International Centre for Allied Health Evidence

Rapid review of literature for consumer-centred care in people with diabetes

Final report

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Australian Diabetes Educators Association

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This report was developed with funding from the NDSS. The National Diabetes Services Scheme (NDSS) is an initiative of the Australian Government administered by Diabetes Australia

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A member of the Sansom Institute

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Citation details

The International Centre for Allied Health Evidence (2014) Rapid review of literature for consumer centred care in people with diabetes. Technical Report. Prepared for the Australian Diabetes Educators Association.

EXECUTIVE SUMMARY

Background

Consumer-centred care is health care that is respectful of, and responsive to, people's preferences, needs and values. It is integral to safe, quality health care for people with diabetes.

Diabetes mellitus (namely Type 2 diabetes) has become one of the most challenging public health problems in Australia.

People with diabetes take an active role in the management of their condition. This means consumer-centred intervention strategies must be tailored to the needs of individuals and groups of people with diabetes.

Purpose

The purpose of this rapid review was to provide a synthesis of the best available research evidence on the impact of consumer-centred care strategies in adults with diabetes.

Methodology

A rapid review of the published literature was undertaken. A rapid review synthesises existing research and provides an evidence platform to guide decisions about interventions, diagnostic processes and application of technologies. It comprises a brief synthesis and 'on balance' judgement of the best available evidence related to a specific question. For effectiveness questions, the best evidence may be identified in systematic reviews, meta-analyses and randomized control trials. For questions on service delivery, the best available evidence may come from observational studies, cost effectiveness studies or even grey literature (government or institutional reports). The literature considered most relevant for each question is judged on its merits, and is identified using a standard literature searching strategy and a hierarchy of evidence relevant to the question intent. In some projects, quality is also judged using a critical appraisal tool.

Key definitions

Diabetes Educators/credentialed diabetes educators:

As defined by ADEA, Credentialled Diabetes Educators already hold a professional health care qualification and have completed a post graduate certificate in diabetes education and care that has been accredited (ADEA 2014). Data relating to the health personnel involved in included reviews were extracted verbatim.

Diabetes:

Inclusive of type 1 and type 2 diabetes

Consumer centred care:

Patient, consumer or family centred care is health care that is respectful of, and responsive to, the preferences, needs and values of patients and consumers (Australian Commission on Safety and Quality in Healthcare 2014). Different definitions and terminology have been used to describe the concepts in this area but key principles of patient centred approaches include:

- treating patients, consumers, carers and families with dignity and respect
- encouraging and supporting participation in decision making by patients, consumers, carers and families
- communicating and sharing information with patients, consumers, carers and families
- fostering collaboration with patients, consumers, carers, families and health professionals in program and policy development, and in health service design, delivery and evaluation.

Review answers

A total of **28** systematic reviews/meta-analyses and economic evaluations were included in this rapid review.

What is consumer-centred care in diabetes?

In the current diabetes literature, most consumer-centred strategies adopted educational and behaviour change approaches.

What approaches and/or strategies have been used to engage with consumers in implementing consumer-centred care for people with diabetes? Have these approaches and/or strategies employed the use of diabetes educators and/or credentialed diabetes educators?

The range of strategies used to engage with people with diabetes varied considerably in their approach, format, and scope. Education was an integral component, and often used in combination with other strategies such as behavioural interventions and/or psychological approaches. The most commonly reported formats or modes of delivery were face-to-face, phone calls or web-based, delivered by a health practitioner or a multi-professional team of medical practitioners, dieticians/nutritionists, diabetes nurse, community health workers and educators. Some reviews reported strategies which utilised passive means of delivering the intervention such as didactic lecture or dissemination of printed information, whereas others used a more interactive approach or both. The duration of consumer-centred interventions and the length of exposure also varied from as little as two hours of contact time to as long as 12 months of continuous contact or eight years of contact with break periods.

What are the outcomes of approaches and/or strategies used to engage with consumers in implementing consumer-centred care for people with

Consumer-centred approaches and strategies were associated with improvements in metabolic/glycaemic control, particularly in the short-term; however trends in other clinical outcomes such as blood pressure, cholesterol, triglycerides/lipids, BMI/weight/waist circumference were less consistent. Improvements in diabetes knowledge were observed in the short and longer term. Positive effects were also

diabetes?	reported for self-management behaviour, especially for outcomes which measured overall or global adherence to treatment for diabetes.
What are the characteristics of effective approaches and/or strategies aimed at engaging with consumers with diabetes when implementing consumer-centred care?	Consumer-centred care that combined educational approaches with behavioural or psychological interventions was most effective for increasing people's diabetes-related knowledge and improving their metabolic/glycaemic control. Successful engagement strategies with people with diabetes generally consisted of patient education, and training sessions that involved behavioural change or problem solving skills. Structured programs adopting predominantly interactive approaches and delivered by a multidisciplinary team of educators (e.g. nurse educators, pharmacists, community health workers, dieticians, diabetes educators) were linked to positive health outcomes. Culturally appropriate interventions were fundamental to engaging with vulnerable populations with diabetes. Approaches which employed technologically-assisted (e.g. internet or web-based) interventions and/or telecare were useful in engaging with people with diabetes and improving a range of health outcomes. Multiple or high intensity interventions delivered over a longer period of time enhanced the effectiveness of interventions and helped sustain the beneficial effects of educational programmes.
Gaps in the literature	Within this body of literature, a number of research gaps were identified, including the lack of consistency in the consumer-centred care and diabetes management nomenclature, large range of variability in the nature of interventions and outcome measures used, and the lack of studies aimed at investigating the success rate of different and specific individual components of interventions/approaches/strategies.
Recommendations from the literature	To engage with people with diabetes, and deliver consumer centred care, in accordance with people's preferences, needs and values, diabetes care should include educational components and behaviour-change approaches, using interactive and technologically-assisted methods by all members of multidisciplinary teams.

Consumer-centred care in diabetes

Background

Supporting people as partners in their health care, and the importance of individualised health services has been an increasing focus of worldwide health care accreditation processes, reforms and initiatives (Health Foundation 2014). There is a growing body of evidence which suggests that engaging people in their health is fundamental to developing sustainable and high quality healthcare (Health Foundation 2014, Nilsen et al 2006, Sarrami Foroushani et al 2012).

Patient, consumer or family centred care is health care that is respectful of, and responsive to, the preferences, needs and values of patients and consumers *(Australian Commission on Safety and Quality in Healthcare 2014).* There is no universally accepted definition of consumer-centred care (Sarrami Foroushani et al 2012), however the underlying evidence positions consumers as equal partners in the planning, development and assessment of their care through shared decision-making, support for self-management and facilitating effective communication (Health Foundation 2014). Several frameworks modelling the key components of consumer-centred care have been proposed (Lowe et al 2011, Sarrami Foroushani et al 2012, Tzelepis et al 2014, US Institute of Medicine,), and while varied terminology is used, there are commonalities among the frameworks in terms of the nature and scope of consumer-engagement strategies (Lowe et al 2011; Appendix 1):

- providing information or education,
- facilitating shared communication and decision-making,
- teaching skills,
- supporting behaviour change,
- providing support,
- minimising risks and harms,
- improving health care equity, and
- engaging consumers at the systems level.

Diabetes mellitus (especially type 2) has become one of the most challenging public health problems in the world. In Australia, there are over 1.5 million cases of diabetes including those who are undiagnosed (Baker IDI Heart and Diabetes Institute 2012). By 2031, it is estimated that 3.3 million Australians will have type 2 diabetes (Vos et al. 2004). Despite scientific discoveries and advances in health technology, the burden of diabetes continues to escalate. Patients take an active role in the management of their condition. People with diabetes provide about 95% of their own care (Krichbaum et al 2003). There are many activities that people with diabetes are responsible for, including manipulation of complex medication schedules, executing detailed dietary recommendations, glucose monitoring, promoting physical activity and participation in preventative care strategies (Boren 2009; Cavanaugh 2011). These activities can be particularly challenging if healthcare interventions are not consumer-centred. Providing education and acknowledging and supporting self-management skills in people with diabetes is critical to a person’s ability to engage with health services, and can help them make effective decisions about their health and participate in mutually-agreed evidence-based self-management strategies.

The Australian Diabetes Educators Association (ADEA) is committed to the highest standards of practice and professional and believes in the provision of patient-centred care in diabetes management. The most important attribute of patient-centred care is the active engagement of patients when health care decisions must be made, and this is enhanced when people are partners in shared-decision making, can access education educated, are supported and taught relevant skills (Health Foundation 2014).

The focus of this rapid review was to examine the impact of different healthcare consumer-centred approaches or strategies with people with diabetes.

Methodology

Objective of this review

The purpose of this rapid review was to provide a synthesis of the best available research evidence on the impact of consumer-centred care strategies in adults with diabetes.

Review questions

This rapid review addressed the following questions:

1. What is consumer-centred care in diabetes?
2. What approaches and/or strategies have been used to engage with consumers in implementing consumer-centred care for people with diabetes? Have these approaches and/or strategies employed the use of diabetes educators and/or credentialed diabetes educators?
3. What are the outcomes of approaches and/or strategies used to engage with consumers in implementing consumer-centred care for people with diabetes?
4. What are the characteristics of effective approaches and/or strategies aimed at engaging with consumers with diabetes when implementing consumer-centred care?

Methods

A rapid review of the published literature was undertaken to provide a brief synthesis and judgment of the available research evidence related to the effectiveness of consumer-centred care programs among adults with diabetes aged over 18 years. The evidence base for this review was limited to “best available evidence” (as is the nature of any rapid review) and hence the research evidence was drawn primarily from existing systematic reviews, meta-analyses, and economic evaluations. A staged approach to interrogating the literature was undertaken, whereby reviewers examined the best available research evidence (i.e. systematic reviews / meta-analyses) as they are the most comprehensive source of evidence. In the absence of the best available research evidence, primary research evidence (such as randomized controlled trials) was considered to fulfill such evidence gaps.

Search strategy

In agreement with the project officer from the Australian Diabetes Educators Association, specific criteria for inclusion in this review were considered using the PECOT framework (as shown in Table 1). Only articles published in English in the past ten years were included in order to capture the most recent scientific evidence on consumer-centred programs. For the purposes of this review, the following key operational definitions were used:

Patient, consumer or family centred care is health care that is respectful of, and responsive to, the preferences, needs and values of patients and consumers (Australian Commission on Safety and Quality in Healthcare 2014). Different definitions and terminology have been used to describe the concepts in this area but key principles of patient centred approaches include:

- *treating patients, consumers, carers and families with dignity and respect*
- *encouraging and supporting participation in decision making by patients, consumers, carers and families*
- *communicating and sharing information with patients, consumers, carers and families*
- *fostering collaboration with patients, consumers, carers, families and health professionals in program and policy development, and in health service design, delivery and evaluation.*

Table 1 Criteria for considering studies in the review

Population	*Adults with diabetes aged over 18 years (to control for potential consent and advocacy issues)and/or their families/carers*
Exposure	• *Consumer-centred care programs conducted in any healthcare or community setting, and where applicable, a subset of these delivered by* diabetes educators and/or credentialed diabetes educators • *Any strategy, model or approach described and reported to involve health-service users*
Comparator	*Consumer-centred care programs delivered by professional staff other than credentialed diabetes educators ,other diabetes consumer-centred care programs (without a patient-engagement component/focus), no intervention or usual practice/care*
Outcomes	*A range of outcomes will be considered including, but not limited to:* • *Haemoglobin* A_{1c} • *Systolic blood pressure* • *Quality of life measures* • *Diabetes knowledge, self-efficacy and health literacy tests (e.g. Diabetes Knowledge Test, Diabetes Health Belief Model Scale, Test of Functional Health Literacy in Adults)* • *Self-report of diabetes complications(e.g. retinopathy, nephropathy, lower extremity amputation, cerebrovascular disease, ischaemic heart disease, hypertension)* • *Number of hospital admissions and/or GP visits related to diabetes* • *Cost-effectiveness* • *Patient perspectives (e.g. shared decision making, satisfaction, autonomy, self management, adherence to treatment plans, self-reported / qualitative data)*
Time	*Short and long term*

A combination of search terms (as shown in Table 2) was used to identify and retrieve articles in the following databases and was based on the search strategy used in a Cochrane review (Nilsen et al 2006).

- Biomed Central Gateway
- CINAHL database
- Cochrane Library
- EMBASE
- ERIC
- Health Source (Nursing / Academic Edition)
- Informit health databases
- MEDLINE
- PsycInfo
- PubMed
- Scopus
- Web of Knowledge

Table 2 Search terms for the review (displayed for the OVID Medline database)

Search terms 1	***Search terms 2***	***Search terms 3***
1. Consumer Participation/ 2. Patient Participation/ 3. Consumer Advocacy/ 4. Patient Advocacy/ 5. Consumer engagement/ 6. Patient engagement/ 7. Family engagement/ 8. Consumer centred care or Consumer centered care/ 9. Patient centred care or Patient centered care/ 10. Person centred care or Person centered care/ 11. Family centred care or Family centered care/ 12. Consumer Organizations/ 13. ((consumer? or patient?) adj2 organi#ation).tw 14. ((consumer? or stakeholder? or patient? or user? or lay or disab$ or citizen? or communit$ or public or advoca$ or carer? or caregiver? or famil? or parent? or relative? or client?) adj2 (particip$ or involv$ or represent$ or collaborat$ or consult$ or contribute$)).tw	Adult	Diabetes

The titles and abstracts identified from the above search strategy were assessed for eligibility by the *i*CAHE researchers and stakeholders from the Australian Diabetes Educators Association. In order to avoid duplication and "double counting" data, umbrella reviews (reviews of reviews) were excluded. These umbrella reviews were utilised to identify other relevant articles by pearling their reference lists. Full text copy of eligible articles was retrieved for full examination.

