Patients confidence to perform self-care is an important mechanism by which health literacy is related to self-care behavior. Dennison et al. (2011) reported patients with adequate health literacy had significantly higher self-care confidence than those with marginal health literacy and

Zou et al. (2017) showed that self-care confidence mediated the relation between health literacy and self-care behaviours. Although the study Dennison et al. (2011) is a small single centre study, the evidence reported has also been found in other similar studies making the evidence more reliable. All patients were hospitalized for at least 24 hours and had received heart failure education from the hospital`s heart failure coordinator prior to being conducted, however there is no detail on how the education took place. Dennison et al. (2011) describes the administration of the health literacy instrument, where research assistants used set of cards containing each item and response options. Otherwise, there was minimal information provided in the chosen articles on how and by whom the tools and measurements were administered, therefore one must assume health professionals had enough guidance on correct administration.

Zou et al. (2017) used a different health literacy scale, the Chinese version of Health Literacy Scale for Patients with chronic disease, this tool assesses four dimensions with a total range of 120, higher scores reflecting higher health literacy, in contrast to the S-TOFHLA having three different groups of literacy levels (inadequate/marginal/adequate), therefore making results difficult to compare. In this study health literacy was found to have a direct relationship with self-care maintenance and indirect relationships with both self-care maintenance and management through the mediation of self-care confidence. In the study by Zou et al. (2017) patients had low heart failure knowledge, which might also hinder self-care behaviours. To underline this problem, Macabasco et al. (2017), Dennison et al. (2011) and, Wu et al. (2017) reported that patients with adequate high literacy were more likely to have higher heart failure knowledge.

In the pilot study by Chen et al. (2011) patients with higher health literacy trended toward having greater self-care confidence, which can increase the performance of self-care, but this finding was not statistically significant. Furthermore, adequate health literacy was associated to better self-care maintenance in this study, although not statistically significant.

In the study Zou et al. (2017), the association of health literacy and social support was found to be directly related to the scores for self-care maintenance in a study sample that mostly had low knowledge. Social support has also been shown to be a beneficial factor in the study by Wu et al. (2017), if both patient and a family

member taking care of the patient had low literacy, poorer medication adherence was observed. The study by Wu et al. (2017) also revealed that family knowledge supporting the patient was significantly associated with 24-hour urinary sodium levels, implying that both patients and family members health literacy and knowledge need to be addressed when designing self-care interventions. Furthermore, the study reported that involving family members in patients' health care may be beneficial, especially the education regarding self-care. The data was collected 10 years previously, where practice may have been different, therefore the findings of the data need to be confirmed in a larger more recent sample size. The measures of health literacy in the study by Wu et al. (2017), the REALM, only assessed participants' reading and not numeracy which is important to measure for medication and low sodium diet adherence.

In the pilot study by Chen et al. (2011) health literacy had a negative relationship with self-care management, suggesting that lower health literacy was associated with better self-care management and higher health literacy with worse self-care management. When analysing these results, you need to acknowledge that most of the participants had adequate health literacy, the sample size was very small and a different version of the SCHFI was used with only 12 instead of 22 items.
Furthermore, in the study Chen et al. (2014) most of the participants had adequate health literacy but were not adherent in self-care, this demonstrates that patients with adequate literacy may not perform better self-care management then patients with low health literacy. In this study self-efficacy was related to self-care, whereas one most consider which self-reported measurements was used, it was a single-centre and small sample size when examining the results. Moreover, there was no data of NYHA functional class of the participants in the study by Chen et al. (2014). Macabasco et al. (2011) and Leon-Gonzales et al. (2018) found that participants in the adequate literacy group were less likely to have NYHA class III or IV than those in the low literacy group.

Chen et al. (2011, 2014), Zou et al. (2017) and Dennison et al. (2011) al focused on finding associations of health literacy using the SCHFI on different subscales of self-care. These four studies did not mention all of the three subscales, some only focused on one relevant subscale in their results. The results identified that health

literacy may have a positive influence on self-care confidence and self-care maintenance in a specific group. However, no influence on self-care management was reported in the results of the studies reviewed. Furthermore, their results revealed other factors influencing health literacy such as NYHA class, heart failure knowledge or social support.

