Characteristics of nursing interventions that improve the quality of life of people with chronic diseases. A systematic review with meta-analysis

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Abstract

Purpose

The objective of this systematic review was to determine the characteristics of the interventions conducted by nurses that attempt to improve the health related quality of life (HRQoL) of people over 18 years of age with chronic diseases.

Methods

This systematic review with meta-analysis summarizes 24 studies, conducted in 10 countries, that evaluated HRQoL through the Short-Form Health Survey (SF). Five databases were accessed to find the available studies from December 31st, 2000 to May 22sd, 2017. Selected studies were coded according to the characteristics of the sample and the intervention. A model of random effects was adopted for the overall estimation and to explain the heterogeneity.

Results

Twenty-four studies were included in the systematic review and meta-analysis providing a sample of 4324 chronic patients aged 63.4 years. Among the 8 subscales and two summary measures that comprise the SF-36, only an overall significant effect size (ES) index was found in the Mental Health Component summary score (ES = 0.14; 95% CI:0.03 − 0.26; I^2 = 44.6, p = 0.042) and the Mental Health subscale. This improvement on HRQoL was associated to interventions on "Case Management" and "Treatments and Procedures", which were based on a theory, were of shorter duration, and had a follow-up period.

Conclusions

Interventions targeting people with chronic diseases resulted in a slight increase in the HRQoL that was not always significant, which suggests that there is a need for their continuous improvement.

Introduction

In the year 2018, the World Health Organization (WHO) estimated that 71% of the deaths worldwide were due to chronic diseases, and this situation was expected to worsen [1]. Among chronic diseases, also known as Non Communicable Diseases (NCDs), the heart diseases, cerebrovascular accidents, cancer, chronic respiratory diseases and diabetes, were highlighted [2]. The fight against NCDs has become one of the main challenges for health systems [3]. They affect not only physical health, but also a person's psychological state, their level of autonomy and the skills needed to perform daily tasks at work and in society [4–7]. These diseases, besides being permanent, can be associated to functional limitations in different dimensions, and this is why treatments are frequently geared towards the improvement of overall health [3,8,9].

According to the WHO, nurses and midwives make up almost 50% of the workforce of health professionals, and their figure must be strengthened in order to support universal health coverage and thus improving the health of the different populations [10]. Due to their close contact with patients and their families, nurses perform interventions focused on the population with NCDs. In these interventions, one of the parameters that is frequently assessed and attempted to improve is health-related quality of life (HRQoL). According to Shumaker et al. [11] it can be understood as "*people's subjective evaluations of the influences of their current health status, health care, and health-promoting activities on their ability to achieve and maintain a level of overall functioning that allows them to pursue valued life goals, and that is reflected in their general well-being*".

The main reason for using quality of life measurements in clinical practice is that it allows treatments to be patient- rather than disease-centered [3,12]. Given their ability to focus on the real needs perceived by the population, the determination of HRQoL is considered a highly discriminative tool in the planning of health policies or in the distribution of resources [13–15].

There are many questionnaires that can be used to evaluate HRQoL, and they differ in their structure (profiles vs indices), as well as in the area of application (generic vs specific) [12]. In general, these questionnaires encompass questions that refer to the severity or intensity of symptoms, functional impairment, emotional disorders and the perception of well-being [3,12].

The Short Form-36 Health Survey (SF-36) is probably the most commonly used instrument for measuring HRQoL [16]. It is a general scale that provides a profile of health status, and is applicable to both chronic patients and the general population [16,17]. Many studies have defined it as having good reliability and construct validity for populations of people with chronic diseases [18–21].

Due to the importance that patients with chronic diseases attach to the improvement or at least the maintenance of HRQoL, the objective of this systematic review was to determine the characteristics of the interventions conducted by nurses aimed at improving the HRQoL of people over 18 years of age with chronic diseases. Any activity outside the usual care

programmes aimed at improving the quality of life of chronically ill patients and conducted by nurses has been considered an intervention. Usual care was commonly employed in the control group.

Materials and methods

Selection criteria and search strategy

In order to select the studies to be used in the systematic review, a search in 5 electronic databases was conducted by an expert on bibliographic search methodology (RM). The databases consulted were: Medline (Pubmed), Scopus, Web of Science, CINAHL and Cochrane.

To conduct the search, boolean operators "AND" and "OR" were used to combine the search terms, which in some cases were truncated to generate the maximum number of results:

("chronic disease*" OR "chronically ill" OR "chronically disease*" OR "chronic illness*" OR "chronically critically ill" OR CCI OR "Chronic patient*" OR "noncommunicable disease*" OR "non communicable disease* OR NCD OR comorbidit* OR multimorbidit* OR "complex patient*") AND ("quality of life" OR "life quality" OR QOL OR HRQOL OR HRQL OR "short-form" OR SF36 OR SF12) AND nurs* AND ("randomized controlled trial" OR RCT OR "clinical trial"). Limits used: Adults, English, Spanish, Time period = 2000–2017.