Critical appraisal

Two reviewers independently appraised the methodological quality of the included articles using the Assessment of Multiple Systematic Reviews (AMSTAR) tool. Differences in opinion were resolved by discussion.

The AMSTAR is an 11-item instrument which was developed by exploratory factor analysis and a nominal group technique involving methodological experts to develop its face and content validity (Shea et al 2007). A copy of the AMSTAR instrument is provided in Appendix 2. Further psychometric testing of AMSTAR has demonstrated substantial inter-rater agreement for individual items (mean Kappa 0.70, 95% CI 0.57, 0.83) and acceptable construct validity for total sum scores (ICC 0.84, 95% CI 0.65, 0.92) when compared with the Overview of Quality Assessment Questionnaire (ICC 0.91, 95% CI 0.82, 0.96) and Sacks' instrument (ICC 0.86, 95% CI 0.71, 0.94) (Shea et al 2009).

Data extraction

Data were extracted from the identified publications using a data extraction tool which was specifically developed for this review. The following information were extracted from individual studies:

- Evidence source (author, year of publication)
- Characteristics of participants
- Consumer-centred care strategies or approaches: nature, setting, delivery, format, intensity/dose/duration
- Personnel involved in the intervention
- Outcome measures
- Results of the review (e.g. evidence of effectiveness, cost-effectiveness)
- Characteristics of effective approaches.

Data synthesis

Findings from the included publications and their methodological quality (based on critical appraisal scores) were synthesised in a narrative summary. The strength of the body of evidence was determined based on the Australian National Health and Medical Research Council (NHMRC) Evidence Grading Matrix (Table 3). Recommendations or plain language summaries for each of the review questions are also provided.

Table 3 NHMRC evidence grading table

	A	B	C	D
Component	**Excellent**	**Good**	**Satisfactory**	**Poor**
Volume of evidence	several level I or II studies with low risk of bias	one or two level II studies with low risk of bias or a SR/multiple level III studies with low risk of bias	level III studies with low risk of bias, or level I or II studies with moderate risk of bias	level IV studies, or level I to III studies with high risk of bias
Consistency	all studies consistent	most studies consistent and inconsistency may be explained	some inconsistency reflecting genuine uncertainty around clinical question	evidence is inconsistent
Clinical impact	very large	substantial	moderate	slight or restricted
Generalisability	population/s studied in body of evidence are the same as the target population for the guideline	population/s studied in the body of evidence are similar to the target population for the guideline	population/s studied in body of evidence different to target population for guideline but it is clinically sensible to apply this evidence to target population*	population/s studied in body of evidence different to target population and hard to judge whether it is sensible to generalise to target population
Applicability	directly applicable to Australian healthcare context	applicable to Australian healthcare context with few caveats	probably applicable to Australian healthcare context with some caveats	not applicable to Australian healthcare context

Results

Evidence Sources

The search was conducted within the same 24 hour period on 21 May 2014 to control for daily updating of databases. There were 3450 records initially identified, 286 of which were duplicates. To establish inter-rater reliability of the screening process, two *i*CAHE researchers independently reviewed the titles and abstracts of a random sample of 30 records to determine potential eligibility (100% consistency). The 3164 records to be screened were halved and distributed between the two *i*CAHE researchers for review. Following this process, 159 full-text articles were assessed against the eligibility criteria, with 36 meeting inclusion. The search results and screening process is summarised below in a modified PRISMA flow chart (Figure 1).

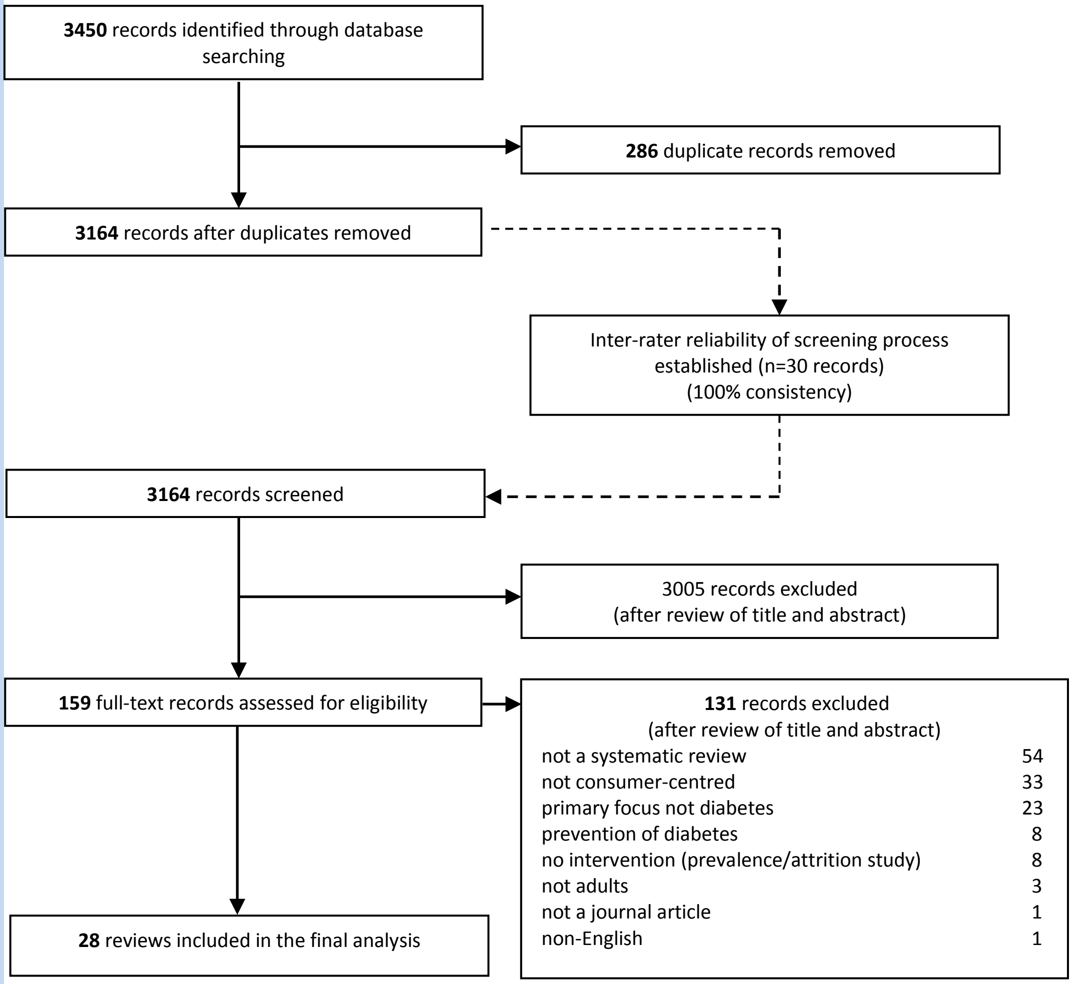

Figure 1 Modified PRISMA flow chart outlining the search results (Moher et al 2009)

Characteristics of included studies

Type of participants

All systematic reviews included adults with diabetes, with a large proportion of reviews (n=12, 42.9%) including only adults with type 2 diabetes (Amaeshi et al 2012, Asante et al 2013, Avery et al 2012, Dale et al 2012, Deakin et al 2009, Duke et al 2009, Hawthorne et al 2010, Jackson et al 2006, Loveman 2008, Minet et al 2010, Omran et al 2012, Shojania et al 2006, Whittemore et al 2007). However, one review did not report on the type of diabetes participants were diagnosed with (Elissen et al 2013). specific subgroups of participants with diabetes were the focus of several reviews, and these comprised:

- adults with type 1 or 2 diabetes (Armour et al 2005, El-Gayar et al 2013, Ellis et al 2004, Elliott et al 2012, Fitzpatrick et al 2013, Liang et al 2011, Pal et al 2013, Wu et al 2010),
- adults with type 1 diabetes (Montori et al 2007, Winkley et al 2006),
- adults with type 1 or 2 diabetes and depression (Baumeister et al 2012),
- ethnic minority groups with type 2 diabetes (Hawthorne et al 2010), such as Hispanic adults (Whittemore et al 2007),
- adults with type 1 or 2 diabetes, from low socioeconomic and specific ethno-racial groups including African Americans, Mexican Americans & Native Americans (Glazier et al 2006),
- adults with type 1 diabetes using insulin pump therapy (Jayasekara et al 2011),
- adults with type 2 diabetes at risk of lower extremity amputation (Amaeshi et al 2012).

Type of interventions

The types of interventions reported by the included reviews are described under 'Question 2', page 14, and presented in Table 5.

Type of outcomes

Included systematic reviews varied considerably in the number, type and timing of (primary and secondary) outcomes of interest, and there was a lack of consistency in the terms used to report and describe these (Appendix 3). Therefore, in this review, outcomes (recorded verbatim from included articles) were categorised as follows: clinical outcomes (physiological and functional measures), knowledge, self-management behaviours, health care use/cost analyses, psychosocial, diabetic complications, and additional outcomes (Appendix 3). Clinical outcomes were most commonly evaluated (n=26 systematic reviews, 92.9%), and these were predominantly physiological measures of glycated haemoglobin (HbA1c) (n=22, 78.6%), blood pressure (n=15, 53.6%), anthropometry (e.g. body weight, BMI, waist circumference) (n=14, 50%), and lipid profiles (e.g. [total] cholesterol, HDL, LDL, triglycerides) (n=11, 39.3%). Of the knowledge outcomes, measures relating specifically to diabetes knowledge were most prevalent (n=7, 25%). The greatest range of measures was for self-management behaviour outcomes, and these included: self-reported behaviours or behavioural changes relating to diet/nutrition (n=6, 21.4%), exercise/physical activity (n=5, 17.9%), medication adherence (n=4, 14.3%), general compliance with therapeutic regimens (n=3, 10.7%).

Consumer-centred outcomes

Among the included systematic reviews, there were a range of outcomes directed at the consumer-level (Appendix 3). These outcomes included: self-efficacy (Amaeshi et al 2012, Dale et al 2012, Deakin et al 2009, Ftzpatrick et al 2013, Hawthorne et al 2010, Wu et al 2010), patient satisfaction (Deakin et al 2009, Hawthorne et al 2010, Jackson et al 2006), patient activation (Asante et al 2013, Fitzpatrick et al 2013), perceived (social) support (Dale et al 2012, Jackson et al 2006), quality of life (Duke et al 2009), perceived barriers (Dale et al 2012), family climate (Armour et al 2005), physician trust (Glazier et al 2006), patient-provider communication (Glazier et al 2013), and usability (El-Gayar et al 2013) (Appendix 3). However, it is important to note that these outcomes were not listed as primary outcomes of interest in any review, and very little detail (if any) was provided regarding the individual tools used (including details of validation, psychometric properties or testing).

Quality of the evidence

For this review, inter-rater reliability of the critical appraisal process (for AMSTAR individual items) was established by each of the two reviewers individually critically appraising a random sample of five included systematic reviews (98.5% consistency). The list of remaining systematic reviews (n=24) were divided between the two reviewers and appraised, with queries relating to individual items resolved by discussion and consensus. Included studies varied in the number and type of AMSTAR items met (Table 4), with Cochrane reviews satisfying most of the eleven AMSTAR criteria (Baumeister et al 2012, Deakin et al 2009, Duke et al 2009, Nield et al 2007, Pal et al 2013 - shaded in blue).

Table 4 Critical appraisal of included reviews

Review	AMSTAR tool items										
	1	2	3	4	5	6	7	8	9	10	11
Ellis et al 2004	Y	Y	Y	Y	N	Y	N	N	Y	N	N
Montori et al 2004	Y	CA	Y	Y	N	Y	N	N	N	N	N
Armour et al 2005	Y	Y	Y	N	N	Y	Y	CA	Y	N	Y
Glazier et al 2006	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y
Jackson et al 2006	Y	Y	Y	Y	N	Y	N	N	Y	N	Y
Shojania et al 2006	Y	CA	Y	Y	N	N	N	N	Y	Y	N
Winkley et al 2006	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Nield et al 2007	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Whittemore et al 2007	Y	N	Y	Y	N	Y	N	N	N	N	N
Loveman et al 2008	Y	N	Y	N	Y	Y	Y	Y	Y	N	Y
Deakin et al 2009	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Duke et al 2009	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Hawthorne et al 2010	CA	Y	Y	N	N	Y	Y	Y	Y	CA	Y
Minet et al 2010	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Wu et al 2010	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Jayasekara et al 2011	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y
Liang et al 2011	Y	Y	Y	Y	N	Y	N	N	Y	Y	N
Amaeshi et al 2012	Y	N	Y	N	N	Y	Y	N	NA	N	N
Avery et al 2012	Y	Y	Y	Y	N	Y	Y	Y	Y	CA	N
Baumeister et al 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dale et al 2012	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y
Elliott et al 2012	Y	N	Y	Y	N	Y	N	N	Y	N	N
Omran et al 2012	Y	N	Y	N	N	Y	Y	Y	Y	N	Y
Asante et al 2013	Y	N	Y	N	N	N	Y	Y	Y	CA	N
El-Gayar et al 2013	Y	Y	Y	N	N	N	N	N	Y	N	Y
Elissen et al 2013	Y	CA	Y	Y	N	Y	Y	Y	Y	N	N
Fitzpatrick et al 2013	Y	Y	Y	N	N	Y	N	N	Y	N	Y
Pal et al 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

CA = can't answer, N = no, NA = not applicable, Y = yes.