The study by DeWalt et al. (2011) demonstrated that when patients have low literacy, a self-care multisession education can be of benefit. Among those with a low literacy, multisession education led to less all-caused hospitalisation and death. When looking at the entire population the multisession group with an intensive educational training did not appear to have benefit on all-caused hospitalisation or death over the 40-minute single session group. The results were similar in heart failure related hospitalisation however favouring the low literacy group. The result of low literacy leading to heart failure related hospitalisation has however been shown in previous studies (Murray et al., 2009). The intensive training group for both low and high literacy probably should have had better results for heart failure admission as they had more advanced training of integrating their diuretics. Therefore, they should have stayed out of the hospital more often, which were not reported in the results. How many patients could have advanced training with diuretic self-care was missing in the data as the patients needed permission to do so with the primary physicians. In the authors discussion, they were unsure as to why the multiple session training did not have a more positive effect, that it was also negative for increased hospitalisation in high literacy patients. This could be due to the self-efficacy in patients having more responsibility of their symptoms and subsequently leading them to more admissions. One also must consider the unevenly distribution between the two education groups. The conclusion of this study is that self-care interventions should be designed related to patient's previous knowledge and skills and that different educational materials and reinforcement of information should be provided.

In the study Baker et al. (2011) with the aim being to examine whether benefits of two different self-care interventions differed by literacy level, the multisession programme was equally successful for patients with inadequate/marginal literacy as for those with adequate literacy regarding self-care behaviours. However, the

participants with poor health literacy had worse self-care behaviours to begin with compared to those with adequate literacy and the intervention did not significantly reduce the difference between groups. Moreover, both education groups showed improvement in knowledge, self-care behaviours, self-efficacy with the multisession education scoring higher.

In the cross-sectional anlasyis by Macabasco-O'Connell et al. (2011) adequate literacy showed positive associations with self-care behaviors and a overall higher self-efficacy, where patients with adeqaute literacy performed better self-care behaviours. Riegel et al. (2008) reported similarly that low health literacy may withhold someone from obtaining information making it harder to follow through with self-care behaviours resulting in negative health outcomes. As shown in other studies Macabasco-O'Connell et al. (2011), Zou et al. (2017), Kumar et al. (2017) and Baker et al. (2011) self-care behaviours in heart failure patients is relatively low. The studies by Baker et al. (2011) and Macabasco et al. (2011), which analysed the baseline data from DeWalt et al. (2011), assessed self-care with the ten-item self-care behavior scale, which includes items related to weight monitoring, weight adherence, correct responses to deal with an increased weight, efforts to decrease salt intake and exercise using an adapted version of the ICICE telephone survey. The self-care behaviours scale was therefore administered orally over the phone, possibly leading to a bias due to subjective answers.

The research of Leon-Gonzales et al. (2018), Matsuoka et al. (2015) and Kumar et al. (2017) was based on the relation between health literacy and self-care behaviours. In the prospective study by Leon-Gonzales et al. (2018) no association was found between self-care and health literacy. However, the results of the study are difficult to compare with other studies, due to the very high age of the participants with a poor prognosis and participants requiring complex care. Moreover, the study used the Short Assessment of Health Literacy for Spanish-speaking Adults for measuring literacy, which includes 50 items, whereas the short assessment in the English version only has only 36 items. Furthermore, the access to a free-health care system in Spain may have compensated for low health literacy, due to the frequent consultations and follow-ups by professionals in contrast to the United States of America. The participants in this study had a lower education level, which has shown to be an influencing factor in literacy level in other studies. In the studies

reviewed, those with adequate literacy level had a higher education level than those with lower literacy level. (Macabasco-O'Connell et al., 2011, Dennison et al., 2011, Matsuoka et al., 2016). The study by Matsuoka et al. (2015) did find a significant relationship between communicative and critical health literacy and self-care behaviours. They reported, that if patients do not understand the health information provided, this can lead to poorer self-care behaviour, consistent with previous studies (Riegel and Dickson, 2008). Matsuoka et al. (2015) used a different health literacy tool, in contrast to the previous studies, it not only measured the functional health literacy, which is the ability to read and write, but also the communicative and critical health literacy, making it difficult to compare with other studies results. The other studies used tools such as S-TOFHLA and the REALM, which only measure the functional domain of health literacy. Measuring the functional health literacy alone may be insufficient, leading to inconclusive results. The need to develop new tools to assess other domains of health literacy has been identified in other research (Sorensen et al., 2012).

In the study by Kumar et al. (2017), where heart failure self-care was relatively low in the study sample with 94% African-American, none of the adherence questions were significantly different with respect to health literacy. The key result of the study was that better illness belief correlated with increasing health literacy, suggesting that to improve the beliefs related to heart failure, health literacy must be considered. This study used the 5-item Self-Care Index, instead as the previous two studies using the 12-item European Heart Failure Self-Care Behaviour, making it difficult to compare the results. Moreover, participants in this study were targeted with acute heart failure in the emergency department rather than the clinical setting as in the other studies. Responses may have differed from participants who are not in an acute state of health, especially regarding self-care behaviours.