Some of the above terms were recognized and used as MeSH terms by the Pubmed search engine: "Chronic Disease", "Multiple Chronic Conditions", "Noncommunicable Diseases", "Quality of Life", "Nurse" and "Nursing".

Likewise, a secondary manual exploration of references cited in the studies selected was performed in order to find primary studies as well as systematic reviews and meta-analysis, related to the topic of interest and not identified in the primary search. Peer review of titles in the first place and abstracts in the second place served to determine whether the results met the inclusion criteria before reading the full-texts. The search was conducted in 2017 and restricted to adults (>18 years old), studies written in Spanish or English, and published from December 31st, 2000 to May 22sd, 2017.

The inclusion criteria of primary studies in the systematic review were the following:

- Randomized controlled trial.

- Participation of at least one nurse in the intervention.

- The intervention was performed on chronic patients >18 year of age.

- The study had to include at least two groups, one of them being the control group.

- The study provided mean values, or the mean change between pre and post values of the intervention and control groups, standard deviations and sample size post intervention of both groups in any of the two summary measures or 8 subscales of the SF-36. Studies using SF-12 were also included, since this version provides the result of the two summary measures.

- The study had to be written in Spanish or English.

The results on HRQoL from the Short Form Health Survey of each study were recorded. This questionnaire is composed of 36 questions (items) that evaluate both positive and negative health states. These 36 items are distributed among 8 subscales: Physical Functioning (PF), Role-Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE) and Mental Health (MH). At the same time, these 8 subscales can

be included within two summary measures: Physical Component Summary (PCS) and Mental Health Component Summary (MCS).

To perform the systematic review, a protocol that included a coding manual, the coding or data extraction sheets and the work procedure was created (S1 File).

Each selected study was independently coded by two coders (F.J.A-S and R.A-B), who extracted the data using a data collection sheet and the coding manual created for this purpose. Disagreements were solved by a third-party expert (C.O-M). The design of both instruments was based on the variables coded in published meta-analyses related to interventions and previous experience.

Two reviewers independently assessed the methodological quality of the RCTs according to the Cochrane Manual 5.1.0 guidelines, using 7 items, each of which had three response options: "Low", "High" and "Not clear" [22].

Once the studies were coded, the intercoder agreement was estimated, resulting in a mean agreement reached for both categorical and continuous variables. The disagreements were solved through deliberation between coders, and when necessary, a third reviewer's criterion was used.

Characteristics of the interventions

The following intervention characteristics were collected:

- Theory: contextual framework used as a foundation for developing the intervention. The presence or absence of theory was recorded, as well as its name.

- Incentive: financial or in-kind remuneration offered to patients for their participation

- Multidisciplinarity: whether the intervention was led by a multidisciplinary team or exclusively by nurses.

- Prior training: the specific pre-training that staff received to perform the intervention.

- Type of intervention: each intervention was classified in one or more of the four categories of the Omaha System intervention classification: "Teaching, Guidance, and Counseling", "Treatments and Procedures", "Case Management", "Surveillance". A description of each can be found on the official Omaha website [23].

- Context: the location where the intervention was performed, either in a clinical context, in a private home, or both.

- Type of contact: if the contact with the subject receiving the intervention was direct (in person), indirect (at a distance, via telephone, e-mail . . .) or received both types of contact.

- Duration of the intervention: the time dedicated to carrying out the complete intervention, in weeks, excluding the follow-up period.

- Follow-up period: the time dedicated to the evaluation of the outcomes in the patient after the intervention is finished, to check the evolution and persistence of the effects. The duration of the follow-up was not taken into account, only if it was present or not. The studies that did not have follow up period evaluated the results "post" only at the end of the intervention.

- Sessions: the number of sessions of the intervention.

- Time per session: duration in minutes of each of the sessions in which the intervention took place.

Also, a detailed and qualitative description of the interventions can be found in S2 File.

Statistical analyses

The standard differences in means proposed by Hedges in each study were weighted by the inverse of their variance in order to obtain the pooled index of the magnitude of the effect, following random-effects assumptions as the results are more robust than fixed-effects assumptions.

Bias in the effect sizes distribution and sensitivity analysis were conducted. More details on statistical analysis are reported in S3 File.

Results

The exhaustive search began on May 5th, 2017, and ended on January 9th, 2018, and resulted in 559 studies, of which 24 were included in the systematic review and meta-analysis [24–47]. Fig 1 shows the flow diagram of the review process, in agreement with PRISMA guidelines [48].

