RAPID RESPONSE REPORT:
SUMMARY WITH CRITICAL APPRAISAL

TITLE: Trained Health Coaches for Chronic Disease Prevention or Management: A Review of Clinical and Cost-Effectiveness and Guidelines

DATE: 06 January 2016

CONTEXT AND POLICY ISSUES

There is currently no standard definition of what constitutes a "health coach". Generally, health coaches work with individuals in order to empower the individual to meet their goals in relation to fitness, wellness, and lifestyle behaviours to allow them to better self-manage chronic health conditions. The coaches teach the client skills to help them create positive change to their health and wellbeing by influencing the client's mindset and outlook on health.[1] It has been suggested that changes in an individual's lifestyle behaviours may lead to changes in morbidity and quality of life.[2]

Health coaching programs can be based on any number of psychological theories such as motivational interviewing,[3,4] cognitive behavioural therapy,[3] and the transtheoretical model of behaviour change.[3,5,6] Health coaches may work with patients in-person, over the phone, or via the internet. Coaching sessions may take place one-on-one or in a group setting. There is not one single training program for health coaches. The National Consortium for Credentialing Health and Wellness Coaches has developed a best practices document and is in the process of creating a national certification program in the United States but standardized certification does not appear to currently exist in Canada.[2]

The purpose of this review is to determine the effectiveness of health coaches for affecting changes in behaviour and health outcomes, to determine the cost-effectiveness of such interventions, and to examine recommendations in regards to how best to make use of health coaches within the continuum care for patients with chronic illness.

RESEARCH QUESTIONS

1. What is the clinical effectiveness of using trained health coaches to effect positive behavior changes in persons with chronic disease or those seeking to reduce moderate to high modifiable risk factors for chronic disease?

2. What is the cost-effectiveness of using trained health coaches to effect positive behavior changes in persons with chronic disease or those seeking to reduce moderate to high modifiable risk factors for chronic disease?

3. What are the evidence-based guidelines associated with the use of trained health coaches for patient behaviour modification in either the prevention or management of chronic diseases?

KEY FINDINGS

Seven systematic reviews (SRs), one economic evaluation, and one evidence-based guideline were identified regarding the use of health coaches. In most of the SRs included in this review, heterogeneity between the identified studies meant that no meta-analyses could be undertaken. This prevented authors from forming any firm conclusions regarding the effectiveness of health coaching. A health coaching intervention for patients following myocardial infarction was not determined to be cost-effective when compared with usual care in one economic analysis. In this case, usual care was less expensive and as effective as the health coaching intervention. One guideline based a number of recommendations encouraging self-management techniques for chronically ill patients on literature examining the use of health coaches, though none of the recommendations provided specific guidance as to how health coaches should be incorporated into the continuum of care.

METHODS

Literature Search Methods

A limited literature search was conducted on key resources including PubMed, Ovid Medline, CINAHL, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, Canadian and major international health technology agencies, as well as a focused Internet search. For the Medline and Pubmed searches, methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic studies, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and November 30, 2015.

Rapid Response reports are organized so that the evidence for each research question is presented separately.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria	
Population	Adult patients trying to prevent or manage chronic disease
Intervention	Trained health coaches
Comparator	Standard of care; No trained health coaches; Self-care; No comparator
Outcomes	Q1: Clinical effectiveness (e.g., in disease management or reduction in risk profile, clinical benefits and patient harms [safety]; symptom management; patient quality of life) Q2: Cost-effectiveness Q3: Guidelines
Study Designs	Health technology assessments, systematic reviews, meta-analyses, economic evaluations, evidence-based guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2010.

Critical Appraisal of Individual Studies

The included systematic reviews (SRs) were critically appraised using AMSTAR,[7] economic studies were assessed using the Drummond checklist,[8] and guidelines were assessed with the AGREE II instrument.[9] Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

A total of 431 citations were identified in the literature search. Following screening of titles and abstracts, 373 citations were excluded and 58 potentially relevant reports from the electronic search were retrieved for full-text review. Six potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 55 publications were excluded for various reasons, while 9 publications met the inclusion criteria and were included in this report. Appendix 1 describes the PRISMA flowchart of the study selection.

Summary of Study Characteristics

Details of individual study characteristics are provided in Appendix 2

Study Design

Seven SRs were included in this review.[3-6,10-12] The SRs included between four and 41 studies each, with a total of 106 unique studies across the reviews. Thirteen studies were included in more than one SR. One cost-effectiveness evaluation, published in 2013, compared the costs and resource utilization of health coaching and usual care.[13] One evidence-based guideline, published in 2010,[14] was included.

Country of Origin

Three SRs were undertaken by groups in Australia,[3,5,6] and one each from Finland,[10] the Netherlands,[11] France,[12] and the United States.[4] The cost-effectiveness evaluation was identified from Australia.[13] The evidence-based guideline was identified from the Ontario Registered Nurses' Association (RNAO) in Canada.[14]

Patient Population

One SR examined health coaching interventions for patients with low back pain[5] and two reviews examined only interventions for patients with diabetes (type 1 and type 2[12] or only type 2[6]). The patient populations in four reviews were mixed.[3,4,10,11] Patient populations identified in these reviews included:
- Chronic conditions[3]
- Type 2 diabetes mellitus[3,10,11]
- Overweight adolescents[3]
- Adults hospitalized with congestive heart failure[3,10]
- Cardiovascular disease[11]
- Overweight and obese patients[3,10]
- Rheumatoid arthritis[3,10]
- Cancer[3,10]
- University employees with unspecified chronic illnesses[3,10]
- Dyslipidemia[10]
- Chronic pain[10]
- Dermatitis[11]

Interventions and Comparators

Interventions were administered by a variety of health care professionals and study personnel who provided the coaching intervention beyond the standard of care. These professionals included:
- Physiotherapists[4,5,10]
- Nurses[4-6,10]
- Nurse educators[6]
- Patient educators[6]
- Psychologists[10]
- Dieticians[4,6,10]
- Social workers[10]
- Fitness professionals[4,10]
- Lifestyle or education coaches[10]
- Researchers[6]
- Physicians[6]
- Endocrinologists[6]
- Care managers[4,6]
- Transition coaches[4]
- Online coaches[6]
- Graduate students[4]

The training requirements of health coaches were described in two of the included SRs.[4,5] Training programs described by Holden et al.[5] included: instruction in motivational enhancement therapy or general communication skills by a psychologist, a 20 hour workshop training nurses to integrate transtheoretical model of change with stage-based motivational counseling, or a three day course including motivational interviewing techniques. Olsen et al.[4] reported coach training requirements that were reported in two included studies. The programs included health coaches who had been extensively trained in motivational interviewing and been assessed in their competency in one study, and registered nurses trained in diabetes education who had been life coaches for more than a year were used to administer health coaching interventions in a second study.[4] The methods used to train health coaches were not described in five SRs.[3,6,10-12]