Strengths and Limitations

A positive strength of the thesis is including all quantative studies compared to qualitive studies or only specific designs, where the aim was more likely answered, only relevant studies found for research and the gap was easily found by including all quantative designs. Furthermore, for inclusion criteria the PICOS Framework was used to perform a more sensitive and effective research and a better comparison of the selected studies. Abstract and title screening was performed together to avoid exclusion of possible relevant studies.

However, a limitation of the thesis is also the domain of the cross-sectional designs, where causality cannot be implied. Additionally, the use of different self-care measures makes it hard to compare One study collected data 10 years ago, leading to a possible bias of the study, since nursing practice may have changed since the data has been collected. the results, leading to a discrepancy in the key results of the thesis. A further limitation of the study is also using only two databases, Pubmed and CINAHL, were only the search of English and German literature was performed, therefore limited literature was found where all PICOS criteria were present, possibly missing important research.

Though, the studies reviewed were recently published, the oldest study only being 6 years old, leading to up to date information. Furthermore, a possible bias of the thesis is only considering studies with a health literacy tool, other studies may have measured health differently or defined health literacy in a different way. However, this could also be a positive factor leading to better comparable results when using a health literacy tool.

Practical and Research Implication

As seen in the literature review performed, different study designs such as randomized control trails are needed over a longer period to identify the effect of health literacy on self-care of heart failure patients. Furthermore, larger sample sizes with different health care settings are needed to generalize the effect on different populations. These randomized control studies need to set appropriate self-care educations for patients with such a complex disease as heart failure. Further

research to develop and test self-care interventions appropriate to patients with low health literacy is warranted. However, this is only possible if health literacy tools are refined for nurses to identify patients with inadequate health literacy in practice. The importance to encourage health professionals to assess health literacy to optimize education and counselling of self-care is present, but should be improved as shown in previous studies (Evangelista et al., 2010, Cajita et al., 2016).

Not only the functional health literacy aspect is important, but also the communicative and critical health literacy to implement correct treatment strategies. The S-TOFHLA is designed to assess reading and understanding of health care materials but does not consider other aspects such as visual or communicative abilities, where further research is needed to have a broader concept of a patient's health literacy status. Moreover, practical standardized strategies for identifying those with low health literacy for use in research and clinical practice are needed. Especially in a population who might not understand the language or have problems reading difficult medical terms. The health literacy tools should be adaptable in practice, so that health professionals can have a more convenient and quicker method to identify patients with low health literacy. Health professionals should receive further education on the correct use of health literacy tools and health literacy should receive more emphases in nursing schools to become more relevant. Especially in Austria there is not enough emphasize on health literacy in further education programs in practice for nurses, which should be implemented to secure better health outcomes and less re-hospitalisation for patients.

Research is also needed to identify cultural, educational and age-related issues that intersect with health literacy and self-care behaviours, both influencing each other. This could be done with further research examining characteristics of patients most vulnerable with heart failure to low or marginal health literacy. In this literature review only one study was performed in Europe. There is a need for further research between health literacy and self-care in Europe to allow transferability of the results to countries within Europe.

Interventions designed to enhance self-care behaviours need to consider patient`s level of health literacy, as well as the health literacy of family members taking care of the patient. However, it is recommended to design self-care education related to the patient's previous knowledge, skills and level of self-care training regardless of literacy level, to be certain to provide the best outcome for the patient. Situational,

environmental, social and personal determinants are all factors to consider when designing self-care education. These factors are also all part of the conceptual model of health literacy (Sorensen et al., 2012). Further self-care interventions and educational materials need to be designed to broaden heart failure patient's knowledge on one's self-care behaviours such as symptoms management. This can be done with not only written information such as flyers or information sheets, but also with visual clips or animations such as shown in the study by Waagenaar et al. (2017) with the website heartfailurematters.org. In Austria written education materials are only provided in German language, therefore patients with a low German literacy cannot understand the information causing problems in self-care behaviours. Health care providers need to be aware of this issue and must address this by providing appropriate educational materials.

5. Conclusion

Based on this literature review it is inconsistent what effect low health literacy has on self-care, because most of the studies do not allow the investigation of causal associations due to their cross-sectional design. Some studies have indicated an association between health literacy and self-care behavior, while others found no significant association. Furthermore, the results are hard to compare since the studies used different instruments for measuring patient variables. A discrepancy of the studies is present, due to factors such as different ethnicities and demographics in the population, different measurements assessing health literacy, self-care and different study designs.