From these 24 studies, 30 intervention groups and 29 control groups were extracted, as four studies provided two intervention groups, one study contributed with three intervention groups, and nineteen studies provided an intervention group and a control group. Tables 1

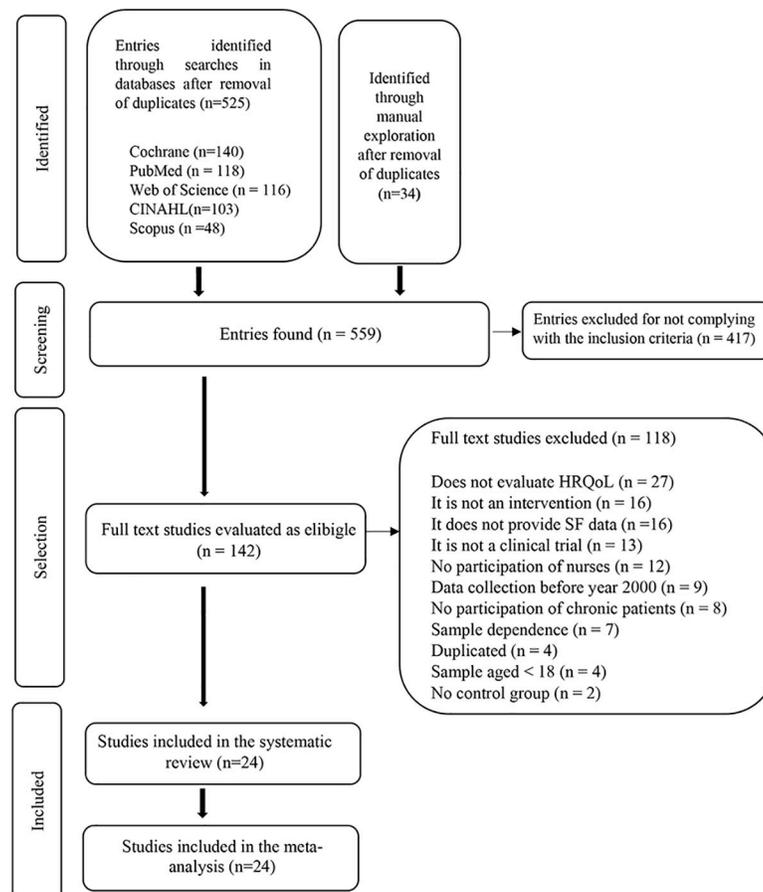**Fig 1. Flow diagram.** Selection process.

and [2] show the characteristics of the 24 studies included in this systematic review and the characteristics of their interventions.

Of these studies, 87.5% (n = 21) were funded, 66.7% (n = 8) were multi-centered, 41.7% (n = 10) were conducted in Western Europe, 37.5% (n = 9) in North America, 16.7% (n = 4) in Asia, and 4.2% (n = 1) in Oceania.

The 24 studies provided a sample of 4324 chronic patients (2205 from the intervention group and 2119 from the control group), with a mean age of 63.4 (SD: 11.3, 36–79 years of age).

The duration of the interventions ranged between 4–104 weeks, with a mean of 9.9 sessions and 44.3 minutes/session (SD = 31.4). In 79.0% (n = 19) of the studies, interventions were not based on a theory.

The intervention was exclusively performed by nurses in 75.0% (n = 18) of the studies, and in the rest of them, along with the nurse, other health professionals, such as pharmacists, doctor, other health worker, psychologists or others, took part.

To perform the intervention, 45.8% (n = 11) of the professionals did not receive specific training, and in 70.0% (n = 17) there was no follow-up period.

The most common type of intervention was "Case Management" [37.5% (n = 9)], followed by Treatments and Procedures [29.2% (n = 7)] and "Teaching, Guidance and Counselling" [20.8% (n = 5)].

Bias was evaluated following the Cochrane guidelines [22]. Of the seven items that assess the bias, the most monitored and best profiled bias was the generation of randomization, classified as "low" in 58.3% (n = 14) of the studies. For the rest of the items, the most frequent bias classification was "unclear" (Table 3).

After the codification, the intercoders agreement was 0.84 (Cohen's Kappa mean was κ = 0.71, and the mean of the Spearman-Brown correlation was r = 0.97). Disagreements were solved through coders deliberation.

Ten overall ES estimations were performed, one for each of the subscales and summary measures included in the SF-36. Physical Functioning subscale was the one that was registered in the highest number of studies (n = 18).

After eliminating the outliers detected in the sensitivity analysis, the overall ES varied between -0.06 and 0.40 (Figs 2 and 3), only obtaining a significant overall ES in the Mental Health subscale and the Mental Component Summary (Fig 3). The plus sign on the estimation indicates a score favorable to the intervention group, and a minus sign indicates a score favorable to the control group.

The scores from the Begg test (z = 1.26 p = 0.208), as well as those from the Egger test (bias = 1.34, p = 0.115) indicate lack of bias.

On scales where the overall ES was significant, this is, Mental Component Summary (MCS) measure and Mental Health subscale, bivariate analyses were conducted, which were used to explain the heterogeneity detected.