Behavioural theories incorporated into the health coaching interventions included:
- Motivational interviewing[3,4]
- Transtheoretical model of change[3,5,6]
- Cognitive behavioural therapy[3]
- Social cognitive theory[3,6]
- Self-efficacy theory[6]
- Social support theory[6]
- Wagner's Chronic Care Model[6]
- Health Belief Model[6]
- Stages of change[3]
- Coping skills training[3]
- Conceptual model [3]
- Goal setting[4]

Interventions were administered through face-to-face sessions,[3,4,10,12] telephone,[3,4,10,12] email,[4,10] the Internet,[3,4,6,10,12] E-health programs,[11] printed educational materials,[3] and newsletters.[10]

Intervention duration ranged from three weeks[5,10] to 48 months.[12] Where reported, the number of sessions ranged from two[3] to 48[3] and the length of study follow-up ranged from three weeks[10] to 30 months.[6,11,12]

In the SRs, health coaching was compared with a variety of other interventions. Comparators included usual care,[3,11,12] other active disease treatment or management,[3,5,12] or alternative educational interventions.[12] The comparator group was not described in two SRs.[6,10] The outcomes considered in the SRs were broad and generally fell within the categories of physiological, behavioural, psychological, and social outcomes.[4-6,10,11] The impact of health coaching on a change in HbA1c in diabetic patients was reported in some studies.[6,11,12]

The included economic analysis assessed the costs and quality-adjusted life years (QALYs) associated with the use of a telephone-delivered health coaching intervention for patients with recent cardiac events as compared to usual care using existing written educational materials.[13] Effectiveness estimates were collected as part of a randomized controlled trial, and resource use and costs were obtained from hospital databases. The analysis was undertaken from the Australian government perspective and, though a time horizon was not specified for the analysis, patient follow-up was continued for 12 months post-intervention.

Summary of Critical Appraisal

A summary of individual study critical appraisal is provided in Appendix 3.

Systematic Reviews

Systematic search strategies were used in the identified SRs.[3,5,6,10-12] It was not clearly indicated whether the grey literature was searched for additional literature to be included in the reviews.[3-6,10-12] Two authors were involved in the screening and selection of studies to be included in four of the SRs.[5,10-12] In one SR, a single author screened titles and abstracts and two authors screened full text articles for inclusion.[3] In two reviews it was unclear clear whether study selection was done in duplicate.[4,6] A list of studies excluded from the SR was provided for only one review.[3] Kivelä et al. excluded studies from their review that were determined to be of low methodological quality based a score of four or less on the Joanna Briggs Institutes Critical appraisal Checklist, which may influence the findings.[10]

Individual studies included in the reviews were assessed for methodological quality using Cochrane Risk of Bias tool,[3] the Joanna Briggs Institute Critical Appraisal Checklist,[10] the PEDro Scale,[5] the Cochrane Criteria for Randomized Controlled Trials,[6,11] or an unspecified tool.[4,12] Overall quality of the studies included by Holden et al.[5] was assessed using the GRADE approach. Due to the observed heterogeneity between included studies, the authors of five reviews did not attempt to calculate effect sizes and instead narratively summarized the study results.[3-6,10] Two SRs identified enough detailed information to be able to calculate effect sizes.[11,12] Eland-de Kok et al.[11] pooled data in order to estimate effect sizes. Pimouguet et al.[12] used meta-regression analysis to determine which part of the intervention contributed to the outcomes and performed three sensitivity analyses to test the robustness of results.

Economic Analysis

Overall, the economic analysis by Turkstra et al. appeared to be well conducted.[13] A clear description of the intervention, comparators, and effectiveness values were provided by referring to the previously conducted randomized controlled trial. Health states were valued by using the SF-36 and SF-6D questionnaires at baseline, six months, and 12 months following the intervention. Costs included those related to the health coaching sessions and medical appointments, medication, and hospitalization costs. Sensitivity analyses were not undertaken. The authors used multiple imputation methods to predict estimated values for missing data. Despite best efforts, these estimates may not reflect true values.

Evidence-Based Guideline

The guideline from the Registered Nurses' Association of Ontario was relatively well prepared.[14] The overall objectives and health questions to be answered by the guideline were clearly described. The guideline development group included individuals from a variety of relevant health care and professional groups. It is unclear whether patient perspectives were obtained or considered. Evidence was used to support the recommendations and grades of the level of evidence were provided for each recommendation. A systematic search of the published and grey literature was undertaken. The search results were then reviewed by a research assistant and assessed against pre-defined inclusion and exclusion criteria for inclusion in the guideline. The guideline was reviewed by external stakeholders prior to publication and a process for review and updating of the guideline is provided.[14]

Summary of Findings

A summary of individual study findings is provided in Appendix 4.

What is the clinical effectiveness of using trained health coaches to effect positive behavior changes in persons with chronic disease or those seeking to reduce moderate to high modifiable risk factors for chronic disease?

Diabetes

Two reviews examined the impact of health coaching on diabetes outcomes.[6,12] In the review by Pimouguet et al.[12] there was a significant mean difference in HbA1c favoring the health coaching group. The absolute mean difference in HbA1c between the intervention and usual care groups was 0.51%. No studies reported a significant change in HbA1c favouring usual care. Adverse events were reported in nine studies included in the review. No difference in hypoglycemic episodes was reported between groups in six studies. Where there was a difference in hypoglycemic episodes between groups, episodes were more frequently reported in the control group (two studies). The absolute reduction in HbA1c was greater for individuals with a mean baseline HbA1c level greater than 8%. Based on an established standard value, the authors determined that the absolute reduction in HbA1c observed in the review could potentially result in a clinically meaningful change in HbA1c.[12]

The review by Ramadas et al.[6] included studies reporting statistically significant improvements in at least one outcome, including self-monitoring, physical activity, nutrition, and diabetes risk factors. The authors found that only studies of 12 weeks duration or longer reported positive findings. They also found that self-monitoring e-interventions resulted in better outcomes than behavioural interventions; however, this could have been a result of there being a greater number of self-management interventions identified in the literature.[6]