The hypothesis is that low health literacy has a negative effect on self-care for patients with heart failure. In this thesis, however, it is inconsistent what effect low health literacy has on self-care due to the study designs of each study, the causal effect cannot be implied. However, some studies did reveal that low literacy may influence self-care behaviours, where patients trended towards poorer self-care adherence and were more likely to not consult information when necessary. To confirm this hypothesis more research with a larger sample size is needed, especially study designs, where causality can be applied, and generalizability is

given. Furthermore, low literacy may be a marker for sociodemographic factors which may affect the outcomes in self-care behaviours. Due to numerous barriers of self-care (Riegel et al., 2009), multiple factors could potentially influence self-care behaviours before even measuring the level of health literacy. Therefore, before measuring health literacy, sociodemographic status should be evaluated as this may have an influence on selfcare management regardless of level of literacy.

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DeWalt, D. A., Schillinger, D., Ruo, B., Bibbins-Domingo, K., Baker, D. W., Holmes, G. M., Weinberger, M., Macabasco-O'Connell, A., Broucksou, K., Hawk, V., Grady, K. L., Erman, B., Sueta, C. A., Chang, P. P., Cene, C. W., Wu, J. R., Jones, C. D. & Pignone, M. 2012. Multisite randomized trial of a single-session versus multisession literacy-sensitive self-care intervention for patients with heart failure. *Circulation,* 125**,** 2854-62.

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7. Appendix

7.1. Checklist of Hawker et al (2002)

This checklist is from Hawker, S., S. Payne, et al. (2002). "Appraising the Evidence: Reviewing Disparate Data Systematically." Qualitative Health Research 12(9): 1284-1299.

Notes for appraising the quality of each paper:

1. Abstract and title:
Did they provide a clear description of the study?
Good Structured abstract with full information and clear title.
Fair Abstract with most of the information.
Poor Inadequate abstract.
Very Poor No abstract.

2. Introduction and aims:
Was there a good background and clear statement of the aims of the research?
Good Full but concise background to discussion/study containing up-to date literature review and highlighting gaps in knowledge. Clear statement of aim AND objectives including research questions.
Fair Some background and literature review. Research questions outlined. Poor Some background but no aim/objectives/questions, OR Aims/objectives but inadequate background.
Very Poor No mention of aims/objectives. No background or literature review.

3. Method and data:
Is the method appropriate and clearly explained?
Good Method is appropriate and described clearly (e.g., questionnaires included). Clear details of the data collection and recording.
Fair Method appropriate, description could be better. Data described.
Poor Questionable whether method is appropriate. Method described inadequately. Little description of data.
Very Poor No mention of method, AND/OR Method inappropriate, AND/OR No details of data.

4. **Sampling:**
Was the sampling strategy appropriate to address the aims?
Good Details (age/gender/race/context) of who was studied and how they were recruited. Why this group was targeted. The sample size was justified for the study. Response rates shown and explained.
Fair Sample size justified. Most information given, but some missing.
Poor Sampling mentioned but few descriptive details.
Very Poor No details of sample.

5. **Data analysis:**
Was the description of the data analysis sufficiently rigorous?
Good Clear description of how analysis was done. Qualitative studies: Description of how themes derived/ respondent validation or triangulation. Quantitative studies: Reasons for tests selected hypothesis driven/ numbers add up/statistical significance discussed.
Fair Qualitative: Descriptive discussion of analysis. Quantitative.
Poor Minimal details about analysis.
Very Poor No discussion of analysis.

6. **Ethics and bias:**
Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?

Good Ethics: Where necessary issues of confidentiality, sensitivity, and consent were addressed. Bias: Researcher was reflexive and/or aware of own bias.
Fair Lip service was paid to above (i.e., these issues were acknowledged).
Poor Brief mention of issues.
Very Poor No mention of issues.

7. Results:
Is there a clear statement of the findings?
Good Findings explicit, easy to understand, and in logical progression. Tables, if present, are explained in text. Results relate directly to aims. Sufficient data are presented to support findings.
Fair Findings mentioned but more explanation could be given. Data presented relate directly to results.
Poor Findings presented haphazardly, not explained, and do not progress logically from results.
Very Poor Findings not mentioned or do not relate to aims.

8. **Transferability or generalizability:**
Are the findings of this study transferable (generalizable) to a wider population?
Good Context and setting of the study is described sufficiently to allow comparison with other contexts and settings, plus high score in Question 4 (sampling).
Fair Some context and setting described, but more needed to replicate or compare the study with others, PLUS fair score or higher in Question 4.Poor Minimal description of context/setting.
Very Poor No description of context/setting.

9. **Implications and usefulness: How important are these findings to policy and practice?**
Good Contributes something new and/or different in terms of understanding/insight or perspective. Suggests ideas for further research. Suggests implications for policy and/or practice.
Fair Two of the above (state what is missing in comments).
Poor Only one of the above.
Very Poor None of the above.