Among the variables analyzed, those that were found significant in the bivariate analyses are displayed in Table 4. Interventions on Treatment and Procedures (ES = 0.504; 95%CI: 0.129 − 0.879), and those on Case Management (ES = 0.241; 95%CI: 0.066 − 0.416) produced significant improvements on MCS measure. In addition, interventions of shorter duration (≤ 12 weeks) (ES = 0.346; 95%CI: 0.183 − 0.509), with follow-up period (ES = 0.384; 95%CI: 0.194 − 0.574) and based on a theory (ES = 0.331; 95%CI: 0.186 − 0.476) were significantly related to this measure. Multivariate models that were created with variables that were significant in the bivariate analyses are not shown because they lost their significance when included in these models.

Table 1. Description of studies included in the systematic review.

Main author (publication year)	Data collection year	Funding	Country[a]	Intervention (n)	Control (n)	Average age	Chronic disease[b]
Alexander and Wagner (2012)	-	No	USA	9	16	70.5	COPD
Angermann et al. (2012)	2004	Yes	Germany	352	363	68.6	Heart failure
Arvidsson et al. (2012)	2009	Yes	Sweden	38	124	55.8	Rheumatic disease
Berkhof et al. (2015)	2003	Yes	The Netherlands	52	49	68.0	COPD
Brodie et al. (2008)	2002	No	UK	42	18	77.0	Heart failure
Chow and Wong (2010)	2005	Yes	China	43	42	57.0	Kidney failure
Chow and Wong (2014)	2010	Yes	China	183	98	76.0	Chronic diseases
Coultas et al. (2005)	2000	Yes	USA	49	51	68.6	COPD
Donesky-Cuenco et al. (2009)	2004	Yes	USA	14	15	70.0	COPD
Friedberg et al. (2013)	2009	Yes	USA	37	36	43.1	Chronic fatigue
Gellis et al. (2014)	2010	Yes	USA	57	58	79.2	Multiple morbidities
Gensichen et al. (2009)	2005	Yes	Germany	267	288	51.1	Depression
Hendriks et al. (2014)	-	Yes	The Netherlands	286	248	66.7	Atrial fibrillation
Houweling et al. (2011)	-	Yes	The Netherlands	102	104	68.3	Diabetes
Jason et al. (2007)	-	Yes	USA	86	28		Chronic fatigue
Markle-Reid et al. (2006)	2001	Yes	Canada	120	122		Chronic diseases
McCorkle et al. (2009)	2003	Yes	USA	63	60	60.3	Gynecologic cancer
Peters-Klimm et al. (2010)	2006	Yes	Germany	97	100	69.7	Heart failure
Shearer et al. (2007)	2001	Yes	USA	42	45	76.0	Heart failure
Sorensen and Frich (2008)	2000	Yes	Denmark	52	49	52.3	Chronic pain
Tsai et al. (2015)	2012	No	Taiwan	32	25	63.0	Chronic disease
Tsay et al. (2005)	-	Yes	Taiwan	30	27	50.7	Kidney disease
Tummers et al. (2012)	-	Yes	The Netherlands	62	61	36.4	Chronic fatigue
Walters et al. (2013)	2008	Yes	Australia	90	92	67.8	COPD

[a]USA: United States of America; UK: United Kingdom

[b]COPD: Chronic obstructive pulmonary disease

Discussion

This review summarized 24 clinical trials with interventions conducted by nurses aimed towards the increase of HRQoL of people with chronic diseases. Most studies produced an increase in HRQoL, although it was small and not always significant. Subgroup analyses supported the robustness of the overall conclusions. In this sense, subgroup analyses involving factors such as different sample sizes, participant characteristics, composition of the control group or correspondence of NCDs and intervention did not produce any qualitative difference in the small effect sizes.

Mental Health subscale and Mental Component Summary measure were the only scales where the overall effect size was significant. Although small, any improvement should be appreciated, as the majority of subjects studied are elderly patients with at least one chronic disease, from which a worsening of their HRQoL is expected. We believe the same is true for the Physical Component Summary. It is unlikely to improve the physical component of HRQoL as most studies target the elderly population with a chronic condition that increases disability with time. However, more tailored interventions with adequate follow-up, and designed for specific diseases may achieve better outcomes. The best results were obtained in studies lasting less than 12 weeks, that were based on a theory, that had a follow-up period, and when interventions were classified as "Treatment and procedures" or "Case management".

Table 2. Characteristics of the interventions and results on SF-36.