Low Back Pain

Due to the lack of detail in the included studies regarding the training of the providers and the composition of the intervention, Holden et al.[5] were unable to make a conclusion regarding the impact of health coaching on low back pain. They did find there was a significant difference between groups in regards to improvements in exercise compliance and pain-free lifting capacity maintained at 1 month follow-up (one study).[5] There were also significant between-group improvements in subscales of pain rehabilitation expectations scale reported at first follow-up but the results were not maintained one month later (one study).[5]

Variety of Conditions

Because of the wide range of patient conditions included, and health coaching approaches examined, most of the SR authors were unable to make an overall conclusion regarding the effectiveness of health coaching to effect positive behaviour changes.[3,4,10,11] Hill et al.[3] found that 94% (15 of 16) of the studies included in their review reported a positive effect of the intervention on at least one outcome measure. The heterogeneity between studies meant that effect sizes could not be calculated.[3] Statistically significant positive change was reported in at least one of a variety of physiological, behavioural, psychological, and social outcomes in 85% (11 of 13) studies included in the review by Kivelä et al.[10] In studies of obese or overweight patients, a reduction in body weight was observed in all studies that reported this outcome .[10] Patients who were overweight, had diabetes, or another chronic disease had the most potential

to benefit from health coaching. It was suggested that health coaching showed promise as a potentially effective method to produce positive change in behaviours and outcomes.[3,10] Olsen et al.[4] found statistically significant improvements reported in 40% (six of 15) of the studies. Improved outcomes included nutrition, levels of physical activity, weight management, and medication adherence. The authors reported that significant health behaviour changes were observed in four studies. The intervention delivery methods in these studies were: telephone, face-to-face, telephone plus internet, and telephone plus face-to-face health coaching, though not every study using these interventions reported significant changes.[4] Goal setting and motivational interviewing were the most common components amongst all interventions. The authors also suggested that health coaching interventions should be designed to take six to 12 months to complete in order to result in optimal behaviour change. Variability between duration, frequency, length of coaching sessions, delivery methods, training and qualifications of the health coaches, and basis of the program design all made it difficult to come to any specific conclusion about the effectiveness of health coaching interventions.[4]

Eland-de Kok et al.[11] investigated the effect of e-health interventions (two way online communication between patient and provider) plus usual care and e-health interventions versus usual care for patients with a variety of health conditions. E-health plus usual care resulted in a significant improvement in primary health outcomes in four of seven studies and was not associated with improved health outcomes in two studies. One study concluded that discharge to a higher level of care, such as nursing home or hospital, was less likely in the coaching group. Versus usual care, the e-health intervention resulted in improved health outcomes, including HbA1c, in four of five studies. One study included in the review found that patients were, on average, "very satisfied" with the e-health intervention they received.[11] Overall, the authors were unable to make a conclusion regarding the effectiveness of e-health interventions for chronically ill patients due to the limited number of studies identified and the methodological limitations of those studies.[11]

What is the cost-effectiveness of using trained health coaches to effect positive behavior changes in persons with chronic disease or those seeking to reduce moderate to high modifiable risk factors for chronic disease?

Turkstra, et al.[13] performed a cost-effectiveness analysis of health coaching (scripted telephone coaching sessions from a qualified health professional or health coach) versus usual care (including existing educational materials) for adults who had recently been hospitalized following myocardial infarction. Overall, improvements in health status were observed in both study groups but there was no statistically significant difference in outcomes reported.

The overall costs were $10,574 for the intervention group versus $8,534 for the control group (P = 0.021).[13] The difference in overall costs was attributed to the higher likelihood of hospitalization for non-cardiac related events in the intervention group (P = 0.042).[13] Patients participating in a health coaching intervention may be more closely monitored and health issues could potentially have been identified earlier leading to hospitalization.[13] The incremental cost-effectiveness ratio was $85,423 per quality-adjusted life year (QALY) (95% confidence interval [CI]; $25,327, dominated).[13] The authors concluded that the cost per QALY associated with the health coaching intervention was high and beyond what they considered to be a cost-effective threshold, though this threshold was not specified. Though not assessed in the study, the authors indicated the intervention could potentially positively impact future patient costs.

What are the evidence-based guidelines associated with the use of trained health coaches for patient behaviour modification in either the prevention or management of chronic diseases?

One evidence-based guideline was identified for inclusion in this review. The guideline for self-management support for patients with chronic conditions from the Registered Nurses' Association of Ontario[14] included four recommendations that incorporated information regarding health coaching within the supporting evidence. A number of the studies that were used to support the recommendations were also included in the identified SRs.

The recommendations that explicitly mention health coaching are as follows:
- "Organizations provide self-management support education through a variety of ongoing professional development opportunities to support nurses in effectively developing skills in self-management support." (level of evidence: IV, page 50)
- "Nurses use a variety of innovative, creative and flexible modalities with clients when providing self-management support such as: a) Electronic support systems b) Printed materials c) Telephone contact d) Face-to-face interaction e) New and emerging modalities." (level of evidence: IIb, page 44)
- "Nurses tailor the delivery of self-management support strategies to the clients' culture, social and economic context across settings." (level of evidence: IIa, page 46)
- "Nurses facilitate a collaborative practice team approach for effective self-management support." (level of evidence: Ib, page 48)

Limitations

There is no one standard definition of what a "health coach" is. Because of the range in definitions and qualifications of health coaching reported, it is possible that studies examining health coaching interventions that used a different definition than the one for inclusion in the review could have been overlooked or excluded from the SRs. Despite the extensive overlap in the literature search timeframes between the identified SRs, relatively few studies were included in multiple reviews. This could be due to the lack of a consistent definition of health coach, both in the individual studies and within the reviews. Studies included in the SRs were generally assessed as being of low or very low quality. One review excluded studies that were assessed to be of low quality.[10] The deliberate or inadvertent exclusion of potentially relevant studies could impact the generalizability of the findings. Olsen et al. indicated that content validity could possibly have been impacted by the variability in coach training between studies and lack of description in others.[4] Additionally, external validity could have been impacted by the variability in personalities and personal interactions between patient and provider and the likeability of individual coaches.[4] The main limitations identified by the review authors were: diversity of intervention approaches,[3,5,10] lack of detail about the interventions used,[3] variation in the training required for health coaches,[5] and the diversity of outcome measures used in the identified studies.[3]

Due to heterogeneity of the included studies, statistical analyses could not be undertaken and only descriptive analyses were provided in most of the SRs. Variability between duration, frequency, length of coaching sessions, delivery methods, training and qualifications of the health coaches, and basis of the program design all made it difficult for most review authors to come to any particular conclusion regarding the effectiveness of health coaching.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

Based on the evidence presented, it is unclear whether health coaching is effective at changing behaviour in people with chronic diseases or risk factors for chronic disease. The results of some studies demonstrated some benefit associated with the use of health coaches but heterogeneity between studies in most of the identified SRs meant that no meta-analyses could be undertaken. This resulted in authors providing a narrative synthesis of the evidence that was identified and prevented them from forming any firm conclusions regarding the effectiveness of health coaching. A health coaching intervention for patients hospitalized following myocardial infarction was not determined to be cost-effective when compared with usual care in one economic analysis.[13] In this case, health coaching was dominated by the usual care which was less expensive and as effective. One guideline[14] based a number of recommendations encouraging self-management techniques for chronically ill patients on literature examining the use of health coaches, though none of the recommendations provided specific guidance as to how health coaches should be incorporated into the continuum of care.