Question 1

What is consumer-centred care in diabetes?

Information regarding the specific consumer-centred approaches and strategies used in interventions with people with diabetes are presented in Question 2 below. Most approaches/strategies aimed to inform or educate people with diabetes, or support behaviour change (Table 5).

Question 2

What approaches and/or strategies have been used to engage with consumers in implementing consumer-centred care for people with diabetes? Have these approaches and/or strategies employed the use of diabetes educators and/or credentialed diabetes educators?

The approaches or strategies used to engage with consumers in implementing consumer-centred care for people with diabetes varied considerably in their content, format and scope, the ways in which they are delivered, length of exposure, duration of the intervention, and the personnel involved (Table 5). Education was an integral component of any consumer-centred strategy, and was often used in combination with other strategies such as behavioural interventions and/or psychological approaches. The most commonly reported formats or modes of delivery were face-to-face, phone calls or web-based, delivered by a health practitioner or a multi-professional team of medical practitioners, dieticians/nutritionists, diabetes nurse, community health workers and educators. There were almost an equal number of reviews which reported one-on-one approach, group approach or a combination of both. Some reviews reported strategies which utilised passive means of delivering the intervention such as didactic lecture or dissemination of printed information, whereas others used a more interactive approach or both. The duration of the intervention and length of exposure varied from as little as one single session to as long as 18 months of continuous contact or eight years of contact with break periods. As there was significant heterogeneity in the consumer-engagement strategies, the different interventions were categorised based on their outcome focus and core elements: *educational interventions, interventions with behavioural change and/or psychological components, family or peer-support based interventions, technologically-enabled programmes or telecare, and culturally-competent/appropriate interventions.* Table 5 presents an overview of the characteristics of consumer-centred care approaches / strategies reported in included systematic reviews, and identifies the specific components of consumer-centred care addressed.

For this report, the evidence base for every category is presented, and where reported, the nature, setting, format or mode of delivery, intensity, frequency and duration of the specific strategies are also described.

Educational interventions

The reviews grouped under this category reported interventions which focused on providing education, alone or in combination with other interventions, to improve self-management of diabetes.

Ellis et al (2004) examined the effects of patient education on glycated haemoglobin. The interventions varied in the techniques used for education, including a didactic teaching method, dictated goal setting, a goal setting negotiated teaching method, situational problem solving, cognitive reframing interventions, and a combination of teaching methods. The contents are also diverse, with many studies reporting education about diet, exercise, self-monitoring of blood glucose, basic diabetes knowledge, medication adherence, and psychosocial topics. The duration and number of interventions ranged from one month to one year and from one to 36 episodes, respectively.

Jackson et al (2006) synthesised the literature to determine how interactive IT has been used to enhance care for adults with type 2 diabetes. Generally, the included studies sought to evaluate the effectiveness of technology-enabled programs to improve diabetes education, clinical outcomes, patients' perceived quality of life and support, as well as patient and provider processes of care (visits, testing, and documentation of adherence). The studies focused on three different categories of IT interventions, namely, internet, telephone and computer-assisted integration of clinical information. The studies in the internet category used interactive web technology to enhance patient self-management and clinical management by providing diabetes education and feedback of resulting data. Articles in the telephone category used interactive, automated telephone calls and telemedicine to enhance patient self-management through self-care education calls and feedback of self-monitored information to the provider. Articles in the computer-assisted integration of clinical information category consisted of computerized patient education and interventions that integrated electronic practice guidelines, reminder systems, and feedback of clinical data to enhance both self and clinical management. All 3 categories included technology focusing on self and/or clinical management and differed mainly by their mode of delivery.

Shojania et al (2006) explored the effects of a range of quality improvement strategies on glycaemic control for people with type 2 diabetes. Most interventions involved educational components, however other commonly used strategies included case management, team management and clinician education (Table 5). Multidisciplinary teams were most commonly involved in each of the intervention strategies, and the professionals most commonly reported were nurses, pharmacists, and dieticians).

Nield et al (2007) assessed the effectiveness of dietary advice to adults with type 2 diabetes on a range of outcomes. Half of the included studies (n=9 of 18) compared the effects of two different types of diabetic dietary advice (i.e. exchange diets versus non-exchange diets; such as reduced-fat, reduced-carbohydrate, calorie-restriction), while others included interventions where dietary advice was provided in conjunction with exercise or behavioural approaches. The delivery/format of interventions, and health professionals involved, were not described in this review.

Loveman et al (2008) determined the effectiveness of patient education on multiple aspects of diabetes self-management. The majority of included studies reported using a group education format. The hours of contact ranged from 2.5 hours (in a 6-month intervention) to 52 hours [in a 1-year intervention]. Some interventions began with two to four intensive sessions of 90–120 minutes followed up with additional sessions. The shortest intervention was two hours and the longest consisted of approximately 30 hours of contact. The interventions also varied considerably in whether sessions were provided over a short interval or were spaced out over time. In one of the longest studies, the interventions were spread throughout a 4-year period but the timing varied among patients. The briefest interventions lasted for one month.

Deakin et al (2009) assessed the effectiveness of group-based education programs on a range of diabetes outcomes. Some interventions had adapted the Diabetes Treatment and Teaching Programme (DTTP) originally developed in Germany for adults with type 1 diabetes and is based on therapeutic patient education. Different models of educational programmes were reported including an empowerment model, an adult learning model, a public health model, a health belief model and a transtheoretical model. The number of patients for group educational programs varied, with the smallest group comprising of four to six and the largest groups comprising of 16 to 18 patients. Programs varied in duration with the least intensive being three hours per year for two years and three or four hours per year for four years. The educators were mostly health professionals including physicians, dietician, nurse, community workers, and paramedical staff. In some programs, a family member or friend was also invited to attend.

Duke et al (2009) evaluated the effectiveness of individual patient education on metabolic control, diabetes knowledge and psychosocial outcomes. The majority of interventions involved face-to-face education and covered a wide range of diabetes topics. The content of the education typically covered pathophysiology of diabetes, diabetes control through diet, diabetes control through exercise, compliance with medication, exercise and exercise regimes, glucose self-monitoring, diabetic complications, foot care, services available, motivation and behavioural strategies. The total face-to-face time varied significantly across studies, as did the frequency of the sessions and the number of months it was carried over. Most studies involved two to four hours of face-to-face time, some contained less than 2 hours, with a few involving greater than five hours of contact time. The majority of the interventions were carried out by diabetes educators and dieticians.

Minet et al (2010) examined two categories of self-care management interventions, including educational interventions (techniques based on didactic-oriented intervention focusing on the knowledge acquisition, skills and information in order to improve diabetes self-management were categorised as education) and behavioural psychosocial interventions (interventions were categorised as behavioural psychosocial if the intervention was based on cognitive, behavioural or motivational approaches, or if the study specified that the patients were receiving psychologically centred counselling involving relaxation, problem-solving, or motivational interviewing).

Amaeshi et al (2012) explored the impact of structured foot-health education intervention on self-care behaviour and the incidence of lower extremity amputation in people with type 2 diabetes. While all interventions were education-based, some involved risk assessments (with podiatrists) and behavioural contracts (with psychologists). The interventions also varied in their mode of delivery (i.e. group versus individualised one-on-one sessions), and intensity (one to eight hours, with 3-30 month follow-up).

In the Omran et al (2012) review, a range of interventions to improve adherence to oral anti-diabetic medications were considered, including an educational-based strategy, behavioural interventions, affective interventions and provider-targeted interventions. The educational-based strategy was designed to improve patient knowledge of drug therapy, explain drug side effects and methods to help minimise them, describe the risk of diabetes complications or discuss the advantages and disadvantages of adapting healthy lifestyle choices. This strategy comprised of in-person meetings between pharmacist and patient, and some printed information.

Jayasekara et al (2011) established the effectiveness of approaches to providing education to adults with diabetes using or initiating insulin pump therapy. The educational methods were diverse; major components of education and training programs were blood glucose monitoring, carbohydrate counting, adjustment of insulin dose (initial basal rates and pre-meal boluses), practical aspect of insulin pump including identification of malfunctions, prevention and management of acute complications, and lifestyle changes. Multidisciplinary teams comprising of doctors, nurses and dieticians and diabetes educators were involved in the programs. The duration and frequency of the educational intervention were adapted to suit individual needs.

Interventions with behaviour change and/or psychological components

There were seven reviews that utilised consumer-centred approaches with behaviour change and/or psychological components. Winkley et al (2006) determined the efficacy of psychological interventions on glycaemic control in people with type 1 diabetes. Specific psychological approaches were counselling, cognitive behaviour therapy, family systems therapy, and psychodynamic therapy; and the techniques used included relaxation, activity scheduling, problems solving, goal setting, contract setting, cognitive restructuring and stress management. Interventions were delivered to individuals and/or groups (average 11 sessions, range 1-25) over a mean duration of 18.25 weeks (range 1-52 weeks).

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Avery et al (2012) investigated the effect of behavioural interventions aimed at increasing physical activity and/or exercise in people with type 2 diabetes. Behaviour change theories/models underpinning the interventions varied, including at least one of the following: the Transtheoretical Model, Social Cognitive Theory, Precede/Proceed Model, Cognitive Behavioural Therapy, Motivational Interviewing. Interventions were delivered over a varying number of individual and/or group face-to-face sessions, and were at times combined with pedometer or supervised physical activity/exercise components.

Elliott et al (2012) examined the impact of cognitive behavioural therapy on glycaemic control and well-being in people with diabetes. While the details of interventions were not reported in this review, specific therapies included cognitive behavioural group training, blood glucose awareness training , and motivational enhancement therapy.

El-Gayar et al (2013) determined how IT has been used to improve self-management for adults with Type 1 and Type 2 diabetes. Internet was used commonly as a primary technology for diabetes self-management. The other studies have employed telemedicine, cellular phone, decision support, or a combination of multiple technologies. With respect to the communication patterns, the majority of included studies showed a pattern of a two-way communication. A two-way communication refers to the active involvement of both patients and clinicians in diabetes management. A feedback system based on an algorithm or a decision support component was reported in some studies.

Fitzpatrick et al (2013) reviewed the effect of problem solving interventions on diabetes self-management and disease control. The interventions reported in the individual studies varied: one was solely problem-solving based; in some studies, problem solving was one component of a larger intervention that utilised other treatment approaches; a few other studies utilised a problem solving-based support group. The interventions utilised a range of strategies including a face-to-face (individual or group) approach, phone-based, DVD-based, internet-based, and videoconferencing.

Interventions with family and/or peer-support

Five reviews adopted family and/or peer support approaches to consumer-centred care. Armour et al (2005) reviewed RCTs that described educational interventions for family members living with people with diabetes. There was a wide range of interventions included in the review, including informal education sessions, self-management training, problem solving and behavioural therapies, stress management, family therapy and group support (Table 5). The settings of interventions varied from diabetes clinics/clubs to hospital wards, and those that were offered in office/worksite-settings to others which were home-based. The duration of interventions also varied considerably among included studies (4 days – 2 years) with a large range in the total number of contact hours (i.e. duration of individual sessions ranging between 1 – 3 hours, frequency of weekly – quarterly) (Table 5).

Baumeister et al (2012) investigated the efficacy of psychological and pharmacological interventions for depression in people with diabetes. Most of the included studies (n=11 of 19, 57.9%) reported on interventions involving the use of antidepressant medication, with the duration of treatment varying between three weeks and six months. The remaining studies (n=8 of 19,42.1%) investigated a range of psychological interventions, comprising (where reported) CBT (face-to-face, web and telephone based) and psychodynamic supportive therapy (duration 3 weeks to twelve months).

In the Omran et al (2012) review, a range of pharmacist-led interventions to improve adherence to oral anti-diabetic medications were considered, including an educational-based strategy, behavioural interventions, affective interventions and provider-targeted interventions. The educational-based strategy was designed to improve patient knowledge of drug therapy, explain drug side effects and methods to help minimise them, describe the risk of diabetes complications or discuss the advantages and disadvantages of adapting healthy lifestyle choices. This strategy comprised of in-person meetings between pharmacist and patient, and some printed information.