Author	Theory	QoL Scale	Duration (weeks)	Sessions	Type of intervention	Multidisciplinarity	Training	Follow-up	PCS	MCS	PF	RP	BP	GH	VT	SF	RE	MH
Alexander and Wagner (2012)	No	SF-36	10	16	2	Yes	No	No			NS	NS	NS	NS	NS	NS	NS	NS
Angermann et al. (2012)	No	SF-36	26	9	4	No	Yes	No	+	NS	+							
Arvidsson et al. 2012	No	SF-36	52	10	1	No	No	Yes			NS	NS	NS	NS	NS	NS	NS	NS
Berkhof et al. (2015)	No	SF-36	26	13	3	Yes	No	No			NS	NS	NS	NS	NS	NS	NS	NS
Brodie et al. (2008)	No	SF-36	21	8	2	Yes	Yes	No			NS	+	NS	NS	NS	+	NS	NS
Chow and Wong (2010)	Yes	SF-36	6	6	4	No	Yes	No			NS	NS	NS	NS	NS	+	NS	NS
Chow and Wong (2014)	Yes	SF-36	4	4	4	No	No	Yes	+	NS	+	+	NS	NS	+	+	NS	+
Coultas et al. (2005)	No	SF-36	26	6	3	No	Yes	Yes			NS	NS	NS	NS	NS	NS	NS	NS
Donesky-Cuenco et al. (2009)	No	SF-36	12	24	2	Yes	No	No	NS	NS								
Friedberg et al. (2013)	No	SF-36	52	2	4	No	Yes	No			NS							
Gellis et al. (2014)	No	SF-12	13		4	No	Yes	Yes	NS	+								
Gensichen et al. (2009)	No	SF-36	52	19	4	No	Yes	No	NS	NS								
Hendriks et al. (2014)	No	SF-36	56	4	3	No	No	No			NS	NS	+	NS	NS	NS	+	NS
Houweling et al. (2011)	No	SF-36	60		3	Yes	Yes	No	−	NS	NS	NS	NS	NS	NS	NS	NS	NS
Jason et al. (2007)	No	SF-36	26	13	2	No	No	Yes			+							
Markle-Reid et al. (2006)	Yes	SF-36	26		3	No	No	No	NS	+	NS	NS	NS	NS	NS	NS	+	+
McCorkle et al. (2009)	No	SF-12	26	18	1	No	No	No	+	+								
Peters-Klimm et al. (2010)	No	SF-36	52	7	4	Yes	Yes	No	NS	NS	NS	NS	NS	NS	+	NS	NS	NS
Shearer et al. (2007)	Yes	SF-36	12	6	1	No	No	No	NS	NS								
Sorensen and Frich (2008)	No	SF-36	104	7	1	No	No	No			NS	NS	NS	NS	NS	NS	NS	NS
Tsai et al. (2015)	No	SF-36	4	8	2	No	Yes	No	NS	+	NS	NS	NS	NS	NS	NS	+	NS
Tsay et al. (2005)	Yes	SF-36	8	8	2	No	Yes	Yes	+	+								
Tummers et al. (2012)	No	SF-36	20		2	No	Yes	No			NS					NS		
Walters et al. (2013)	No	SF-36	52		1	No	Yes	No	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

QoL: Quality of Life; Type of intervention (OMAHA classification system): 1. Teaching, Guidance, and Counseling/ 2. Treatments and Procedures/ 3. Case Management/ 4. Surveillance. PCS: Physical Component Summary; MCS: Mental Health Component Summary; PF: Physical Functioning; RP: Role-Physical; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Functioning; RE: Role-Emotional; MH: Mental Health. NS: Non-significant ($p \geq 0.05$). "+": Significant and positive result; "−": Significant and negative result.

Table 3. Risk of bias summary: Review authors' judgements about each risk of bias item for each included study.

Main author	Bias. Author's judgement[a]						
	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Alexander and Wagner (2012)	3	3	1	3	3	3	3
Angermann et al. (2012)	2	2	1	2	2	2	2
Arvidsson et al. 2012	3	2	1	3	3	3	3
Berkhof et al. (2015)	2	3	1	2	2	2	3
Brodie et al. (2008)	2	2	1	3	1	1	3
Chow and Wong (2010)	2	3	1	3	3	3	3
Chow and Wong (2014)	2	2	1	2	3	2	3
Coultas et al. (2005)	2	3	1	2	3	3	3
Donesky-Cuenco et al. (2009)	3	3	1	1	2	1	3
Friedberg et al. (2013)	2	3	1	2	2	3	2
Gellis et al. (2014)	2	3	1	2	2	3	3
Gensichen et al. (2009)	3	3	1	1	2	2	2
Hendriks et al. (2014)	3	3	1	3	2	3	3
Houweling et al. (2011)	3	2	1	1	3	3	3
Jason et al. (2007)	2	3	1	3	3	3	3
Markle-Reid et al. (2006)	2	3	1	2	2	2	2
McCorkle et al. (2009)	3	2	1	3	3	3	3
Peters-Klimm et al. (2010)	2	3	1	3	3	2	2
Shearer et al. (2007)	3	1	1	1	2	1	3
Sorensen and Frich (2008)	3	3	1	2	3	3	3
Tsai et al. (2015)	2	2	1	2	3	3	2
Tsay et al. (2005)	3	3	1	3	3	3	3
Tummers et al. (2012)	2	2	1	1	3	3	3
Wagner et al. (2014)	2	3	1	3	2	2	3