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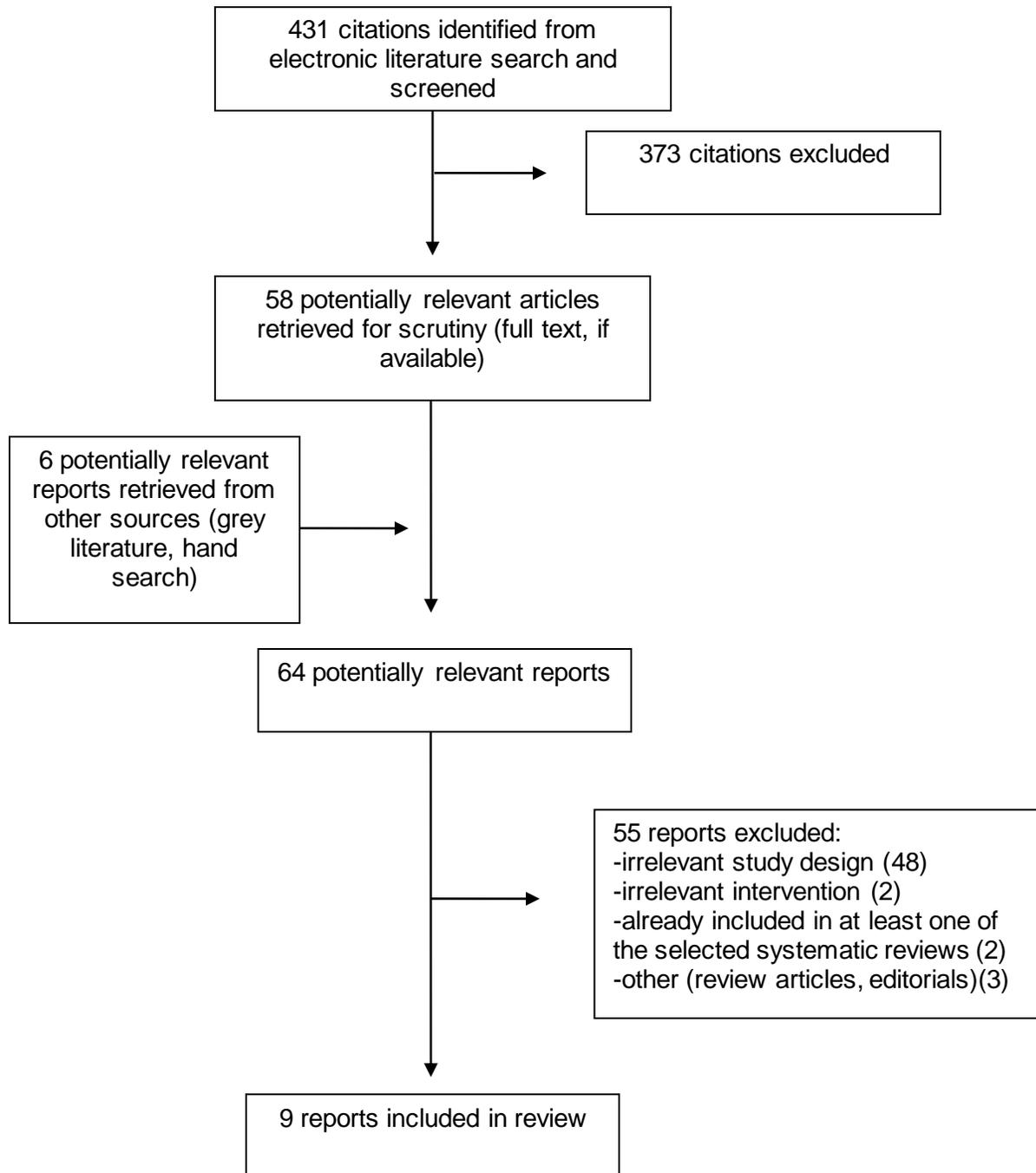Canadian Agency for Drugs and Technologies in Health
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APPENDIX 1: Selection of Included Studies

431 citations identified from electronic literature search and screened

373 citations excluded

58 potentially relevant articles retrieved for scrutiny (full text, if available)

6 potentially relevant reports retrieved from other sources (grey literature, hand search)

64 potentially relevant reports

55 reports excluded:
-irrelevant study design (48)
-irrelevant intervention (2)
-already included in at least one of the selected systematic reviews (2)
-other (review articles, editorials)(3)

9 reports included in review

APPENDIX 2: Characteristics of Included Publications

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses					
First Author, Publication Year, Country	**Types and numbers of primary studies included**	**Population Characteristics**	**Intervention**	**Comparator(s)**	**Clinical Outcomes, Length of Follow-Up**
Hill, 2015[3] Australia	16 RCTs Literature search range: January 2000 to October 2012	11 target patient populations (number of studies): • Chronic conditions (4) • T2DM (2) • Overweight adolescents (2) • Hospitalized patients with CHD (1) • Obese and hypertensive patients (1) • Early RA (1) • Cancer (1) • Parents and children aged 7-9yrs (1) • University employees (1) • Individuals with exercise and stress risk (1) • Patients registered to a specific clinic (1)	Behavioural theories (number of studies): • MI (6) • None (5) • TTM (4) • CBT (2) • Social cognitive theory (2) • Stages of change (1) • Coping skills training (1) • Conceptual model (1) Health coaching interventions (studies): • Telephone coaching (8) • In-person coaching (7) • Computer program (3) • Medication management (3) • Exercise (2) • TPC (1) • TMI (1) • Client-developed self-action plan (1) • Diet (1) • Educational materials (1)	Control group; Usual care; Other active intervention.	Intervention duration (range): 2 to 22 months Number of sessions (range): 2 to 48 sessions Length of follow-up (reported in 3 studies): NR Physiological, behavioural, psychological, and social outcomes

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses					
First Author, Publication Year, Country	**Types and numbers of primary studies included**	**Population Characteristics**	**Intervention**	**Comparator(s)**	**Clinical Outcomes, Length of Follow-Up**

Holden, 2014[5]
 	
Australia
	4 included studies:
	• 3 RCTs
	• 1 cluster RCT (2 publications)
	
	Literature search range:
	January 2009 to June 2013
		Patients with low back pain (with or without leg pain) of any duration
		
		Mean age (range):
		• Intervention group
		  ○ 39.5 to 70.09 yrs
		• Control group
		  ○ 39.5 to 70.56 yrs
		
		Male gender (range):
		• Intervention group
		  ○ 37.2% to 53%
		• Control group
		  ○ 31.6% to 67%
		
		Total number of patients = 1,666
			All health coaching interventions based on TTM of change
			• Physiotherapy + MET
			• Excluded CBT
			
			Content of each program varied.
			