7.2. Hawker et al (2002) critical appraisal

Baker, D. W., Dewalt, D. A., Schillinger, D., Hawk, V., Ruo, B., Bibbins-Domingo, K., Weinberger, M., Macabasco-O'Connell, A., Grady, K. L., Holmes, G. M., Erman, B., Broucksou, K. A. & Pignone, M. 2011. The effect of progressive, reinforcing telephone education and counseling versus brief educational intervention on knowledge, self-care behaviors and heart failure symptoms. J Card Fail, 17, 789-96.

1. Abstract and title: Did they provide a clear description of the study?	
Title is long, has no design or setting, the abstract is structured but has no clinical or research implications, method has design and sample but no measurements; the results have relevant statistical numbers; however, the aim is not clearly defined, and the background is too short	Poor
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
No title of introduction, background information and literature up to date and well described, research gap and aim is clear	Good
3. Method and data: Is the method appropriate and clearly explained?	
Design, setting, sample and measurements are described (better described in the previous study), intervention program and measurements with validity are well described	Good
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Recruitment is described, response rate is mentioned and the reason for exclusion is presented with a figure, inclusion and exclusion criteria are shortly described, sample size is however not discussed	Fair
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Data analysis is well described, and statistical significance are discussed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	

Approved by the Institutional Review Board Human Subjects Committee at all sites, informed consent provided, limitations are described in the discussion	Good
7. Results: Is there a clear statement of the findings?	
The results are presented in subtitles and understandable and significant statistics are presented, the aim of the study is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Longer follow-up of this study population is needed, context and setting need to be more described in depth to allow a generalizability for a wider population, however the study implicates further research needed for clinical practice	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Further research and clinical implication are well-defined	Good
Total score	32 (88,8%)

Chen, A. M., Yehle, K. S., Albert, N. M., Ferraro, K. F., Mason, H. L., Murawski, M. M. & Plake, K. S. 2014. Relationships between health literacy and heart failure knowledge, self-efficacy, and self-care adherence. Res Social Adm Pharm, 10, 378-86.

1. Abstract and title: Did they provide a clear description of the study?	
The title is short, no design or setting, the abstract is complete and sectionalized, methods is limited, no clinical implications, however research implications are stated	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
The introduction is long, has background, literature review, research gap is missing, however objective well stated	Fair
3. Method and data: Is the method appropriate and clearly explained?	
Method is not sectionalized, the design, sample, setting, measurements, data analysis are all reported, validity of measurements are also included	Good

4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample Strategy is appropriate, inclusion and exclusion criteria are stated, response rate not in percentage, but reasons are described for removal, detail of recruitment is limited, sample size adequate after power analysis was obtained	Fair
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Data analysis is well described, and statistical significance are discussed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Approval was obtained by committees, consent was obtained, limitations and strengths are stated	Good
7. Results: Is there a clear statement of the findings?	
The results are very short, all statistics are well described with tables and objective is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Generalizability is limited due to sample (higher level in literacy), small sample from three different sites, self-reported measurements, cross-sectional design, however the findings are important for further research	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical as for research implications are concluded.	Good
Total score	32 (88,8%)

Chen, A. M., Yehle, K. S., Plake, K. S., Murawski, M. M. & Mason, H. L. 2011. Health literacy and self-care of patients with heart failure. J Cardiovasc Nurs, 26, 446-51.

1. Abstract and title: Did they provide a clear description of the study?	
Title is short, no design or setting, abstract is structured with all the main elements, however no clinical or research implication and no exact design of the study	Fair

2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
Background is informative and relevant, definition of health literacy and self-care and heart failure, literature review of relevant articles, research gap and aim are present	Good
3. Method and data: Is the method appropriate and clearly explained?	
Design of the study is not described, however, sample and setting is, but no exact country, measurements with validity, data analysis are described, the exact education program are not described (“not known in the study”), who gave out the questionnaire and where did they complete the questionnaire is unclear, which is an important factor	Poor
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Recruitment of the sample is clear and reason for this type of recruitment is also described, inclusion and exclusion criteria very short, response rate not mentioned and no exclusion reason, the sample group is one-sided – mostly have adequate health literacy, characteristics are described	Poor
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
The data analysis is sufficiently described with mention of statistical significance	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Written or verbal consent obtained, however approval by ethics committee was given, limitations and strengths of the study are well defined	Good
7. Results: Is there a clear statement of the findings?	
Results are very short, no table of self-care findings with significant differences, not enough data, however demographic table explained, and the purpose of the study is answered	Fair

8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Small sample size/Pilot study and there for not generalizable on a wider population, cross-sectional design – only describes relationship at one point in time, the population mostly had adequate literacy – should be presented in the title and abstract	Poor
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical and research implications are described shortly in discussion, especially future research recommendations	Good
Total score	28 (77,7%)

Dennison, C. R., McEntee, M. L., Samuel, L., Johnson, B. J., Rotman, S., Kielty, A. & Russell, S. D. 2011. Adequate health literacy is associated with higher heart failure knowledge and self-care confidence in hospitalized patients. *J Cardiovasc Nurs,* 26**,** 359-67.