[a]Bias. Author's judgement. 1 = High risk, 2 = Low risk, 3 = Unclear risk

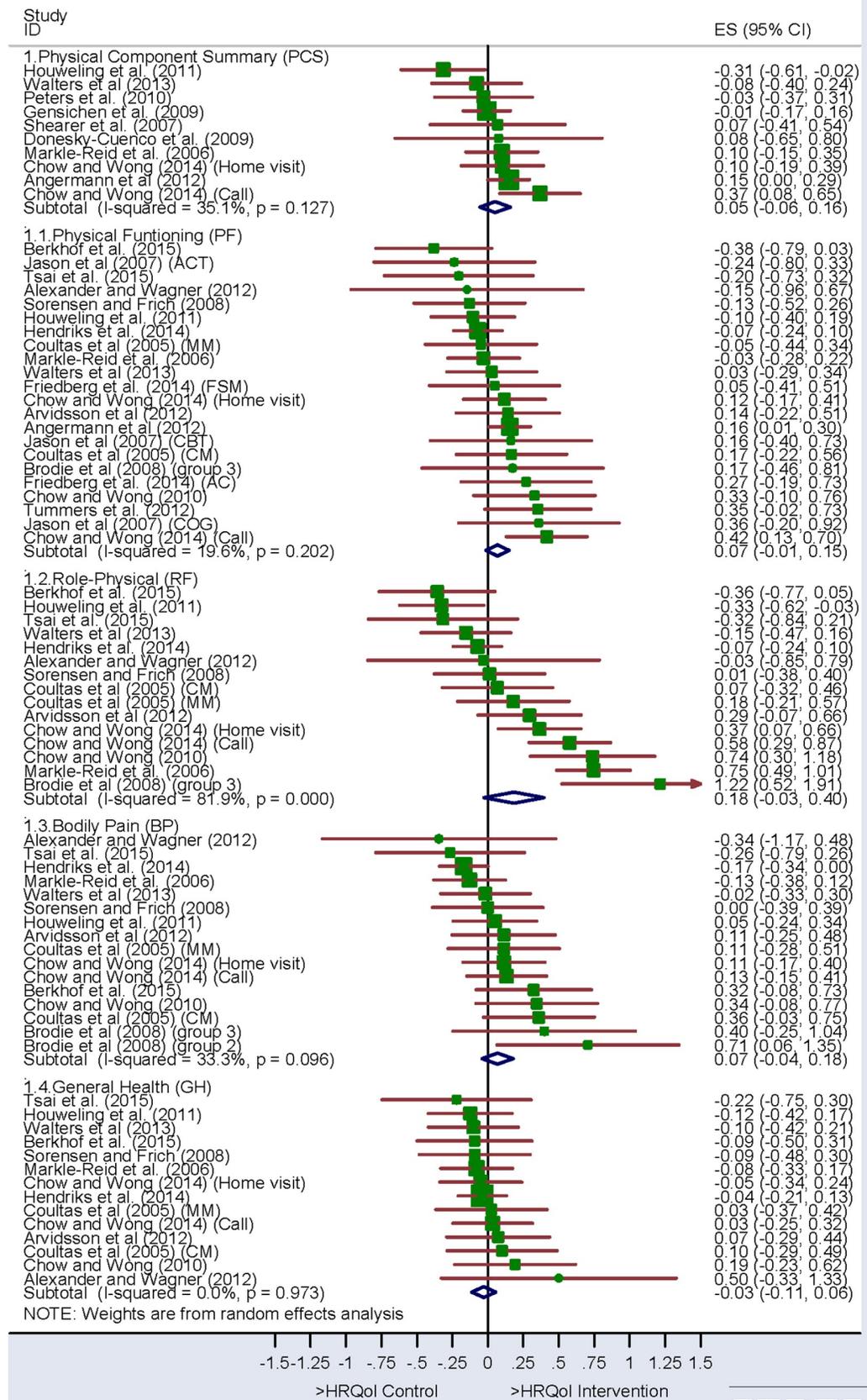https://doi.org/10.1371/journal.pone.0218903.t003

Fig 2. Forest plot. Physical dimensions (SF-36 and SF-12).

This systematic review shows that nurses, especially in Western Europe and North America, have conducted interventions involving more than 4000 chronic patients aged 36 to 79 years. This highlights the involvement and interest of nursing in improving the quality of life of chronic patients. Data from clinical trials contribute to the methodological quality of the results obtained, favoring the generalization of their application in similar areas. Likewise, these results also bring to light the concern of the oldest countries with the need to analyze the phenomenon studied, as most projects were funded in order to implement actions that aim to reduce the impact of diseases, on the one hand [25,36,41–44] and to prevent the emergence of possible complications, on the other [28–30].