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Dale et al (2012) summarised the evidence on the impact and effectiveness of peer support for adults with diabetes. There was considerable heterogeneity in the format and scope of the interventions, and in the ways in which peers were recruited and trained for their role. The most commonly reported formats were group face-to-face format, telephone calls in addition to a group support, phone calls alone, peer interaction over the internet and use of information kiosk.

Technologically-enabled interventions and telecare

The reviews presented in this category examined studies which investigated technologically-enabled interventions and/or telecare aimed at improving one or more diabetes-related outcomes.

Elissen et al (2013) synthesised the evidence for a wide range of multi-component chronic care management strategies for people with diabetes, including disease and case management, telemonitoring, specialist nurse interventions and shared care. The most commonly used components were delivery system designs, clinical information systems, and self-management and decision-support; and these were typically aimed at improving glycaemic control.

In their review of telecare, Montori et al (2004) included randomised controlled trials of interventions involving transmission of glucometer data and feedback by health professionals for people with type 1 diabetes. All studies used modem transmission of information as the intervention, however there was considerable variability in the frequency with which information was transmitted, ranging from nightly to monthly.

Jackson et al (2006) synthesised the literature to determine how interactive IT has been used to enhance care for adults with type 2 diabetes. Generally, the included studies sought to evaluate the effectiveness of technology-enabled programs to improve diabetes education, clinical outcomes, patients' perceived quality of life and support, as well as patient and provider processes of care (visits, testing, and documentation of adherence). The studies focused on three different categories of IT interventions, namely, internet, telephone and computer-assisted integration of clinical information. The studies in the internet category used interactive web technology to enhance patient self-management and clinical management by providing diabetes education and feedback of resulting data. Articles in the telephone category used interactive, automated telephone calls and telemedicine to enhance patient self-management through self-care education calls and feedback of self-monitored information to the provider. Articles in the computer-assisted integration of clinical information category consisted of computerized patient education and interventions that integrated electronic practice guidelines, reminder systems, and feedback of clinical data to enhance both self and clinical management. All 3 categories included technology focusing on self and/or clinical management and differed mainly by their mode of delivery.

In the review and meta-analysis by Wu et al (2010), the evidence base for telephone follow-up as an intervention for people with diabetes was evaluated. There was large variation among the included RCTs in terms of the call direction (i.e. calls to patient, calls form patient, automated calls), content (e.g. lifestyle, self-care behaviour, glucose monitoring, therapy adjustment, psychological input), purpose (i.e. clinical target versus reinforcement), and whether the health professional involved had a background specific to diabetes. For those studies that reported the call duration, this ranged from 6-8 minutes to 15-20 minutes.

Jayasekara et al (2011) established the effectiveness of approaches to providing education to adults with diabetes using or initiating insulin pump therapy. The educational methods were diverse; major components of education and training programs were blood glucose monitoring, carbohydrate counting, adjustment of insulin dose (initial basal rates and pre-meal boluses), practical aspect of insulin pump including identification of malfunctions, prevention and management of acute complications, and lifestyle changes. Multidisciplinary teams comprising of doctors, nurses and dieticians and diabetes educators were involved in the programs. The duration and frequency of the educational intervention were adapted to suit individual needs.

Liang et al (2011) evaluated the effects of mobile phone interventions on glycaemic control for people with diabetes. The interventions showcased a range of technological innovations (i.e. mobile phone and/or internet/bluetooth, diabetes interactive diary), however the most commonly used were short message SMS services to deliver blood glucose test results and/or self-management information/education. The interventions were conducted in a variety of healthcare settings (i.e. tertiary hospitals, primary care, generalist settings) and ranged in frequency from at least daily to weekly (for those studies that reported these data).

Asante et al (2013) reviewed the evidence for pharmacological and/or lifestyle interventions for promoting treatment adherence in type 2 diabetes. Interventions included individualised education, telephone interventions (telenursing), electronic pill caps, and decision aid and mnemonic devices. Typically, interventions provided education on self-care topics (e.g. adherence to medication, diet, exercise, other lifestyle modifications), were delivered by diabetes specialists or trained nurses, via telephone and/or face-to-face follow up.

El-Gayar et al (2013) determined how IT has been used to improve self-management for adults with Type 1 and Type 2 diabetes. Internet was used commonly as a primary technology for diabetes self-management. The other studies have employed telemedicine, cellular phone, decision support, or a combination of multiple technologies. With respect to the communication patterns, the majority of included studies showed a pattern of a two-way communication. A two-way communication refers to the active involvement of both patients and clinicians in diabetes management. A feedback system based on an algorithm or a decision support component was reported in some studies.

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Pal et al (2013) reviewed RCTs that described computer-based diabetes self-management interventions for people with type 2 diabetes. Interventions included those that were clinic-based, internet-based (which participants used from home) and others that used mobile devices. The interventions ran for between four to six weeks and 12 months, and ranged in frequency from one to four exposures ("doses") for studies that were prescriptive (the pattern of use in other studies was largely participant-driven).

Culturally-competent/appropriate interventions

There were three reviews which focussed on culturally competent or appropriate interventions for people with diabetes (Glazier et al 2006, Whittemore et al 2007, Hawthorne et al 2010).

Glazier et al (2006) examined patient, provider and health system interventions to improve diabetes care in adults with diabetes who belong to low socio-economic status and specific ethno-racial groups including African Americans, Mexican Americans, and Native Americans. Diabetes education was the main focus in many of the included studies; others focused on innovative health care provide roles, whereas others focused on specific aspects of diabetes-related care such as physical activity sessions, a focused education and support intervention to improve ophthalmic examinations, implementation of a visual communication tool, reminder cards for diabetes care indicators and rapid A1C testing. The educational interventions used a variety of methods including didactic lectures, skill building, problem solving, behavioural strategies, feedback, family member participation, and/or individualised assessment.

Whittemore et al (2007) investigated the efficacy of culturally competent interventions developed specifically for Hispanic adults with type 2 diabetes. Most interventions were educational in nature (+/- support meetings), and were offered in a diverse range of settings including those that were community versus clinic-based, in both rural and urban areas. The majority of interventions were interdisciplinary, involving nurses, certified diabetes educators, registered dieticians and community health workers. The number of contact hours varied considerably among included studies, ranging from 10 hours of group education over a 4 week period to 52 hours of group education and support over twelve months.

Hawthorne et al (2010) reviewed the literature on culturally appropriate health education for diabetes in ethnic majority groups. Some educational programs recognised theoretical models of behavioural change and innovative approaches such as soap dramas, storytelling, and lay workers to deliver health messages were used. A group approach was used in some studies, whereas other studies used one-to-one interviews or a mixed approach. Duration of the interventions ranged from one session to 12 months, with some studies utilising a repeated intervention design for between six and 12 weeks.

Table 5 Different approaches to consumer-centred care in people with diabetes

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
Ellis et al 2004	Educational interventions	Didactic Goal setting negotiated / dictated Situational problem solving Cognitive reframing One-on-one Group Patient with family	6 – 36 sessions 42 – 365 days 3 – 15 months (some not reported)	Outpatient	Nurse Dietician Psychologist Physician Research staff (some not specified)	✓	✓						
Montori et al 2004	Telecare (modem transmission glucometer data, clinician feedback)	Daily – every 2-4 weeks	Not reported	Not reported		✓							
Armour et al 2005	Family interventions	Didactic Responsibility sharing Informal education / semi structured discussion session, planning Individualised home care Self-management training Practical problem solving Stress management Family therapy Modifying behaviours (behaviour acquisition/strengthening) Discussion groups/family encouragement Behavioural family system therapy Group/support Partner education	1 hour – 3 hours (some not reported) 4 days – 2 years (some not reported) Weekly – 3 monthly (some not reported)	Diabetes clinic Hospital ward Home Worksite / office-based Diabetes club Smoking cessation clinic Not reported	Not reported	✓	✓		✓	✓		✓	

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
		Culturally-specific (Mexican Americans) Educational interviews/fact sheets Spousal support Behavioural weight loss Home visits for smoking cessation											
Glazier et al 2006	Patient, provider, and health system interventions (including diabetes education) to improve diabetes care among socially disadvantaged groups	Didactic lectures Skill building Problem solving Behavioural strategies Feedback Family member participation	Individualised assessment Group sessions	Community-based Primary care settings Hospital-based			✓	✓	✓				
Jackson et al 2006	Technology-enabled education programmes	Internet, telephone, and computer-assisted integration of clinical information	2 – 18 months	Web-based Nursing school Clinic	Health providers (not specified) Nursing student	✓							
Shojania et al 2006	Quality improvement strategies	Audit and Feedback; Case Management; Team Changes; Electronic Patient Registry; Clinician Education; Clinician Reminders; Facilitated Relay of Clinical Information to Clinicians; Patient Education; Promotion of Self-Management.; Patient Reminder Systems; Continuous Quality Improvement	Not reported	Not reported	GP Nurse Multidisciplinary teams Pharmacist	✓			✓				
Winkley et al 2006	Psychological therapy	Group AND/OR individual	1 – 25 sessions 1 week – 1 year weekly – monthly	Not reported	Not reported		✓	✓					

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
Nield et al 2007	Dietary advice +/- Behavioural approaches / exercise	Not reported		Clinic and / or community based	Not reported	✓			✓				
Whittemore et al 2007	Culturally-competent interventions	Group setting Individual (1 study)	2-2.5 hours – 4 hours Monthly support meetings 4 – 6 weeks	Community setting Rural	Diabetes Educator Nurse Dietician Community health worker	✓						✓	
Loveman et al 2008	Specialist nurse-led interventions	Automated/follow-up telephone calls Nurse-led changes to treatment regimens	Weekly – every 2 weeks (not specified) Individualised	Primary care Hospital based	Specialist nurses / Nurse Practitioners Diabetes nurses Case manager Physicians Multidisciplinary team	✓							
Deakin et al 2009	Group-based educational programmes	Not reported	3-4 – 16 hours weekly - quarterly 4-10weeks – 2 years	Primary care Hospital diabetes centres	Health professionals Multidisciplinary Physicians Lay health advisors	✓							
Duke et al 2009	Individual education	Face-to-face	20 minutes - 7 hours	Not specified	Diabetes Educators Dieticians Link worker (non-medical)	✓							
Hawthorne et al 2010	Culturally appropriate education	Group AND/OR individual	Biweekly – monthly	Community clinics Home	Dietician Physiotherapist								

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
			6 weeks – 9 months 1 hour – 2 hours	Hospital GP practices Primary care	Peer leader / Link worker Nurse Diabetes nurse								
Minet et al 2010	Self-care management interventions Education / counselling Behavioural psychosocial techniques Telecare / telephone support	Individual AND/OR group based	1 – 12 sessions 3 months – 8 years		Diabetes nurse specialist Nurse case manager Dietician Pharmacist Exercise physiologist Multidisciplinary team Community health worker Researcher Peer counsellor Physician Trained interventionist	✓			✓	✓			
Wu et al 2010	Telephone follow-up	Telephone	3-5 minutes – 20 minutes Bi-weekly – 3 months 6 – 18 months	General medical centres Diabetes specialty clinic Primary Care Centre	Nurse Diabetes Nurse Psychology student				✓				
Jayasekara	Insulin-pump therapy	Information sessions	45 mins – 8	Outpatient	Diabetes educator	✓							

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
et al 2011	education	Individual AND/OR group	hours 7 days – 4 months	Others not specified	Diabetes nurse Dietician								
Liang et al 2011	Mobile phone interventions (reinforcement of disease/lifestyle management)	Short message SMS Personalised SMS Internet +/- other intervention strategies	Daily - weekly	Not reported	Not reported	✓			✓				
Amaeshi et al 2012	Foot health education	One-to-one; AND/OR Groups sessions	15 mins – 23 hours 1 month – 2 years	Home, outpatients, ED, specialist clinics, care homes, not reported	Podiatrist Psychologist								
Avery et al 2012	Behavioural interventions	Face-to-face, telephone Individual AND/OR group sessions	Daily – 6 monthly 8 weeks – 2 years	Clinical / community settings	GP Diabetes Educator Nurse Dietician / Nutritionist Exercise physiologist Personal Trainer Physiotherapist Psychologist				✓				
Baumeister et al 2012	Psychological / pharmacological treatments	Face-to-face, telephone or web-based Individual, group or family therapy	3 weeks – 12 months	Outpatients	Psychologist				✓	✓			
Dale et al 2012	Peer-support interventions	Group based	6 weeks – 2 years	Clinic-based Community	Health professionals				✓	✓			

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
	Telecare E-newsletters, real time online chat				Peers								
Elliott et al 2012	Cognitive behavioural therapy	Not reported	Not reported	Diabetes centres Outpatient clinics	Not specified				✓				
Omran et al 2012	Pharmacist interventions Educational components Behavioural interventions Affective interventions	Individual Telephone / pamphlets	Not reported	Ambulatory care settings Community health centres Hospital wards Community pharmacies	Pharmacist	✓			✓		✓		
Asante et al 2013	Adherence promoting interventions (pharmacologic, lifestyle modification)	Telephone interventions / telenursing Micro electronic monitoring system Face-to-face, telephone	15 - 30 mins 4 weeks – 1 year Weekly – quarterly (some not reported)	Home based (some not reported)	Diabetes Educator Nurse Diabetes Specialist				✓		✓		
El-Gayar et al 2013	IT-based interventions	Internet Phone Decision support Telemedicine	Not reported	12 hours – 60 months	Not reported				✓				
Elissen et al 2013	Disease / case management	Not reported	3 – 42 months	Primary and secondary care	GP Nurse		✓		✓				