			Health coaching by provider (number of studies):
			• Physiotherapist (3)
			• Nurse (1)
			
			Definition:
			"Any individual, one-on-one intervention that facilitates healthy behavior change through such techniques as motivational interviewing, stage-based motivational counseling and facilitative counselling approaches."
				Physiotherapy; Sham ultrasound; GP management	Intervention duration (range):
					3 to 8 weeks
					
					Number of sessions (range):
					3 to 10
					
					Length of follow-up (range):
					NR
					
					Outcome measures:
					• Exercise compliance
					• Pain scales
					• Activity levels

Kivelä, 2014[10] Finland	13 included studies: • 11 RCTs • 2 quasi-experimental studies	Adults with chronic diseases, excluding mentally ill or disabled (number of studies): • T2DM (3) • Overweight	Health coaching interventions (number of studies): • Telephone (12) • Face-to-face (5) • Internet (3)	Not described	Intervention duration (range): 3 weeks to 18 months Number of sessions (range):

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses					
First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
	Literature search range: January 2009 to September 2013	patients (3) • CHF (1) • T2DM, CAD, or CHF (1) • Dyslipidemia (1) • RA (1) • Cancer pain (1) • Chronic pain, mobility, or depression (1) • University employees (1) Sample sizes (range): 22 to 1755 participants	• Email (2) • Exercise (1) • Newsletters (1) Health coaching by provider (number of studies): • Nurses (6) • Psychologists (2) • Dieticians (1) • Social workers (1) • Physical therapists (1) • Fitness professionals (1) • Lifestyle coaches (1) • Education coaches (1)		3 to 14 sessions Length of follow-up (range): 3 weeks to 24 months Physiological, behavioural, psychological, and social outcomes
Eland-de Kok, 2011[11] Netherlands	12 RCTs Literature search range: January 2000 to July 2009	Patients diagnosed with somatic chronic diseases (number of studies): • T2DM (9) • Atopic dermatitis (1) • Cardiovascular disease (1) • Combination (1) Sample sizes (range): • Total participants (40 to 1665) • Intervention group (20 to 844)	Study interventions (number of studies): • E-health + usual care (7) • E-health vs usual care (5) Excluded interventions using only: • Monitoring device • Telephone • Webcam • Videoconferencing E-health intervention defined as an interactive website with store-and-	Usual care (regular hospital visits, regular visits at home by primary care provider, or visits to GP)	Health outcomes; Quality of life; Patient satisfaction; Costs Intervention duration (range): 3 months to 12 months Length of follow-up (range): 0 months to 30 months

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses					
First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
		• Control group (20 to 821)	forward messages between healthcare providers and patients.		
Pimouguet, 2011[12] France	41 RCTs Literature search range: 1960 to December 2009	Population of interest (number of studies): • T2DM (29) • T1DM and T2DM (9) • T1DM (3) Mean age (SD): 57.6 years (7.3) Male gender: 46.0% Sample sizes (range): 31 to 1665 patients Mean HbA1c concentration at baseline (SD): 8.5% (1.4%)	Health coaching interventions (number of studies): • Face-to-face (31) • Telephone (28) • Web (1)	Treatment in control group (number of studies): • Usual care (31) • Educational/ informational mailings (3) • Primary care physician (3) • Education program (1) • Dietician visit (1) • Contact nurse if necessary (1) • Minimal feedback of blood glucose (1)	Frequency of contact (number of studies): • High (16) • Moderate (12) • Low (8) • NR (5) Intervention duration (range): 1.5 months to 48 months Length of follow-up (range): 0 months to 30 months Outcome measures: • Change in HbA1c • Adverse events
Ramadas, 2011[6] Australia	13 included studies: • 11 RCTs (17 publications) • 2 quasi-experimental studies (3 publications)	Population of interest (number of studies): • Adults with T2DM (10) • Adults with poorly controlled T2DM (1) • Obese adults with	Web-based interventions for the management of T2DM intervening on (number of studies): • Self-monitoring (7) • Physical activity (4) • Combination (2) [physical activity +	Not described	Outcome measures: • behavior changes • biomarkers related to T2DM Intervention duration (range): 12 to 52 weeks

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses

First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
	Literature search range: 2000 to June 2010	T2DM (1) • Older adults with T2DM (1)	nutrition, diabetes risk factors] Health coaching by provider (number of studies): • Researchers (5) • Physicians (3) • Study nurse (2) • Care manager (2) • Endocrinologist (1) • Nurse educator (1) • Patient educator (1) • Automatic web response (1) • Online coach (1) • Dietician (1) Behavioural theories used (number of studies): • None (8) • Self-efficacy Theory (1) • Social Support Theory (1) • Wagner's Chronic Care Model (1) • Health Belief Model (1) • TTM (1) • Social Cognitive Theory (1)		Number of sessions (range): NR Length of follow-up (2 studies): 10 to 30 months

Table A1: Characteristics of Included Systematic Reviews and Meta-Analyses					
First Author, Publication Year, Country	Types and numbers of primary studies included	Population Characteristics	Intervention	Comparator(s)	Clinical Outcomes, Length of Follow-Up
Olsen, 2010[4] United States	15 quantitative and qualitative (number of studies): • Qualitative (2) • Non-randomized (6) • Quasi-experimental (1) • RCT (6) Literature search range: up to 2008	Patients of any age seeking help for any chronic illness or wellness or aging issues.	Health coaching interventions (number of studies): • Face-to-face (7) • Telephone (9) • Internet (2) • Email (1) Behavioural theories used (number of studies reporting): • MI (2) • Goal setting (1) Health coaching by provider (number of studies): • Transition coach (1) • Exercise coach (1) • RN (6) • Nurse care manager (1) • Graduate students (1) • Physical therapist (1) • Dieticians (2)	Not specified	Intervention duration (range): 3 to 18 months Outcome measures: • Nutrition • Physical activity levels • Weight management • Medication adherence