1. Abstract and title: Did they provide a clear description of the study?	
The title is short, but does not include the design, the abstract is not sectionalized and has no further practical or research implications and the exact setting is not mentioned, however the most important results are stated with statistical numbers	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
The introduction is long, the background information is clearly stated, the definition health literacy is explained, studies are compared, the aim and research gap are stated.	Good
3. Method and data: Is the method appropriate and clearly explained?	
The methods are underlined with subtitles and well structured, study design, sample and analysis are mentioned, data collection with the measurements are defined and well explained, the exact time when the data collection took place is not given and the exact setting is barely described, patients received heart failure education prior to being contacted, this was not well described	Fair

4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample is well characterized with inclusion and exclusion criteria, reasons for inclusion and exclusion are not stated, the response rate is stated, however reasons for elimination are not mentioned, recruitment of participants mentioned shortly but not in depth, the reason for this exact sample targeted is too vague.	Poor
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
The process of the statistical analysis is described sufficiently with statistical significance	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Only a verbal consent was obtained, and the study was approved by the institutional review board, limitation of the study is present and described	Good
7. Results: Is there a clear statement of the findings?	
All measurements are clearly stated in the results, however not structured, tables are understandable and relevant, statistical significance is discussed, all the aims are answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
The study has a relatively small sample size, used a convenience sample and there for not generalizable, however the results help for further research in health literacy and have significant clinical implications	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Implications are well stated for further research and clinical interventions are mentioned	Good
Total score	31 (86,1%)

DeWalt, D. A., Schillinger, D., Ruo, B., Bibbins-Domingo, K., Baker, D. W., Holmes, G. M., Weinberger, M., Macabasco-O'Connell, A., Broucksou, K., Hawk, V., Grady, K. L., Erman, B., Sueta, C. A., Chang, P. P., Cene, C. W., Wu, J. R., Jones, C. D. & Pignone, M. 2012. Multisite randomized trial of a single-session versus multisession literacy-sensitive self-care intervention for patients with heart failure. Circulation, 125, 2854-62.

1. Abstract and title: Did they provide a clear description of the study?	
Title is good, abstract is sectionalized, the aim is not stated in the abstract, there are no clinical or research implication, methods is minimally described, results are defined.	Poor
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
No title of introduction, the introduction has background, literature review, research gap and objectives with aim	Good
3. Method and data: Is the method appropriate and clearly explained?	
Design, sample, setting, measurements, data analysis are all reported, procedure of interventions are well described in depth and interviews are described shortly	Good
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample is well described with inclusion and exclusion criteria, recruitment of patients very shortly described, response rate exists, and reason exclusion is well defined with a figure, sample size is discussed and justified	Good
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Data analysis is well described, and statistical significance are discussed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Informed consent was provided, study protocol was approved by committees, limitations and strengths are concluded	Good
7. Results: Is there a clear statement of the findings?	

Primary and secondary outcomes are well described with subtitles and answers the research question, tables are well presented and explained, figures should be described below	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Conducted at 4 academic centres which may limit generalizability of health care systems, due to randomization an even distribution is not given, however this is well discussed, and the research is important for clinical perspectives	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical as for research implications are concluded.	Good
Total score	33 (91,6%)

Kumar, V. A., Albert, N. M., Medado, P., Mango, L. M., Nutter, B., Yang, D. & Levy, P. 2017. Correlates of Health Literacy and Its Impact on Illness Beliefs for Emergency Department Patients With Acute Heart Failure. Crit Pathw Cardiol, 16, 27-31.

1. Abstract and title: Did they provide a clear description of the study?	
The title is short and clear, the abstract is complete and structured, however the background should be stated before the aim, and there are no clinical or research implications and the exact setting is not stated	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
No title of introduction, the introduction is long, has background information, literature review, research gap and ends with the aim	Good
3. Method and data: Is the method appropriate and clearly explained?	
Method is not sectionalized, the design, sample, exact setting, measurements, data analysis are all reported, validity of measurements are also included, the method is clearly explained, however no mention by whom the surveys were administered	Fair
4. Sampling: Was the sampling strategy appropriate to address the aims?	