Review	**Characteristics of consumer-centred care approaches / strategies in included systematic reviews**					**Taxonomy of interventions directed at consumers (Cochrane 2012)**							
	Type	***Delivery / format***	***Duration / intensity / dose***	***Setting***	***Health professionals***	***Inform or educate***	***Facilitate communication and decision making***	***Teach skills***	***Support behaviour change***	***Support***	***Minimise risk / harms***	***Improve health care equity***	***Involve consumers at systems level***
	Telemonitoring, specialist nurse interventions, shared care			clinics, community settings, outpatients, community pharmacy practice sites	Multidisciplinary care teams Pharmacist Case manager								
Fitzpatrick et al 2013	Problem solving interventions Psychotherapy / counselling / couples therapy / pharmacotherapy	Individual AND/OR group Internet / DVD, face-to-face	10 mins - 2.5 hours 2.5 days - 12 months	Community Others not specified	Nurse specialist Nurse Peer-led		✓		✓	✓			
Pal et al 2013	Computer-based self-management interventions	Clinic-based Peer support / education online Internet-based / home	4-6 weeks - 12 months (participant driven)	Not reported	Clinic-based Peer support / education online Internet-based / home	✓				✓			

Question 3 **What are the outcomes of approaches and/or strategies used to engage with consumers in implementing consumer-centred care for people with diabetes?**

The outcomes of approaches and/or strategies (i.e. interventions) used to engage with consumers in implementing consumer-centred care for people with diabetes varied among the included reviews ranging from those that favoured the intervention to others where the effects were inconclusive. There were no studies where outcomes favoured the control or comparator condition. Due to the heterogeneity of included reviews, summaries of the main findings and authors' conclusions are presented for each main outcome category according to whether results favoured the intervention or were inconclusive.

Clinical outcomes

There were 25 reviews that evaluated the effect of approaches and strategies on clinical outcomes, and these were predominantly measures of metabolic control (Appendix 4). Of these, 15 reviews (53.6%) reported that metabolic/glycaemic control outcomes (e.g. HbA1c, blood glucose levels) favoured the intervention groups, particularly in the short-term (e.g. at 3 month follow-up). The magnitude of improvement ranged from small to large (Fitzpatrick et al 2013, Minet et al 2010). Trends in outcomes for blood pressure, cholesterol, triglycerides/lipids, BMI/weight/waist circumference were less consistent among the included reviews (Appendix 4).

Knowledge

Knowledge was evaluated in 11 reviews (Appendix 5). Relatively consistent (n=5 reviews) and substantial (standardised mean differences 0.46 to 1.0) improvements in diabetes knowledge was reported for people with diabetes in the short (e.g. 3-6 months) and longer-term (e.g. 12-14 months).

Self-management behaviours

Fourteen reviews evaluated the effect of approaches and strategies on a range of self-management behaviours (Appendix 6). The results were inconsistent and varied for most outcomes, but particularly for physical activity (Dale 2012, Fitzpatrick et al 2013) and medication adherence (Omran et al 2012). The summary of reviews that were specific to the diabetes population included positive effects for diet and global diabetes adherence (Fitzpatrick et al 2013).

Quality of life

Quality of life was evaluated in seven reviews but relevant findings were reported in only two (Appendix 7). The conclusions able to be drawn were limited by the heterogeneity of included studies (Omran et al 2012).

Health care costs and health service usage

There were ten reviews that evaluated health care costs or health service usage for people with diabetes (Appendix 8). Summaries of findings among the majority of reviews indicated a positive trend towards reduced health care costs (Deakin et al 2009) and improved health service utilisation (Jackson et al 2006). The findings of the remaining reviews were predominantly limited by a lack of data and methodological issues in small numbers of included studies.

Psychosocial outcomes

Fourteen reviews evaluated psychosocial outcomes for people with diabetes following consumer-engagement interventions (Appendix 9). Overall, findings were promising for depression (Dale et al 2012, Fitzpatrick et al 2013), empowerment / self efficacy (Dale et al 2012), health care attitudes (Jackson et al 2006), and the provision of support (Dale et al 2012). However, the specific effects of different models of peer support were unable to be determined by Dale et al (2012), and limited numbers of eligible studies precluded meta-analysis in the review by Duke et al (2009).

Diabetes complications

Inconclusive findings were reported among the eight reviews that evaluated the effects of interventions on the prevalence or risk of diabetes complications (Appendix 10). Given the current research literature in this area, it is not possible to comment on whether an association exists between consumer-engagement strategies and the prevalence of diabetes complications.

Other outcomes

Eight reviews evaluated the efficacy of interventions across a range of other outcomes (Appendix 11), however only three reviews reported relevant results. There were favourable outcomes following the use of information technology for health-care purposes for most outcomes (El-Gayar et al 2013), but particularly for behaviours, attitudes, knowledge and skills (Jackson et al 2006).

Question 4

What are the characteristics of effective approaches and/or strategies aimed at engaging with consumers with diabetes when implementing consumer-centred care?

Figure 2 summarises the characteristics of effective approaches to engaging with people with diabetes in implementing consumer-centred care.

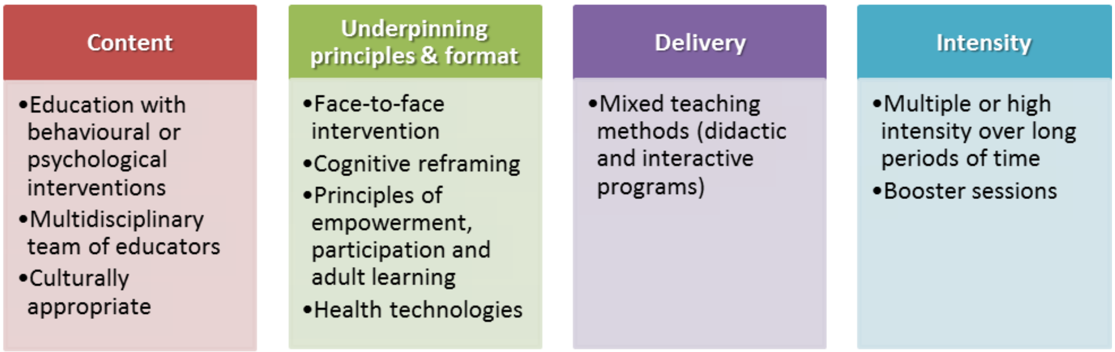

Figure 2 Effective approaches to consumer-engagement

Content

Education combined with cognitive reframing and exercise was most effective for increasing knowledge and achieving physiologic control of diabetes (Ellis et al 2004). Successful interventions for consumer-engagement generally consisted of patient education, problem solving training sessions, engaging patients in skills building (e.g. self-management skills), and counselling of individuals with diabetes (Loveman et al 2008; Fitzpatrick 2013) or their families (Armour et al 2005).

Educational interventions linked to positive health outcomes consist of multiple components (Loveman et al 2008), and were structured and delivered by a multidisciplinary team of educators (e.g. nurse educators, pharmacists, community health workers, dieticians, diabetes educators) trained to facilitate a diabetes education program (Deakin et al 2009, Loveman et al 2008. Education delivered with some degree of reinforcement of that education made at additional points of contact provided the best opportunity for improvements in patient outcomes (Loveman et al 2008). A standardised diabetes education that is accessible to all diabetes patients was also proposed (Qingping 2N11).

Culturally appropriate interventions that are tailored to the needs of the patients was highlighted in the literature as fundamental to an effective intervention for engaging with consumers (Glazier et al 2006).

Underpinning principles and format

Diabetes education that relies on face-to-face interaction enhanced communication and was more likely to be successful (Ellis et al 2004, Armour et al 2005). Educational models that utilised cognitive reframing as a method for teaching tend to promote psychosocial interaction and require patients to be more engaged in the process, potentially leading to better outcomes (Ellis et al 2004). Use of principles of empowerment, participation and adult learning proved effective for delivering education and teaching self-management skills (Deakin et al 2009).

Use of health technologies including cellular phones and internet or web-based interventions were used to engage with consumers (El-Gayar et al 2013). However, not all patients were motivated to incorporate technology in their daily routine (El-Gayar et al 2013). Providing appropriate incentives (El-Gayar et al 2013), fitting the technology to the needs, viewpoints, experiences and requirements of the patient (El-Gayar et al 2013), and increasing user-friendliness can increase its use (El-Gayar et al 2013).

Delivery

Mixed teaching methods (i.e. didactic and interactive programs) appeared more effective than either didactic or interactive method alone in improving knowledge, physiologic control or self-management behaviour. Glazier (2006) argued that those interventions that used mainly didactic teaching that focused only on diabetes knowledge are associated with negative outcomes.

Intensity

Multiple or high intensity interventions delivered over a long period of time enhanced the effectiveness of interventions and helped sustain the beneficial effects of educational programmes (Glazier 2006; Fitzpatrick 2013). Fitzpatrick (2013) proposed approximately four or more sessions, while Glazier (2006) suggested more than 10 contact times for a period of at least six months to achieve positive effects. Providing additional sessions (i.e. booster sessions) on an annual basis has long lasting benefits and helps maintain the desired changes (Deakin et al 2009).

Identified gaps in the literature

Within this body of literature, several research gaps were identified, including:

- Lack of consistency in consumer-centred and diabetes management nomenclature and meaning (including a lack of specificity among included reviews regarding the credentialing of diabetes educators as per the Australian model)
- Large range of variability in the nature of interventions and outcome measures used
- No studies specifically aimed at investigating the success rate of different and specific individual components of interventions/approaches/strategies (e.g. randomised controlled trials with a number of treatment arms/control)

Conclusion

The evidence from a range of literature sources has been summarised using the NHMRC Body of Evidence Matrix (NHMRC 2009). This framework considers different dimensions of research evidence and ranks them accordingly.

After considering various dimensions of evidence underpinning the rapid review questions, the overall body of evidence using this matrix was **B**.

The message for Australian Diabetes Educators/Credentialed Diabetes Educators is to build on the current evidence related to interactive, multi-model, multidisciplinary education to genuinely engage consumers in care partnerships that support both clinical care, and the majority of care that is delivered through self-management by people with diabetes and their families.

Component	Evidence Grading
Evidence base *The evidence base is assessed in terms of the quantity, level and quality (risk of bias) of the included studies.*	A
Consistency *The consistency component of the 'body of evidence' assesses whether the findings are consistent across the included studies.*	C
Clinical impact *Clinical impact is a measure of the potential benefit from application of the findings to a population.*	B
Generalisability *This component covers how well the subjects and settings of the included studies match those of the recommendations.*	B
Applicability *This component addresses whether the evidence base is relevant to the Australian healthcare setting generally.*	A

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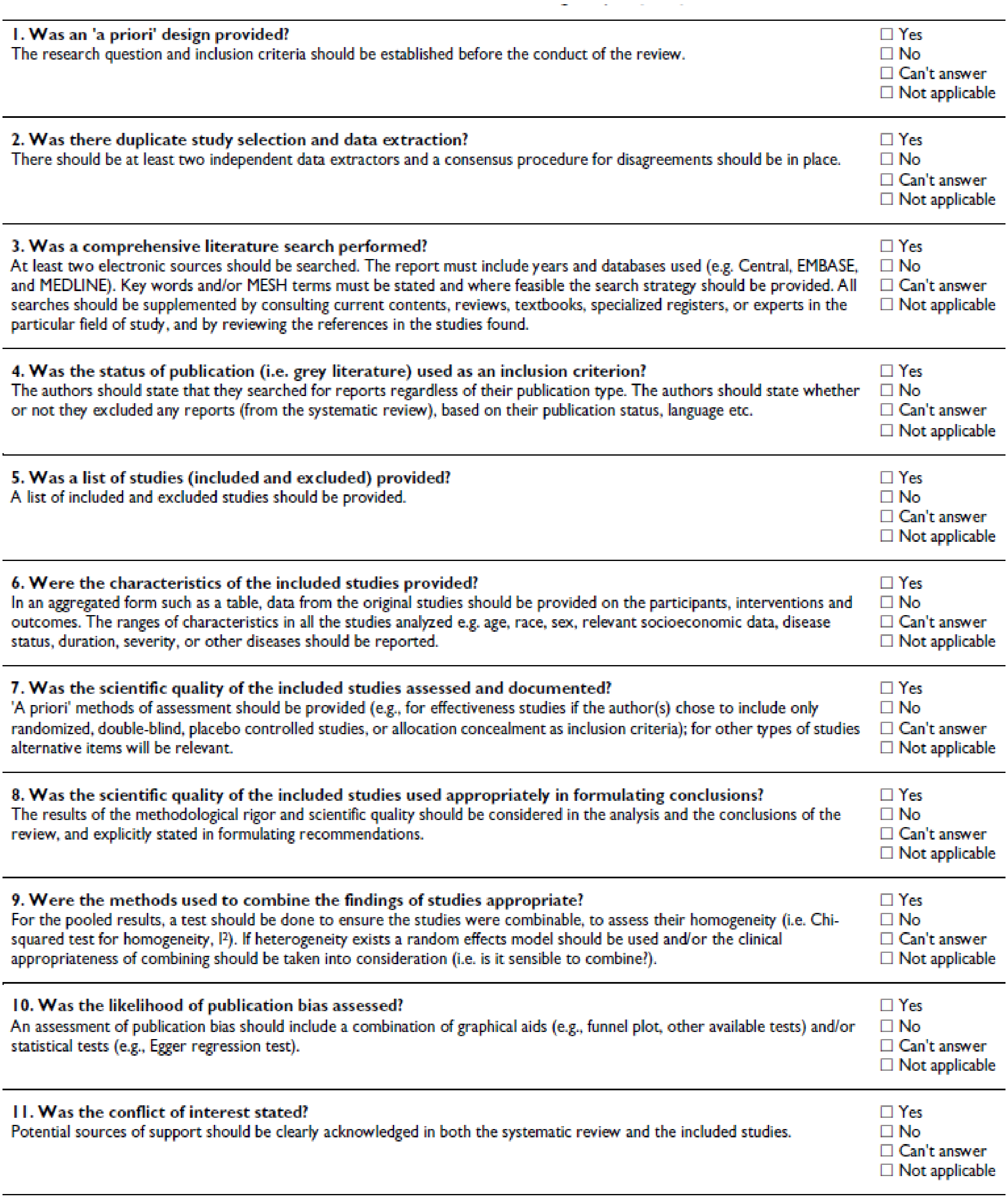
APPENDIX 1