CAD = coronary artery disease; CBT = cognitive behavioural therapy; CHD = coronary heart disease; CHF = congestive heart failure; COACH = Coaching patients On Achieving Cardiovascular Health; GP = general practitioner; MI = motivational interviewing; MET = motivational enhancement therapy; NA = not applicable; NR = not reported; RA = rheumatoid arthritis; RCT = randomized controlled trial; RN = registered nurse; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus; TMI = telephone motivational interviewing; TSM = tailored self-management; TTM = transtheoretical model; vs = versus; yrs = years

Table A2: Characteristics of Included Cost Studies					
First author, Publication Year, Country	Type of Analysis, Perspective	Intervention, Comparator	Study Population	Time Horizon	Main Assumptions
Turkstra, 2013[13] Australia	Cost-effectiveness analysis Government perspective	Health coaching (ten 30 minute scripted telephone coaching sessions from a qualified health professional or health coach) vs Usual care (existing written educational materials)	Adults with recent MI N = 430 <u>Health coaching</u> (n = 215) Mean age = 61.3 yrs Male = 75.8% Smoking status - Never (25.1%) - Previous (43.7%) - Current (31.1%) <u>Usual care</u> (n = 215) Mean age = 59.9 yrs Male = 73.5% Smoking status - Never (30.2%) - Previous (38.1%) - Current (31.6%)	Not specified	Outcomes: - Cost per QALY Costs: - Resource utilization based on self-reporting - Hospital resource use and costs from Queensland hospital database - National average costs were used for each item of resource use - All costs reported in 2008 AUD

AUD = Australian dollars; MI = myocardial infarction; yrs = years

Table A3: Characteristics of Included Guidelines						
Objectives			Methodology			
Intended users/ Target population	Intervention and Practice Considered	Major Outcomes Considered	Evidence collection, Selection and Synthesis	Evidence Quality and Strength	Recommendations development and Evaluation	Guideline Validation
Registered Nurses' Association of Ontario (RNAO), 2010[14]						
Nurses, Health care professionals; Administrators	Strategies to support self-management in chronic conditions	Self-management support: • Increase patients' confidence in ability to change • Help clients become informed about their conditions and take an active role in treatment	Systematic search of the literature (range 1995 to August 2006), grey literature search, and hand searching Abstracts were screened by a single reviewer to assess for inclusion.	Relevant recommendations: Ib: Evidence obtained from at least one randomized controlled trial. IIa: Evidence obtained from at least one well-designed controlled study without randomization. IIb: Evidence obtained from at least one randomized controlled trial. IV: Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities	Development panel and advisory panel both composed of a range of health care professionals. Development panel members reviewed literature and came to consensus regarding the evidence to support each recommendation. Panel members reviewed the draft and agreed on final recommendations.	External stakeholders reviewed the recommendations and provided feedback. Feedback was reviewed by the panel and incorporated into the final draft report.

APPENDIX 3: Critical Appraisal of Included Publications

Table A4: Strengths and Limitations of Systematic Reviews and Meta-Analyses using AMSTAR[7]	
Strengths	**Limitations**
Hill, 2015[3]	
- Systematic search strategy undertaken using PRISMA criteria - Two authors screened full text for inclusion - List of excluded studies provided in additional document - Characteristics of included studies were provided - Assessed risk of bias for individual studies using Cochrane guidelines - Used pre-defined criteria for data extraction and study/outcome classification - Effect sizes not calculated due to study heterogeneity	- Grey literature was not searched - Single author screened titles and abstracts - Conflicts of interest were not provided
Kivelä, 2014[10]	
- Protocol written a priori - Used CRD systematic review criteria - Clear research question and PICO - Study screening and selection done in duplicate - Characteristics of included studies were provided - Study quality was assessed using Joanna Briggs Institute Critical Appraisal Checklist - Meta-analysis was not possible due to heterogeneity in the included studies - No conflicts of interest were declared	- Studies determined to be of low quality were excluded from the review - Unclear whether data extraction was done in duplicate - Unclear whether grey literature was searched - List of excluded studies was not provided
Holden, 2014[5]	
- Two reviewers screened titles and abstracts and screened full text - Clear inclusion and exclusion criteria - Methodological quality of included studies was assessed with the PEDro Scale. - Overall quality of included studies assessed using GRADE approach - Characteristics of included studies were provided - Meta-analysis was not possible due to heterogeneity in the included studies - No conflicts of interest were declared	- Data was extracted by one reviewer, verified by the second - Unclear whether grey literature was searched - List of excluded studies not provided

Table A4: Strengths and Limitations of Systematic Reviews and Meta-Analyses using AMSTAR[7]	
Strengths	Limitations
Eland-de Kok, 2011[11]	
• Two reviewers screened titles and abstracts to assess eligibility • Methodological quality of included studies was assessed using the Cochrane Criteria for RCTs • Characteristics of included studies provided • Effect sizes were calculated • No conflicts of interest were declared	• Unclear whether grey literature was searched • Excluded studies list not provided
Pimouguet, 2011[12]	
• Study selection and data extraction was done in duplicate • Some characteristics of included studies were presented • Studies were assessed for methodological quality • Due to heterogeneity, used a random effects model to calculate pooled standardized mean difference in HbA1c between groups • Used meta-regression analysis to determine which part of the intervention contributed to the outcomes • Performed 3 sensitivity analyses to test the robustness of results • Conflicts of interest were declared	• Unclear whether grey literature was searched • Method of quality assessment was not specified • Excluded studies list was not provided
Ramadas, 2011[6]	
• Systematic search undertaken according to PRISMA guidelines • Quality of individual studies was assessed using a modified Cochrane checklist • Study results were narratively summarized • No conflicts of interest were declared	• Unclear whether study selection and data extraction was undertaken by more than one reviewer • Unclear whether grey literature was searched • Comparator groups were not well described • Excluded studies list not provided
Olsen, 2010[4]	
• Methodological quality of individual studies was assessed using a pre-defined scoring system • Characteristics of individual studies were provided • Studies were narratively summarized	• Unclear whether grey literature was searched • Unclear whether study selection, data extraction, and quality assessment were undertaken by more than one reviewer • Excluded studies list not provided • Conflicts of interest not declared

Table A5: Strengths and Limitations of Economic Studies using Drummond[°]	
Strengths	**Limitations**
Turkstra, 2013[13]	
- Research questions stated - Viewpoint of the analysis is stated and justified - Rationale for comparison - Clear description of comparators (refers to original publication) - Effectiveness values taken from RCT - Outcome measures clearly stated - Health states valued with SF-36/SF-6D - Multiple imputation methods used to predict values for missing data - Currency (2008 Australian dollars) reported - Sources/estimation of unit costs described - Choice of model is justified - Statistical results, including confidence intervals and significance values, presented - Based on 6 months of follow-up data - Discounting was not applied due to 6 month time horizon	- Sensitivity analyses were not undertaken - Losses to follow up and incomplete data were accounted for using imputation techniques and may not reflect true values.