Sample strategy is described as appropriate, inclusion and exclusion criteria are stated, response rate not mentioned, the sample is one sided with 94% African American and therefore not comparative, the reason for the exact sampling strategy is not mentioned	Poor
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Data analysis is described very shortly, statistical significance is discussed	Fair
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Consent was obtained, approved by committees, limitations and strengths are resolved	Good
7. Results: Is there a clear statement of the findings?	
The results are very short, all statistics are well described, tables with the questionnaires understandable and the aim is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Generalizability is limited due single case study, small sample size and 94 % were African American, responses may differ in a non-acutely state, however the findings help further research and clinical practice	Poor
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical as for research implications are concluded, however more could have been implemented in clinical practice	Fair
Total score	28 (77,7%)

Leon-Gonzalez, R., Garcia-Esquinas, E., Paredes-Galan, E., Ferrero-Martinez, A. I., Gonzalez-Guerrero, J. L., Hornillos-Calvo, M., Menendez-Colino, R., Torres-Torres, I., Galan, M. C., Torrente-Carballido, M., Olcoz-Chiva, M., Rodriguez-Pascual, C. & Rodriguez-Artalejo, F. 2018. Health Literacy and Health Outcomes in Very Old Patients With Heart Failure. *Rev Esp Cardiol* (Engl Ed), 71, 178-184.

1. Abstract and title: Did they provide a clear description of the study?	

Title is clear, no design or exact setting, abstract is well structured with all elements except for clinical and research implication	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
Introduction is long, has clear background, statement of gap and aim is detailed	Good
3. Method and data: Is the method appropriate and clearly explained?	
Design, sample, setting, data analysis, measurements are structured and informative, more information on how the management programs could have been relevant and how the questionnaire were conducted and by whom (mentioned in previous study)	Fair
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample size calculated with power analysis, adequate size, response rate and reason for exclusion is shown, inclusion and exclusion criteria are stated	Fair
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
The data analysis is sufficiently described with mention of statistical significance	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Informed consent obtained, approval by ethics committee, limitations and strengths of the study are well defined	Good
7. Results: Is there a clear statement of the findings?	
Results are clear and answer the question, tables are understandable and explained	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Only for patients very old and low education status, to measure mortality outcome not on all population, only in Spain with free health care access, sample size was adequate, however the reasons and comparison with	Fair

other literature is well described and the findings are important for further research.	
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical and research implications exist with important information for further practice	Good
Total score	88,8%

Macabasco-O'Connell, A., DeWalt, D. A., Broucksou, K. A., Hawk, V., Baker, D. W., Schillinger, D., Ruo, B., Bibbins-Domingo, K., Holmes, G. M., Erman, B., Weinberger, M. & Pignone, M. 2011. Relationship Between Literacy, Knowledge, Self-Care Behaviors, and Heart Failure-Related Quality of Life Among Patients With Heart Failure. *J Gen Intern Med,* 26**,** 979-86.

1. Abstract and title: Did they provide a clear description of the study?	
The title holds all relevant information except for the design and exact setting, the abstract is structured, however has no background information and no clinical or research implications, the results and method are clear.	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
The introduction starts off with background information and literature review, research gap and aim and ends with a hypothesis. There is no definition of health literacy included.	Fair
3. Method and data: Is the method appropriate and clearly explained?	
The method is well structured with subtitles and informative with sample, setting, data analysis and measurements, measurements used are explained with reliability and were appropriate to assess	Good
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample is characterized with inclusion and exclusion criteria short, explanation why participants were omitted is stated in a figure and	Fair

the sample size is justified, exact recruitment is not mentioned, and it is not understandable why they targeted this exact sample	
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
The process of the statistical analysis is described sufficiently, statistical significance was assessed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Study protocol was approved by a review board committee, an informed consent was provided, limitations and strengths are declared in the discussion	Good
7. Results: Is there a clear statement of the findings?	
The results are structured with subtitles and the characteristic are described, figures and tables are well presented, and understandable, statistical significance are also discussed, and the aim is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
The study shows weakness in the participants: patients with more severe symptoms may have received more education which means the variables are influenced and not precise, the instruments used cannot address all aspects of care for an individual, furthermore all the participants with low literacy may not be presentative for all people with low literacy. However, this is well described in the study as a bias and the findings could be relevant for further research and clinical practice	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
There are no implications for further research and practice.	Very poor
Total score	29 (80,5%)

Matsuoka, S., Tsuchihashi-Makaya, M., Kayane, T., Yamada, M., Wakabayashi, R., Kato, N. P. & Yazawa, M. 2016. Health literacy is independently associated with self-care behavior in patients with heart failure. Patient Educ Couns, 99, 1026-32.