COCHRANE TAXONOMY OF INTERVENTIONS DIRECTED AT CONSUMERS (Lowe et al 2011)

Taxonomic categories and definition	*Examples of interventions*
To inform and educate Strategies to enable consumers to know about their treatment and their health. Interventions include those to educate, provide information, or to promote health or treatment. Interventions can be provided to individuals or groups, in print or verbally, or face to face or remotely. Interventions may be simple, such as those seeking solely to educate or provide information; or complex, such as those to promote or manage health or treatment as part of a multifaceted strategy.	• Written medicines information • Patient information materials • Generic or tailored patient education
To support behaviour change Strategies focussing on the adoption or promotion of health and treatment behaviours, such as adherence to medicines. Interventions may address behaviour change for the under-use, overuse or misuse of medicines, and may include practical strategies to assist consumers in taking their medicines correctly such as reminder devices, pre-packaging of multiple medicines, or different or simplified medicine formulations.	• Reminder devices • Patient reminders or recall systems • Pre-packaged medicines • Simplified dosing regimens • Pharmacist-led services for patients • Oral versus injected medicines
To teach skills Strategies focussing on the acquisition of skills relevant to medicines use. Interventions aim to assist consumers to develop a broad set of competencies around medicines use and health, such as medicines management or monitoring; or training consumers in the correct use of treatments or devices to deliver treatment.	• Medicines management strategies • Training sessions with providers • Self-management programs • Problem solving skills training • Self-monitoring
To facilitate communication and/or decision making Strategies to involve consumers in decision making about medicines. Interventions include those that aim to help consumers make decisions about medicines use, such as interventions to encourage consumers to express their beliefs, values and preferences about treatments and care; and/or to optimise communication with consumers about medicines use and related issues.	• Decision aids • Communication skills training • Delayed prescribing practices • Written action plans • Written question lists for pharmacists
To support Strategies to provide assistance and encouragement to help consumers cope with and manage their health and related medicines use. Interventions can target patients or carers, as individuals or n groups, and may be delivered face to face or remotely.	• Counselling • Therapy (motivational interviewing, family • interventions, cognitive behavioural therapy) • Group programs • Peer support programs
To minimise risks and harms Strategies specifically focussing on preventing or managing adverse events of treatment and complications of disease. Interventions can be for ongoing treatment or related to emergency or crisis events. Strategies aim to minimise risks or harms at an individual or at a population level, such as reducing use of antibiotics, or augmenting immunisation uptake.	• Consumer reporting of adverse events • Harm reduction training • Mass mailings for immunisation uptake • Medicines review to reduce adverse events
To involve consumers at the systems level Strategies to involve consumers in decision making processes on medicines prescribing and use at a system level, such as in research planning, formulary and policy decisions. Interventions can involve consumers in different roles, such as planning, research, audit and review and governance.	• Policy or guideline committee involvement • Peer review for government and non-government research • Consumer involvement in the development of patient medicines information
To improve health care quality Strategies to improve the total package, coordination or integration of care delivered. Interventions can involve substitution or expansion of one type of care, such as interventions that aim to overcome system barriers to medicines use, including access and financial barriers.	• Collaborative care • Pharmaceutical care plan and follow-up • Financial incentives for patients • Financial or formulary interventions • Lay health mentoring

APPENDIX 2

AMSTAR Critical Appraisal Tool



1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable

APPENDIX 3

Summary of outcomes assessed in included reviews

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	Function							
Ellis et al 2004	Glycemic control – HbA1c								
Montori et al 2004	HbA1c								
Armour et al 2005	Glycated haemoglobin (GHb)		Knowledge	Compliance with therapeutic regimen		Cost-effectiveness	Family climate		Smoking consumption
Glazier et al 2006	Glycosylated haemoglobin, weight/BMI, lipids, blood pressure, eye examination, diabetes care indicators	physical activity	Diabetes knowledge				Physician trust		
Jackson et al 2006	HBA1c body weight, blood pressure, microalbumin, creatinine, lipids, hematocrit values		patients' understanding of their medical condition (knowledge)	Self-report & documentation of diabetic crises Personal health care patient skills (interventions easy to use & understand)	QOL	Hospitalisations Primary care visits Foot exams Eye exams HBA1c tests Costs (associated with interventions)	Depression Perceived support		Rate of completion of intervention Patient satisfaction (with intervention)
Shojania et al 2006	HbA1c								
Winkley et al 2006	Glycated haemoglobin						Psychological distress		

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	**Function**							
Nield et al 2007	Glycated haemoglobin Body weight Serum cholesterol (LDL / HDL) Blood pressure	Maximal exercise capacity (VO_2 max)		Anti-diabetic medication use Compliance	QOL			Development of microvascular and macrovascular diabetic complications (including neuropathies, retinopathy, nephropathy and cardiovascular diseases)	Mortality
Whittemore et al 2007	Glycaemic control HbA1c Lipids Blood pressure BMI		Diabetes-related knowledge	Exercise behaviour Dietary behaviours					
Loveman et al 2008	glycated haemoglobin, blood pressure, BMI/weight, cholesterol and triglycerides								
Deakin et al 2009	PRIMARY Glycated haemoglobin (%) and fasting blood glucose (mmol/L) Body weight (Kg)/body mass index (BMI)(Kg/m2); SECONDARY • Blood pressure (systolic/diastolic) (mmHg); • Lipid profile (total cholesterol, HDL		Diabetes knowledge		Quality of life		Empowerment/self-efficacy	Diabetes complications (myocardial infarction, angina, heart failure, stroke, renal failure, neuropathy, retinopathy, peripheral vascular disease); Diabetes-related mortality (death from myocardial	Patient treatment satisfaction

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	Function							
	cholesterol, LDL cholesterol, triglycerides) (mmol/L);							infarction, stroke, peripheral vascular disease, renal disease, hyper- or hypoglycaemia or sudden death; • Adverse effects e.g. increased hypoglycaemia.	
Duke et al 2009	HbA1c physical measures (body mass index (BMI, kg/m2), weight (kg), blood pressure (systolic and diastolic (mmHg)); metabolic (lipids - total cholesterol (mmol/L), HDL cholesterol (mmol/L), LDL cholesterol (mmol/L), triglycerides (mmol/L)).		Diabetes knowledge	patient self-care behaviours (dietary habits, physical activity levels) self management skills (medication administration, use of equipment);	QOL	health service utilisation and health care costs (admission and readmission rates, average length of stay, visits to the general practitioner and the emergency department).	psychosocial outcomes (quality of life, psychological problems such as depression);	diabetes complications (eg retinopathy, nephropathy, neuropathy, lower limb amputation, cardiovascular disease	
Hawthorne et al 2010	biomedical measures of glycated haemoglobin (HbA1c) and blood pressure (BP). body mass index (BMI), lipid levels,		validated questionnaires of knowledge of diabetes and its management.		a patient-oriented measure of quality of life as measured using validated tools	acute hospital admissions, health economic assessments	Patient attitude empowerment and self efficacy	recorded long-term diabetic complications mortality rates, episodes of hypoglycaemia.	Patient satisfaction
Minet et al 2010	HbA1c								
Wu et al 2010							Self-efficacy		

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	**Function**							
							Depression		
Jayasekara et al 2011	Glycaemic control measured by glycated haemoglobin concentration (HbA1c-level) and/or fasting plasma glucose level • Continuous blood glucose monitoring • Body mass index and weight		Insulin pump knowledge					Episode of diabetic ketoacidosis (DKA) • Frequency and severity of hypoglycaemia • Frequency of admission/presentation/contact with healthcare professionals for blood glucose level problems • Frequency of site complications (including infection)	
Liang et al 2011	HbA1c								
Amaeshi et al 2012			Foot-care knowledge	Compliance with recommended foot-care routines		Physician practice pattern	Self-efficacy	Rate of lower extremity amputation Ulceration rates Incidence of dermatological problems Incidence surgical procedures	
Avery et al 2012	HbA1c BMI			Objective / self-report physical activity / exercise					
Baumeister et al 2012						Healthcare costs	Anxiety Depression		

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	Function							
Dale et al 2012	HbA1c BP Cholesterol Symptoms of hypo- & hyperglycemia BMI/weight/body fat/waist measurement	Fatigue	Knowledge outcomes	Physical activity/fitness Glucose monitoring Diet Insulin therapy		Clinic & communication visits	Self-efficacy Depression/health distress Perceived social support		Perceived barriers acceptability
Elliott et al 2012	HbA1c BMI Fasting blood glucose			Eating behaviours			Anxiety Depression		
Omran et al 2012	fasting blood glucose, blood pressure, cholesterol, BMI			Medication adherence (as measured by patient self-report, pharmacy refill records or pill counts or more than one method)	Quality of life	Health expenditure		10-year risk of cardiovascular event	
Asante et al 2013	Blood glucose level HbA1c Systolic BP		Knowledge Problem solving	Diet / exercise Medication use Foot care			Perceived barriers to medication adherence Patient activation Perceived social support / benefit		
El-Gayar et al 2013	HbA1c BMI BP			Behaviour – intake of healthy food Healthy behaviour Physical activity	QOL		Depression, anxiety & mental disorder		Usability Composite rating

Review	Clinical outcomes		Knowledge	Self-management behaviour	Quality of life	Healthcare cost/health service use	Psychosocial outcomes	Diabetes complications	Others
	Physiological	**Function**							
	Glucose values Fasting plasma glucose Weight Insulin (dose) LDL								
Elissen et al 2013	HbA1c Systolic blood pressure			Eye examinations Foot examinations					
Fitzpatrick et al 2013	HbA1c, total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), systolic blood pressure, diastolic blood pressure, weight, BMI, waist circumference, and symptoms of hypo/hyperglycaemia			diet, exercise, self-monitoring of blood glucose, medication adherence, problem solving skill or process			self-efficacy, patient activation, depression, patient-provider communication		
Pal et al 2013	Blood pressure BMI Lipids Hypoglycaemia					Cost-effectiveness and economic data		Adverse effects	Covariates / effect modifiers / confounders: Computer literacy Attrition

APPENDIX 4

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on clinical outcomes, mapped according to whether results favoured the intervention or were inconclusive

Study	**Clinical outcomes**	
	Favoured intervention	**Inconclusive effect**
Ellis et al 2004	Twenty-eight educational interventions (n = 2439) were included in the analysis. The net glycaemic change was 0.320% lower in the intervention group than in the control group. Meta-regression revealed that interventions which included a face-to-face delivery, cognitive reframing teaching method, and exercise content were more likely to improve glycaemic control. Those three areas collectively explained 44% of the variance in glycaemic control. Current patient education interventions modestly improve glycaemic control in adults with diabetes. These three components of educational interventions may predict an increased likelihood of success in ameliorating glycaemic control.	
Montori et al 2004	Meta-analysis of seven randomized trials of adult patients with type 1 diabetes found a 0.4% difference (95% CI 0–0.8) in HbA1c mean change from baseline between the telecare and control groups.	
Armour et al 2005	Searches identified 19 randomized controlled trials. Positive effect sizes for family interventions on knowledge were demonstrated {0.94 [95% confidence interval (CI) 0.67, 1.82]} for five studies (*N*= 217). A beneficial effect of interventions on GHb for eight studies (*N*= 505) was also observed using meta-analysis [−0.6 (95% CI−1.2,−0.1)].	
Glazier et al 2006		Interventions (patient, provider, and health system interventions to improve diabetes care) for socially disadvantaged populations can be effective and have the potential to reduce health disparities in diabetes care and outcomes; key intervention features may predict success.
Jackson et al 2006		There were 26 studies (27 reports): internet (n=6; 3 RCTs), telephone (n=7; 4 RCTs), and computer-assisted integration of clinical information (n=13, 7 RCTs). The median (range) sample size was 165 (28 to 6,469 participants) for patients and 37 (15 to 67) for providers; the median duration was 6 (1 to 29) months. Ethnic minorities or underserved populations were described in only 8 studies. Six of 14 interventions demonstrated moderate to large significant declines in haemoglobin A1c levels compared with controls.