SF-36 = short form 36 health survey; SF-6D = short form 6 dimensions

Table A6: Strengths and Limitations of Guidelines using AGREE II[9]	
Strengths	**Limitations**
Registered Nurses' Association of Ontario[14]	
- Overall objectives clearly described - Health questions specifically described - Population for whom the guideline is meant to apply to is described - Guideline development group includes individuals from a variety of relevant health care and professional groups - Target users clearly outlined - Systematic methods were used to search for the evidence - Evidence used to support the recommendations was graded - There is an explicit link between the recommendations and supporting evidence - Guideline was reviewed by external stakeholders prior to publication - Process for review and updating of the guideline is provided - Key recommendations are easily identifiable	- Unclear whether patient views and preferences were obtained or considered - Criteria for selecting the evidence are vaguely described - Strengths and limitations of the body of evidence were not clearly presented - Overall methods for formulating the recommendations were provided (group discussion/consensus) but detailed methods were not provided - Conflicts of interest were not declared

APPENDIX 4: Main Study Findings and Author's Conclusions

Table A7: Summary of Findings of Included Studies	
Main Study Findings	**Author's Conclusions**
Systematic Reviews	
Hill, 2015[3]	

• 94% (15 of 16) included studies reported a positive effects of the intervention on at least one outcome measure
• heterogeneity between studies (11 populations) meant effect sizes could not be calculated for outcomes
	• The authors suggested that health coaching showed some promise as a method to produce positive behavioural or outcome change.
	• The authors were not confident making definitive conclusions regarding health coaching based on the literature they identified.
	• The authors noted three main issues:
	  ○ diversity of intervention approaches
	  ○ lack of detail about the interventions used
	  ○ diversity of outcome measures used in the identified studies
	• The authors were unable to answer their predefined research questions:
	  ○ Is health coaching effective at eliciting positive behavioural our outcome change?
	  ○ Are there specific outcomes or populations for which health coaching is more (or less) effective?
	  ○ Is there an optimal intervention duration that is most effective?
	  ○ Are studies including and reporting sufficient detail to allow behavioural change techniques to be classified according to Michie and colleagues criteria?
	  ○ Are certain theoretical bases associated with more effective interventions?

Kivelä, 2014[10]	

Statistically significant positive outcomes (number of studies reporting):
• Physiological outcomes
  ○ Weight (3)
  ○ Physical health status (3)
  ○ BMI (2)
  ○ HbA1c (2)
  ○ Blood pressure (1)
  ○ HDL- cholesterol (1)
  ○ Diabetes medical symptoms (1)
  ○ Pain (1)
	• "Health coaching affected patients with diabetes, overweight status or a chronic disease the most." (p.155)
	• Health coaching methods and applications varied between studies, making an overall estimate of effectiveness difficult
	• The authors concluded that "the results of (the) review indicated that health coaching has positive effects on adults with chronic diseases." (p.155)

Table A7: Summary of Findings of Included Studies	
Main Study Findings	**Author's Conclusions**
○ Dyspnea severity (1) - Behavioural outcomes ○ Physical activity (6) ○ Reinforcement of self-care (1) ○ Diet (1) ○ Foot care (1) ○ Self-assessment of most important behavior change (1) ○ Readiness to change (1) - Psychological outcomes ○ Self-efficacy (2) ○ Mental health (2) ○ Satisfaction of treatment (1) ○ Stress (1) ○ Quality of life (1) ○ Awareness of self-care goals (1) ○ Perception of illness (1) - Social outcomes ○ Social support (2) ○ Self-efficacy for communication with physician (1) ○ Availability of social resources (1) 85% (11 of 13 studies) reported a statistically significant improvement in at least one outcome. Reductions in body weight were observed in all studies that measured it.	
Holden, 2014[5]	
- Results reported, or calculated, as mean difference (standardised where possible) - Results favoring health coaching intervention ○ Significant between-group improvements in exercise compliance and pain-free lifting capacity maintained at 1 month follow-up (1 study) ○ Significant between-group improvements in subscales of pain rehabilitation expectations scale reported at first follow-up but the results were not maintained one month later (1 study) - In one study, significant improvements were reported in for both the motivational counselling and general information	- There was wide variation in what constituted a health coaching intervention and the level of training required for the health coaches. - Due to the lack of detail in the included studies regarding the competency or proficiency of health coaches, the authors were unable to conclude whether the interventions actually constituted formal health coaching. - The authors were unable to make a conclusion regarding the effectiveness of health coaching for low back pain due to the level of heterogeneity between studies and the GRADE rating of the evidence as very low quality.

| Table A7: Summary of Findings of Included Studies ||
Main Study Findings	Author's Conclusions
groups: ○ Significantly fewer days in pain ○ Improvements in overall activity levels ○ Greater self-efficacy for physical activity at 6 and 12 months follow-up	
Eland-de Kok, 2011[11]	
E-health + usual care (7 studies) • Significant improvement (small to moderate effect size) reported for primary health outcomes for patients with diabetes (4 studies) • E-health was not associated with improved health outcomes (2 studies) • No significant differences between groups in resource use were identified (2 studies) E-health vs usual care (5 studies) • Improved health outcomes for patients with T2DM, including HbA1c, were reported in the intervention group (4 studies) • "Greater improvement in clinical outcomes in patients with cardiac diseases and fewer cardiovascular-related events as measured after 6 months" (p. 3006) Costs and health care utilization (4 studies) • Results varied. • One study concluded there was not sufficient evidence to support the cost-effectiveness of e-health interventions Patient satisfaction (1 study) • Average patient satisfaction score was 'very satisfied' with the e-health intervention	• "In general, small to moderate effects were shown on clinical health outcomes of e-health interventions…" (p.3006) • The authors hypothesized that there would be an improvement in outcomes in the studies where e-health interventions were provided in addition to usual care. The additional care and attention was predicted to result in better health outcomes. Small to moderate positive effects were observed. • Due to the limited number of studies identified, and the methodological limitations of those studies, the authors were unable to make a conclusion regarding the effectiveness of e-health interventions for chronically ill patients.
Pimouguet, 2011[12]	
All results refer to SMD in change in HbA1c between intervention and control groups Random effects model Pooled SMD = -0.38 (favoring intervention) [95% CI, -0.47 to -0.29; P <0.001] Absolute mean difference in HbA1c between intervention and control = 0.51% No studies reported a significant change in	• "Our meta-analysis suggests that disease-management programs have a favorable effect on improving glycemic control…" (p. E120) • Based on an established standard value, the authors determined that the absolute reduction in HbA1c observed in the review could result in a clinically meaningful change in HbA1c. • The authors suggested that the effect on HbA1c may be underestimated due to