1. Abstract and title: Did they provide a clear description of the study?	
Title is short, no design or setting, abstract has all main elements, however methods is limited with no measurements or setting, no research implication and title objective should have been background	Poor
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
Introduction is long with definitions and a literature review, has no missing elements, gap and aim are clearly stated	Good
3. Method and data: Is the method appropriate and clearly explained?	
Design, sample, data analysis, measurements with reliability are well described, no exact setting (what country/hospital?), could complete the questionnaire in a private room, however by whom the questionnaire was administered is unclear	Fair
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Sample recruitment is minimally described, inclusion and exclusion criteria are completed, power calculation was carried out and adequate, response rate and reason for exclusion is described	Good
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Statistical analysis is well described with significance level	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Written informed consent and ethical approval received, limitations are well described	Good
7. Results: Is there a clear statement of the findings?	
Results are clear and structured with subtitles, tables informative and explained and aim is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Self-reported measurements – possible bias, cross-sectional study, which means no cause effect, however the association is considered	Fair

valid and important for further research, more information is needed on setting and sample to be able to generalize the findings	
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical and research implication are useful and well described	Good
Total score	33 (91,6%)

Wu, J. R., Reilly, C. M., Holland, J., Higgins, M., Clark, P. C. & Dunbar, S. B. 2017. Relationship of Health Literacy of Heart Failure Patients and Their Family Members on Heart Failure Knowledge and Self-Care. J Fam Nurs, 23, 116-137.

1. Abstract and title: Did they provide a clear description of the study?	
Title is clear, however no design or exact setting, abstract is not sectionalized, method is short and no exact aim written, no background, has no conclusion or research implications	Poor
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
The title of introduction is missing, background, literature review, study gap and aim are all concluded and well defined	Good
3. Method and data: Is the method appropriate and clearly explained?	
Methods is sectionalized with design, sample, setting, measurements with validity, data analysis are all reported, however the procedure of how the interviews and by whom it was obtained is not indicated	Good
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Inclusion and exclusion criteria are mentioned, detail of recruitment is limited, no percentage of response rate, however reasons for elimination are reported, why exactly this group were targeted is barely explained	Poor
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Data analysis is well described, and statistical significance are discussed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	

Informed consent was obtained; however, no mention of ethical approval, limitations and strengths are concluded	Fair
7. Results: Is there a clear statement of the findings?	
Results with tables are structured with subtitles and significant statistics are presented and understandable and the aim is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
The sample size is relatively small and thus the findings would need a confirmation in larger sample, measures of medication adherence was self-report, there for a possible bias, study is based on a cross-sectional design and therefor causality cannot be implied, however findings of the study adds understanding and clinical attention	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical as for research implications are concluded.	Good
Total score	31 (86,1%)

Zou, H., Chen, Y., Fang, W., Zhang, Y. & Fan, X. 2017. Identification of factors associated with self-care behaviors using the COM-B model in patients with chronic heart failure European Journal of Cardiovascular Nursing, 16, 530-538.

1. Abstract and title: Did they provide a clear description of the study?	
The title is short, but no design and no mention of setting, abstract has background, aim, methods with sample and analyse, however no setting is mentioned, results and conclusion with clinical implication are present	Fair
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
Introduction is quite long starting with background and research gap and ends with the aim, no definition of health literacy, however the model which they use is well explained	Good
3. Method and data: Is the method appropriate and clearly explained?	
Methods is structured with subtitles, sample, exact setting and design are described, the measurements are explained and validated, data	Fair

analysis is also described, the medical data was collected by interview, these are not described: how and when performed?	
4. Sampling: Was the sampling strategy appropriate to address the aims?	
The recruitment of the sample is not described, response rate is stated and explained, exclusion and inclusion criteria also mentioned, single centre study - sample size was adequate since patients only recruited in one large hospital in China and this is described	Fair
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
The data analysis is described, significance level is discussed and assessed	Good
6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	
Approved by the ethics committee, signed written consents, limitations of the study are clearly stated	Good
7. Results: Is there a clear statement of the findings?	
Results are well structured with subtitles, characteristics of sample, figures and tables are comprehensive, the purpose of study is answered	Good
8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	
Due to the sample size and design as a single centre study a generalizability of the findings is not represented, the measures were also self-reported leading to a possible bias, cross-sectional study has no ability to infer causality, however the findings are important for further research.	Fair
9. Implications and usefulness: How important are these findings to policy and practice?	
Clinical and research implications are defined.	Good
Total score	32 (88,8%)