Study	**Clinical outcomes**	
	Favoured intervention	**Inconclusive effect**
Shojania et al 2006	Fifty randomized controlled trials, 3 quasi-randomized trials, and 13 controlled before-after trials met all inclusion criteria. Across these 66 trials, interventions reduced HbA1c values by a mean of 0.42% (95% confidence interval [CI], 0.29%-0.54%) over a median of 13 months of follow-up. Trials with fewer patients than the median for all included trials reported significantly greater effects than did larger trials (0.61% vs 0.27%, *P*=.004), strongly suggesting publication bias. Trials with mean baseline HbA1c values of 8.0% or greater also reported significantly larger effects (0.54% vs 0.20%, *P*=.005). Adjusting for these effects, 2 of the 11 categories of QI strategies were associated with reductions in HbA1c values of at least 0.50%: team changes (0.67%; 95% CI, 0.43%-0.91%; n=26 trials) and case management (0.52%; 95% CI, 0.31%-0.73%; n=26 trials); these also represented the only 2 strategies conferring significant incremental reductions in HbA1c values. Interventions involving team changes reduced values by 0.33% more (95% CI, 0.12%-0.54%; *P*=.004) than those without this strategy, and those involving case management reduced values by 0.22% more (95% CI, 0.00%-0.44%; *P*=.04) than those without case management. Interventions in which nurse or pharmacist case managers could make medication adjustments without awaiting physician authorization reduced values by 0.80% (95% CI, 0.51%-1.10%), vs only 0.32% (95% CI, 0.14%-0.49%) for all other interventions (*P*=.002)	
Nield et al 2007		Thirty-six articles reporting a total of eighteen trials following 1467 participants were included. Dietary approaches assessed in this review were low-fat/high-carbohydrate diets, high-fat/low-carbohydrate diets, low-calorie (1000 kcal per day) and very-low-calorie (500 kcal per day) diets and modified fat diets. Two trials compared the American Diabetes Association exchange diet with a standard reduced fat diet and five studies assessed low-fat diets versus moderate fat or low-carbohydrate diets. Two studies assessed the effect of a very- low-calorie diet versus a low-calorie diet. Six studies compared dietary advice with dietary advice plus exercise and three other studies assessed dietary advice versus dietary advice plus behavioural approaches. The studies all measured weight and measures of glycaemic control although not all studies reported these in the articles published. Other outcomes which were measured in these studies included

Study	Clinical outcomes	
	Favoured intervention	**Inconclusive effect**
		mortality, blood pressure, serum cholesterol (including LDL and HDL cholesterol), serum triglycerides, maximal exercise capacity and compliance. The results suggest that adoption of regular exercise is a good way to promote better glycaemic control in type 2 diabetic patients, however all of these studies were at high risk of bias.
Whittemore et al 2007	The majority of studies (*n* = 8) evaluated the intervention effect on glycemic control with a significant improvement demonstrated between intervention and control group (Brown et al., 2002; Rosal et al., 2005), between intervention and comparison group (Philis-Tsimikas et al., 2004; Two Feathers et al., 2005), and from Prei-ntervention to post-intervention (Banister et al., 2004). One randomized clinical trial compared an "extended" culturally competent intervention to a "compressed" culturally competent intervention with no significant difference demonstrated between groups with respect to glycemic control; however, metabolic control improved significantly in both groups over time (Brown et al., 2005). Another randomized clinical trial reported significant improvement in glycemic control of the control group; however, in this study, both the control group and the experimental group received diabetes education, with the experimental group having a choice concerning the curriculum (Noel et al., 1998). One study, in which individualized diabetes education was provided by a certified diabetes educator and a community health worker, did not demonstrate a significant effect on glycaemic control compared with a control group who received individualized diabetes education alone (Corkery et al., 1997). In this study, the community health worker did have a significant effect on program completion and program completers had a significant improvement in glycaemic control. Improvements in glycaemic control ranged from 0.8% in a sample with fairly good baseline HbA1c% (Rosal et al., 2005) to 1.8% (Corkery et al., 1997). It is important to note that despite the improvements demonstrated in HbA1c	A systematic approach was used to locate empirical reports (n = 11). Interventions were multifaceted with the majority demonstrating significant improvements in clinical outcomes, behavioral outcomes, and diabetes-related knowledge. Culturally competent interventions have the potential to improve outcomes in Hispanic adults with type 2 diabetes. However, improvements were modest and attrition was moderate to high in many studies. Addressing linguistic and cultural barriers to care are important beginnings to improving health outcomes for Hispanic adults with type 2 diabetes.

Study	Clinical outcomes	
	Favoured intervention	**Inconclusive effect**
	levels, HbA1c levels were greater than 8.0% at follow-up in six of eight studies and were greater than 9.5% in three of the eight studies. Other clinical outcomes evaluated included body mass index (BMI), lipids, and blood pressure. All studies that evaluated BMI reported no significant intervention effect on BMI (Banister et al., 1994; Brown et al., 2002; Elshaw et al., 1994; Philis-Tsimikas et al., 2004). With respect to lipids and blood pressure, two studies reported no intervention effect on lipids (Brown et al., 2002; Rosal et al., 2005), whereas one study reported a significant improvement in select lipid parameters and blood pressure (Philis-Tsimikas et al., 2004).	
Loveman et al 2008		Studies of multi-component educational interventions yielded mixed results: • Some trials reported significant improvements on measures of diabetic control but others did not. • Positive effects may be attributable to longer-term interventions with a shorter duration between the end of the intervention and the follow-up evaluation point. • There may also be an effect of having a multi-professional team delivering the educational programme. • Studies of focused educational interventions did not yield consistent results. Some effects were shown on measures of diabetic control in studies that focused on diet or exercise alone.
Deakin et al 2009	Fourteen publications describing 11 studies were included involving 1532 participants. The results of the meta-analyses in favour of group-based diabetes education programmes were: reduced glycated haemoglobin at four to six months (1.4%; 95%CI 0.8 to 1.9; P < 0.00001), at 12-14 months (0.8%; 95% CI 0.7 to 1.0; p < 0.00001) and two years (1.0%; 95% CI 0.5 to 1.4; P < 0.00001); reduced fasting blood glucose levels at 12 months (1.2 mmol/L; 95% CI 0.7 to 1.6; P < 0.00001); reduced body weight at 12-14 months (1.6 Kg; 95% CI 0.3 to 3.0; P = 0.02); and reduced systolic blood pressure at four to six months (5 mmHg: 95% CI 1 to 10; P = 0.01).	
Duke 2009	Nine studies involving 1359 participants met the inclusion criteria. Six studies compared individual education to usual care and three compared	In the six studies comparing individual face-to-face education to usual care, individual education did not significantly improve glycaemic control

Study	**Clinical outcomes**	
	Favoured intervention	**Inconclusive effect**
	individual education to group education (361 participants). There were no long-term studies and overall the quality of the studies was not high. However, there did appear to be a significant benefit of individual education on glycaemic control in a subgroup analysis of three studies involving participants with a higher mean baseline HbA1c greater than 8% (WMD -0.3% (95% CI -0.5 to -0.1, P = 0.007).	(weighted mean difference (WMD) in HbA1c -0.1% (95% confidence interval (CI) -0.3 to 0.1, P = 0.33) over a 12 to 18 month period. In the two studies comparing individual to group education, there was no significant difference in glycaemic control between individual or group education at 12 to 18 months with a WMD in HbA1c of 0.03% (95% CI -0.02 to 0.1, P = 0.22). There was no significant difference in the impact of individual versus usual care or group education on body mass index, systolic or diastolic blood pressure.
Hawthorn et al 2010	Few studies fitted the selection criteria, and were heterogeneous in methodologies and outcome measures, making meta-analysis difficult. HbA1c showed an improvement at 3 months [weighted mean difference (WMD) 0.32%;95%confidence interval (CI)) 0.63, 0.01] and 6 months post intervention (WMD) 0.60%, 95% CI)0.85,)0.35). Culturally appropriate health education was more effective than 'usual' health education in improving HbA1c and knowledge in the short to medium term. Due to poor standardization between studies, the data did not allow determination of the key elements of interventions across countries, ethnic groups and health systems, or a broad view of their cost-effectiveness.	
Minet et al 2010	The analysis showed a 0.36% (95% CI 0.21–0.51) improvement in glycaemic control in people who received self-care management treatment. In type 2 diabetes, there are improvements in glycaemic control in people who receive self-care management treatment with a small advantage to interventions with an educational approach.	
Wu et al 2010	HbA1c levels reported in the reviewed studies were pooled using random effects models. The standardized effect of telephone follow-up was equivocal, with endpoint data showing weighted mean differences of –0.44 (95% CI –0.93 to 0.06) (Z = –1.72, P = 0.08) in favour of the telephone follow-up intervention. Subgroup analysis of more intensive interventions (interactive follow-up with health professional plus automated follow-up or non-interactive follow-up) showed (n = 1057) a significant benefit in favour of the treatment group, with a standardized	Therewere few differences between the intervention and control groups on secondary outcome variables studied (weight, lipids, blood pressure, health service use, satisfaction, general wellbeing and mortality / adverse events).

Study	Clinical outcomes	
	Favoured intervention	**Inconclusive effect**
	mean difference of –0.84 (95% CI –1.67 to 0.0) (Z = 1.97,P = 0.05), indicating thatmore intensive (targeted) modes of follow-up may have better effects on glycaemic control.	
Jayasekara et al 2011		A total of five descriptive studies were included in the review. The included papers reported a variety of educational methods and different outcome measures.
Liang et al 2011	A total of 22 trials were selected for the review. Meta-analysis among 1657 participants showed that mobile phone interventions for diabetes self-management reduced HbA1c values by amean of 0.5% [6 mmol / mol; 95% confidence interval, 0.3–0.7% (4–8 mmol/ mol)] over a median of 6 months follow-up duration. In subgroup analysis, 11 studies among Type 2 diabetes patients reported significantly greater reduction in HbA1c than studies among Type 1 diabetes patients [0.8 (9 mmol/ mol) vs. 0.3% (3 mmol / mol); P = 0.02]. The effect of mobile phone intervention did not significantly differ by other participant characteristics or intervention strategies.	
Baumeister et al 2012	The database search identified 3963 references.Nineteen trials with 1592 participants were included. Psychological intervention studies (eight trials, 1122 participants, duration of therapy three weeks to 12 months, follow-up after treatment zero to six months) showed beneficial effects on short (i.e. end of treatment), medium (i.e. one to six months after treatment) and long-term (i.e. more than six months after treatment) depression severity (range of standardised mean differences (SMD) -1.47 to -0.14; eight trials). However, between-study heterogeneity was substantial and meta-analyses were not conducted. Short-term depression remission rates (OR 2.88; 95% confidence intervals (CI) 1.58 to 5.25; P = 0.0006; 647 participants; four trials) and medium-term depression remission rates (OR 2.49; 95% CI 1.44 to 4.32; P = 0.001; 296 participants; two trials) were increased in psychological interventions compared to usual care. Evidence regarding glycaemic control in psychological intervention trials was heterogeneous and inconclusive. QoL did not improve significantly based on the results of three psychological	Psychological and pharmacological interventions have a moderate and clinically significant effect on depression outcomes in diabetes patients. Glycaemic control improved moderately in pharmacological trials, while the evidence is inconclusive for psychological interventions. Adherence to diabetic treatment regimens, diabetes complications, death from any cause, health economics and QoL have not been investigated sufficiently. Overall, the evidence is sparse and inconclusive due to several low-quality trials with substantial risk of bias and the heterogeneity of examined populations and interventions.