Table A7: Summary of Findings of Included Studies	
Main Study Findings	**Author's Conclusions**
HbA1c in favor of usual care. Significant heterogeneity between studies in regards to change in HbA1c (I^2 = 66%) Mean HbA1C level at baseline • <8% vs ≥8% (SMD -0.14 vs -0.45, P <0.003) Components of intervention resulting in greatest HbA1c control: • Disease manager able to start or modify treatment without approval of primary care physician (13 studies) vs programs without (28 studies) ○ SMD = -0.60 vs -0.28 (P <0.001) • Frequency of contact (36 studies) ○ High frequency (16 studies) vs usual care SMD = -0.56 (95% CI; -0.72 to -0.40; P = 0.033) ○ The effect of low and moderate frequencies were not statistically significant Adverse events (9 studies) • No difference in hypoglycemic episodes between groups (6 studies) • Difference in hypoglycemic episodes between groups (3 studies) ○ More frequently reported in the control group (2 studies) Results of primary analyses did not change after conducting three sensitivity analyses: • Excluded studies with dropout rates of ≥20% and trials without dropout information • Excluded studies with between-group difference in dropout rate of ≥7% and trials without dropout information • Excluded trials with unclear allocation concealment	"usual care" in RCTs generally being more thorough than usual care in practice. • Results suggest that disease-management interventions were more effective for patients with poorer glycemic control (mean baseline HbA1c level ≥8%).
Ramadas, 2011[6]	
Statistically significant positive outcomes (number of studies reporting): • Self-monitoring (7 studies)	• "Only relatively longer studies (12 weeks) reported positive findings." (p. 401) • "The findings suggest that behavioural

Table A7: Summary of Findings of Included Studies	
Main Study Findings	**Author's Conclusions**
○ HbA1c (7) ○ FBG (2) ○ Cholesterol (3) ○ Weight (1) ○ Measures of depression (1) ○ QoL (1) ○ Social support (1) ○ Self-efficacy (1) - Physical Activity (3 studies) ○ Physical activity level (2) ○ HbA1c (1) ○ FBG (1) - Physical activity + nutrition (1 study) ○ Weight ○ Waist circumference ○ HbA1c ○ QoL - Diabetes risk factors (1 study) ○ Clinical composite score 62% (8 of 13 studies) reported participation rate or details that could be used for a calculation - Participation rate ranged from 32% to 83% (mean: 58%) Email and SMS services were commonly used with websites to encourage and reinforce the use of the intervention.	intervention require a longer duration to yield positive results as compared to self-monitoring e-interventions." (p. 401) "…longer follow-up is essential to investigate the sustainability of web-based interventions." (p.401) "…the use of other technologies [emails and SMS] was found to be an excellent method of reinforcing web-based interventions." (p.401) "Generally, the self-monitoring e-interventions yielded better results than the behavioural e-interventions, although this could also be due to higher number of self-management e-interventions that was reported." (p. 403) "…web-based intervention programmes have potential to reach and educate diabetic patients and further exploration in this area is warranted." (p.403)
Olsen, 2010[4]	
- Significant improvements were reported in (6 of 15 studies): ○ Improved nutrition ○ Increased levels of physical activity ○ Weight management ○ Medication adherence - Health coaching improved healthy lifestyle behaviours related to weight management. There was variability between studies in regards to the frequency and delivery of health coaching. - Improvements in medication management and adherence were reported. - Significant health behaviour changes were observed with telephone, face-to-face, telephone + internet, and telephone + face-to-face delivery methods	- The authors suggested that health coaching interventions should be designed to take 6 to 12 months in order to results in optimal behaviour change. - Despite some positive results reported in individual studies, overall the results of the review were inconclusive and the authors were unable to make a conclusion regarding the effectiveness of health coaching for various health conditions.

Table A7: Summary of Findings of Included Studies	
Main Study Findings	**Author's Conclusions**
Economic Evaluations	
Turkstra, 2013[13]	
Improvements in health status (SF-6D) were observed in both groups at both 6 and 12 months, with no statistically significant difference in scores between groups. Patients in the health coaching group were significantly more likely to be hospitalized for non-cardiac related events ($P = 0.042$) Overall cost (health coaching vs control) $10,574 vs $8,534; $P = 0.021$ Hospitalization costs (health coaching vs control) $6,841 vs $4,984; $P = 0.036$ Over 6 months: Incremental cost = $2,040 Incremental effectiveness = 0.012 QALYs Incremental cost-effectiveness ratio = $85,423/QALY (95% CI; $25,327, dominated)	• The authors concluded that the ProActive Heart health coaching intervention resulted in greater health care costs and no associated improvement in health status. • The authors concluded that the cost per QALY associated with the health coaching intervention was high and beyond what they considered to be a cost-effective threshold. • Though not assessed, the authors indicated the intervention could potentially positively impact future patient costs. Patients participating in a health coaching intervention may be more closely monitored and health issues could potentially be identified earlier.
Evidence-Based Guidelines	
RNAO, 2010[14]	

- "Nurses use a variety of innovative, creative and flexible modalities with clients when providing self-management support such as: a) Electronic support systems b) Printed materials c) Telephone contact d) Face-to-face interaction e) New and emerging modalities."
  - Level of evidence: IIb (p.44)
- "Nurses tailor the delivery of self-management support strategies to the clients' culture, social and economic context across settings."
  - Level of evidence: IIa (p. 46)
- "Nurses facilitate a collaborative practice team approach for effective self-management support." (p. 48)
  - Level of evidence: Ib
- "Organizations provide self-management support education through a variety of ongoing professional development opportunities to support nurses in effectively developing skills in self-management support."
  - Level of evidence: IV (p. 50)

BMI = body mass index; FBG = fasting blood glucose; HbA1c = glycated hemoglobin; HDL = high-density lipoprotein; QALY = quality-adjusted life year; QoL = quality of life; RNAO = Registered Nurses' Association of Ontario; SF-6D = short form six dimensions; SMD = standardized mean difference; SMS = short message service/text message; vs = versus