Among the chronic pathologies included in the studies selected, Chronic Obstructive Pulmonary Disease (COPD) was the most frequent, followed by heart failure, which was expected as these two are commonly among the most frequent NCDs [3,7,9,15] and are known to impair quality of life [49,50].

The duration of the interventions ranged widely among the different studies, oscillating from only four weeks to up to 104 weeks. Although this systematic review did not allow us to clearly conclude what duration was the best or most adequate, the analysis revealed that the most-effective interventions were those of the shortest duration, and especially those that had a follow-up period. This may have to do with the fact that compliance with both pharmacological and non-pharmacological therapies is generally low in chronic disease patients [51–53] and it even decreases over time [54,55], since, in short-term interventions, both patients and staff are more engaged in the process.

Interventions on treatments and procedures and on case management were not just the most common, but also those that had the greatest positive effect on HRQoL. In relation to the former, they have amply shown their effectiveness previously in cancer patients in a review of systematic reviews [56], but it is still to be confirmed their efficacy on other type of chronic patients. Case management has demonstrated to reduce the use of hospital services and improve the health of chronic patients [57], although a recent review shows that patients still perceive barriers such as lack of information and time constraints for accessing this type of health service [58]. Hudon et al. [59] recommended that case management interventions for frequent users of health services, such as chronic disease patients, ensure appropriate case finding processes and sufficient intervention intensity, among others. Weingarten et al. [60], in a meta-analysis on the management of disease in patients with chronic diseases, found that patient's education was an integral part of most intervention programs. In fact, many of the interventions in this study were classified as "Case Management" or "Surveillance," but also included educational components. However, interventions that relied exclusively on "Teaching, Guidance, and Counseling" did not show improvement in HRQoL. Education may be a necessary but not sufficient condition for this purpose.

Although the interventions were applied to patients with long-term diseases, most of them were conducted without follow-up period which may have affected their efficacy. Also, it should be noted that most health professionals performed the intervention without it being based on any theory, and without specific training. The application of a theory for the intervention design and the evaluation of complex interventions of behavioral change is considered a good practice, but in spite of this, most studies omitted if they were based on a theory, as also pointed out in some reviews [61,62].

The results obtained in the meta-analysis indicate that interventions did not result in a significant improvement of the HRQoL evaluated with the SF-36, except in the Mental Health
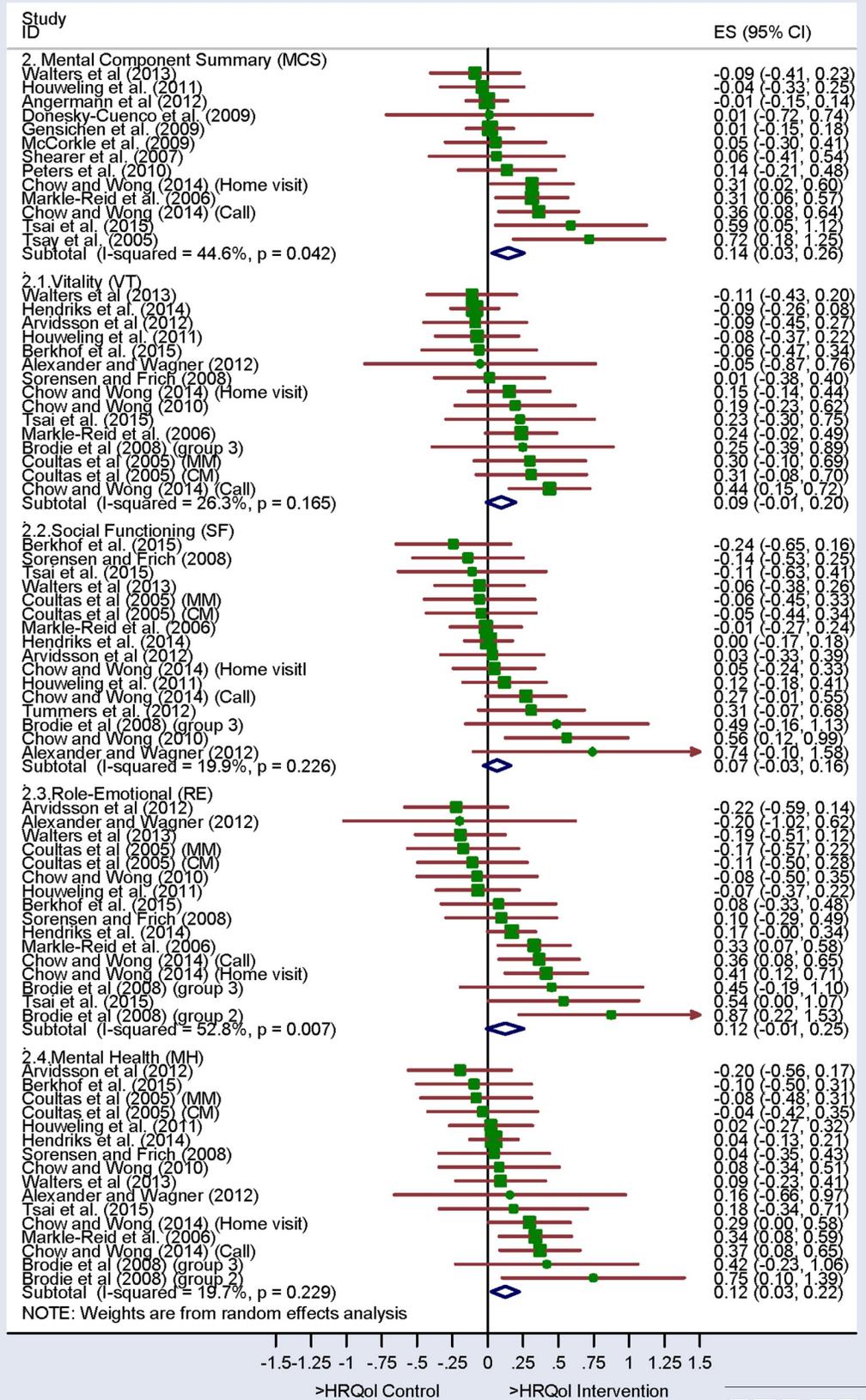
Fig 3. Forest plot. Mental dimensions (SF-36 and SF-12).

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subscale and Mental Component Summary measure, where, in any case, the impact on HRQoL was very small, in agreement with similar systematic reviews [8,9,12,63,64].

As for the biases assessed according to the Cochrane guidelines [22], the control of the random sequence generation was generally good, while in many cases, there was not sufficient information for the evaluation of other items such as "blinding of participants and personnel" or "blinding of outcome assessment", so bias was classified as unclear. Due to the nature of the interventions, patient or personnel blinding was not possible. However, the degree of bias is unknown. Future experimental studies on this matter should provide the minimum necessary information on the efforts made to avoid bias.

Several limitations to this study are noteworthy. The heterogeneity when grouping the data, as well as the possible existence of unexplored confounding explanatory factors led us to be cautious when establishing some variables mentioned as real predictive factors for the improvement of HRQoL. The exclusion of articles published in languages other than Spanish or English, and the scarcity of statistical data or information provided by some of the selected papers are other limitations that could also imply that some research results could have been ignored. Thus, the addition of new studies is advisable in order to reach more accurate conclusions.

Conclusions

Worldwide, nurses perform multiple interventions destined to people with chronic diseases, in which HRQoL assessment is common. These interventions are too heterogeneous, and although they produced an overall improvement of the HRQoL favorable to the group interventions, this was small, and in many occasions not significant.

Table 4. Bivariate analysis. Mixed effects. Mental Component Summary measure.

Variables	k	ES	95%CI		REML		
					B Coefficient	p	R²
Duration of the intervention							
≤ 12 weeks	6	0.346	0.183	0.509			100.00%
> 12 weeks	7	0.039	-0.048	0.126	-0.3075	0.0011	
Theory							
Yes	5	0.331	0.186	0.476			99.98%
No	8	0.020	-0.069	0.109	-0.3106	0.0003	
Follow-up							
Yes	3	0.384	0.194	0.574			100.00%
No	10	0.059	-0.033	0.151	-0.3315	0.0017	
Intervention classification							
Teaching, Guidance an Counselling	3	-0.009	-0.220	0.203			100.00%
Treatments and Procedures	3	0.504	0.129	0.879	0.5245	0.0096	
Case Management	4	0.241	0.066	0.416	0.2528	0.0504	
Surveillance	3	0.015	-0.090	0.120	0.0239	0.8424	

REML: Restrited Maximum Likelihood; k: Number of interventions for each outcome included in the anlaysis. ES: Overall Effect Size; CI: Confidence Interval; R^2: Percentage of heterogeneity that the moderator accounts for.

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The results obtained in the meta-analysis indicated that except for Mental Health subscale and Mental Component Summary measure, the interventions did not achieve a significant improvement of HRQoL as evaluated by the SF-36. Also, although the overall size effect in Mental Health subscale was favorable and significant to the intervention group, it was small, according to Cohen's classification.

It is proposed that further studies assessing HRQoL should conduct interventions, if possible on case management and treatments and procedures, based on a theoretical framework, adequately controlling bias with an exhaustive description of the data and its analysis, including an satisfactory follow-up and previous training of the health professionals.

One of the obstacles to the visibility of nursing is that, in many contexts, it is not recognized as a rigorous scientific discipline. For this reason, we believe that revisions such as this one help to make the contribution of nurses measurable and visible.

Supporting information

S1 File. Coding manual, data extraction sheet and work procedure.
(PDF)

S2 File. Characteristics of the interventions.
(PDF)

S3 File. Additional statistical analysis information.
(PDF)

S4 File. PRISMA checklist.
(PDF)

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