Study	**Clinical outcomes**	
	Favoured intervention	**Inconclusive effect**
	intervention trials compared to usual care. Healthcare costs and adherence to diabetes and depression medication were examined in only one study and reliable conclusions cannot be drawn. Diabetes complications and death from any cause have not been investigated in the included psychological intervention trials. With regards to the comparison of pharmacological interventions versus placebo (eight trials; 377 participants; duration of intervention three weeks to six months, no follow-up after treatment) there was a moderate beneficial effect of antidepressant medication on shortterm depression severity (all studies: SMD -0.61; 95% CI -0.94 to -0.27; P = 0.0004; 306 participants; seven trials; selective serotonin reuptake inhibitors (SSRI): SMD-0.39; 95%CI -0.64 to -0.13; P = 0.003; 241 participants; five trials). Short-termdepression remission was increased in antidepressant trials (OR 2.50; 95% CI 1.21 to 5.15; P = 0.01; 136 participants; three trials). Glycaemic control improved in the short term (mean difference (MD) for glycosylated haemoglobin A1c (HbA1c) -0.4%; 95% CI -0.6 to -0.1; P = 0.002; 238 participants; five trials). HRQoL and adherence were investigated in only one trial each showing no statistically significant differences. Medium- and long-term depression and glycaemic control outcomes as well as healthcare costs, diabetes complications and mortality have not been examined in pharmacological intervention trials. The comparison of pharmacological interventions versus other pharmacological interventions (three trials, 93 participants, duration of intervention 12 weeks, no follow-up after treatment) did not result in significant differences between the examined pharmacological agents, except for a significantly ameliorated glycaemic control in fluoxetine-treated patients (MD for HbA1c -1.0%; 95% CI -1.9 to -0.2; 40 participants) compared to citalopram in one trial.	
Dale et al 2012		Twenty-five studies, including fourteen randomized, controlled or comparative trials, met the inclusion criteria. There was considerable heterogeneity in the design, setting, outcomes and measurement tools. Peer support was associated with statistically significant improvements in glycaemic control (three out of 14 trials), blood pressure (one out of four

Study	**Clinical outcomes**	
	Favoured intervention	**Inconclusive effect**
		trials), cholesterol (one out of six trials), BMI⁄ weight (two out of seven trials), physical activity (two out of five trials), self-efficacy (two out of three trials), depression (four out of six trials) and perceived social support (two out of two trials). No consistent pattern of effect related to any model of peer support emerged.
Elliott et al 2012		Several studies showed improvements in glycaemic control after CBT, but few found these to be statistically significant, except in subjects with particular co-morbidities. Meta-analysis confirmed no overall statistically significant impact on glycaemic control. Depression and other psychological outcomes improved in most cases. Further research is needed to identify particular groups of patients who might benefit from targeted CBT intervention both physiologically and psychologically, and to identify which interventions are both practical and cost effective.
Omran et al 2012		Change in adherence rate was assessed using a variety of measurement methods, and 6 studies reported the effect of pharmacist intervention on clinical, economic or humanistic outcomes. Compared to a control group, 5 studies reported significant improvements in adherence rate with pharmacist intervention; however, glycemic control improved significantly in only 2 studies.
Asante et al 2013	Some 10 primary research studies met the inclusion criteria for this review. Nearly all the interventions had a positive impact on glycaemic control, with HbA1c levels dropping in the range of 0.1% to 0.8%.	
El-Gayar et al 2013	*Results not reported*	
Elissen et al		Overall, reviews (*n* = 15) of diabetes care programmes report modest

Study	Clinical outcomes	
	Favoured intervention	**Inconclusive effect**
2013		improvements in glycaemic control. Empirical studies (*n* = 61) show wide-ranging results on HbA1c, systolic blood pressure and guideline adherence.
Fitzpatrick et al 2013	Fifty per cent of studies reported significant improvements in HbA1c following intervention, ranging from -0.09 to -0.93. These improvements in HbA1c were seen over 3–12 months of follow-up. In three studies, however, the improvement in HbA1c was not maintained at 6-month follow-up, 12-month follow-up , or 18-month follow-up.	Mixed and/or inconclusive results for the outcomes of total cholesterol, LDL, HDL, systolic/diastolic blood pressure, waist circumference, weight/BMI, and symptoms of hyper/hypoglycaemia.
Pal et al 2013	Computer-based diabetes self-management interventions currently have limited effectiveness. They appear to have small benefits on glycaemic control (pooled effect on glycosylated haemoglobin A1c (HbA1c): -2.3 mmol/mol or -0.2% (95% confidence interval (CI) -0.4 to -0.1; P = 0.009; 2637 participants; 11 trials). The effect size on HbA1c was larger in the mobile phone subgroup (subgroup analysis: mean difference in HbA1c -5.5 mmol/mol or -0.5% (95% CI -0.7 to -0.3); P < 0.00001; 280 participants; three trials).	Four (out of 10) interventions showed beneficial effects on lipid profile. Current interventions do not show adequate evidence for improving depression, health-related quality of life or weight.

APPENDIX 5

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on diabetes knowledge, mapped according to whether results favoured the intervention or were inconclusive

Study	**Knowledge**	
	Favoured intervention	**Inconclusive effect**
Armour et al 2005	*Results not reported*	
Glazier et al 2006	*Results not reported*	
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care attitudes and knowledge.	
Whittemore et al 2007	Knowledge was evaluated in four studies. A significant increase in diabetes-related knowledge was reported for participants who received a culturally competent intervention (Brown et al., 2005; Brown et al., 2002; Philis-Tsimikas et al., 2004; Two Feathers et al., 2005).	
Deakin et al 2009	Fourteen publications describing 11 studies were included involving 1532 participants. The results of the meta-analyses in favour of group-based diabetes education programmes were: improved diabetes knowledge at 12-14 months (SMD 1.0; 95% CI 0.7 to 1.2; $P < 0.00001$)	
Duke 2009		There were too few studies to perform a meta-analysis on the effect of individual education on diabetes knowledge.
Hawthorn et al 2010	Knowledge scores improved in the intervention groups at 6 months (standardized mean difference 0.46, 95% CI 0.27, 0.65).	
Jayasekara et al 2011	*Results not reported*	
Amaeshi et al 2012	The overall result of the review favours the use of diabetic foot education for reducing/delaying the onset of diabetic complications, which ultimately result in amputation. Although diabetic foot education was found to be effective in delaying the onset of diabetes complications and reducing the incidence of LEA, it is cautioned that it should not be used in isolation.	
Dale et al 2012	*Results not reported*	
Asante et al 2013	*Results not reported*	

APPENDIX 6

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on self-management behaviours, mapped according to whether results favoured the intervention or were inconclusive

Study	**Self-management behaviour**	
	Favoured intervention	**Inconclusive effect**
Armour et al 2005	*Results not reported*	
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care utilization, behaviours and skills.	
Nield et al 2007	*Results not reported*	
Whittemore et al 2007	The primary behavioural outcomes evaluated in studies included dietary and exercise behaviours. The majority of studies that evaluated dietary behaviours (three of four studies) reported significant improvement compared with a control group or in a pre-post design (Elshaw et al., 1994; Lorig et al., 2005; Two Feathers et al., 2005). In a pilot study, Rosal and colleagues (2005) reported no intervention effect on dietary behaviours. Intervention effects on exercise behaviour were more variable. A general self-management intervention provided by community health workers in two different samples demonstrated a significant increase in exercise behaviour (Lorig et al., 2003; Lorig et al., 2005). Other studies that evaluated exercise behavior demonstrated only a trend toward an intervention effect in a pilot study (Rosal et al., 2005) or no intervention effect (Two Feathers et al., 2005).	
Duke et al 2009		There were too few studies to perform a meta-analysis on the effect of individual education on dietary self-management, and smoking habits. No data were available on the other main outcome measures of diabetes complications or health service utilization and cost analysis in these studies.
Amaeshi et al 2012	The overall result of the review favours the use of diabetic foot education for reducing/delaying the onset of diabetic complications, which ultimately result in amputation. Although diabetic foot education was found to	

Study	Self-management behaviour	
	be effective in delaying the onset of diabetes complications and reducing the incidence of LEA, it is cautioned that it should not be used in isolation.	
Avery et al 2012	*Results not reported*	
Dale et al 2012		Twenty-five studies, including fourteen randomized, controlled or comparative trials, met the inclusion criteria. There was considerable heterogeneity in the design, setting, outcomes and measurement tools. Peer support was associated with statistically significant improvements in physical activity (two out of five trials). No consistent pattern of effect related to any model of peer support emerged.
Elliott et al 2012	*Results not reported*	
Omran et al 2012	Interventions to help improve medication adherence generally included an educational strategy combined with one or more other strategies to address behavioural, affective and provider-related issues of adherence.	
Asante et al 2013	Although several measurements were used to assess treatment adherence, adherence increased overall across all intervention groups.	
El-Gayar et al 2013	*Results not reported*	
Elissen et al 2013		Overall, reviews (*n* = 15) of diabetes care programmes report modest improvements in glycaemic control. Empirical studies (*n* = 61) show wide-ranging results on HbA1c, systolic blood pressure and guideline adherence.
Fitzpatrick et al 2013	Fifteen (88%) studies with adults reported self-management behaviours as intervention outcomes. Most frequently reported were diet (n = 10), exercise (n = 11), self-monitoring of blood glucose (n = 8), and medication adherence (n = 5). Of the 10 studies reporting dietary outcomes, six (60%) reported a significant effect of the intervention on one or more aspects of following a healthy diet, while 4 studies reported no effect of the intervention on any aspect of following a healthy diet. While none of the 5 studies assessing medication adherence reported a significant effect of the intervention, both studies reporting global diabetes adherence (Summary of Diabetes Self-Care Activities scale) found significant improvement in self-management behaviours overall following intervention.	Of the 11 studies reporting physical activity outcomes, three (27%) reported a significant effect of the intervention on one or more aspects of physical activity, while 8 studies reported no effect of the intervention on physical activity. All 8 studies assessing self-monitoring of blood glucose reported no effect of the intervention. Similarly, none of the 5 studies assessing medication adherence reported a significant effect of the intervention.

APPENDIX 7

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on quality of life (QOL), mapped according to whether results favoured the intervention or were inconclusive

Study	**Quality of life**	
	Favoured intervention	**Inconclusive effect**
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care utilization, behaviours, attitudes, knowledge, and skills	
Nield et al 2007	*Results not reported*	
Deakin et al 2009	*Results not reported*	
Duke et al 2009	*Results not reported*	
Hawthorne et al 2010	*Results not reported*	
Omran et al 2012		Effect of pharmacist interventions on this outcome cannot be established
El-Gayar et al 2013	*Results not reported*	

APPENDIX 8

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on health care costs or health service usage, mapped according to whether results favoured the intervention or were inconclusive

Study	**Healthcare cost/health service use**	
	Favoured intervention	**Inconclusive effects**
Armour et al 2005	*Results not reported*	
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care utilization.	
Deakin et al 2009	Fourteen publications describing 11 studies were included involving 1532 participants. The results of the meta-analyses in favour of group-based diabetes education programmes were: reduced need for diabetes medication (odds ratio 11.8, 95% CI 5.2 to 26.9; $P < 0.00001$; RD = 0.2; NNT = 5). Therefore, for every five patients attending a group-based education programme we could expect one patient to reduce diabetes medication.	
Duke 2009		There were too few studies to perform a meta-analysis on the effect of individual education on dietary self-management, diabetes knowledge, psychosocial outcomes and smoking habits. No data were available on the other main outcome measures of diabetes complications or health service utilization and cost analysis in these studies.
Hawthorn et al 2010		There was only one longer-term follow-up study, and one formal cost-effectiveness analysis.
Amaeshi et al 2012	The overall result of the review favours the use of diabetic foot education for reducing/delaying the onset of diabetic complications, which ultimately result in amputation. Although diabetic foot education was found to be effective in delaying the onset of diabetes complications and reducing the incidence of LEA, it is cautioned that it should not be used in isolation.	
Baumeister et al 2012		Psychological and pharmacological interventions have a moderate and clinically significant effect on depression outcomes in diabetes patients. Glycaemic control improved moderately in pharmacological trials, while the evidence is inconclusive for psychological interventions.

Study	**Healthcare cost/health service use**	
		Adherence to diabetic treatment regimens, diabetes complications, death from any cause, health economics and QoL have not been investigated sufficiently. Overall, the evidence is sparse and inconclusive due to several low-quality trials with substantial risk of bias and the heterogeneity of examined populations and interventions.
Dale et al 2012	*Results not reported*	
Omran et al 2012		Effect of pharmacist interventions on this outcome cannot be established
Pal et al 2013		Current interventions do not show adequate evidence for improving depression, health-related quality of life or weight.

APPENDIX 9

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on psychosocial outcomes, mapped according to whether results favoured the intervention or were inconclusive

Study	**Psychosocial outcomes**	
	Favoured intervention	**Inconclusive effects**
Armour et al 2005	*Results not reported*	
Glazier et al 2006	*Results not reported*	
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care attitudes.	
Deakin et al 2009	*Results not reported*	
Duke 2009		There were too few studies to perform a meta-analysis on the effect of individual education on psychosocial outcomes.
Hawthorne et al 2010	*Results not reported*	
Wu et al 2010		There were few differences between the intervention and control groups on secondary outcome variables studied (weight, lipids, blood pressure, health service use, satisfaction, general wellbeing and mortality / adverse events).
Amaeshi et al 2012	The overall result of the review favours the use of diabetic foot education for reducing/delaying the onset of diabetic complications, which ultimately result in amputation. Although diabetic foot education was found to be effective in delaying the onset of diabetes complications and reducing the incidence of LEA, it is cautioned that it should not be used in isolation.	
Baumeister et al 2012		Psychological and pharmacological interventions have a moderate and clinically significant effect on depression outcomes in diabetes patients. Glycaemic control improved moderately in pharmacological trials, while the evidence is inconclusive for psychological interventions.

Study	Psychosocial outcomes	
		Adherence to diabetic treatment regimens, diabetes complications, death from any cause, health economics and QoL have not been investigated sufficiently. Overall, the evidence is sparse and inconclusive due to several low-quality trials with substantial risk of bias and the heterogeneity of examined populations and interventions.
Dale 2012	Twenty-five studies, including fourteen randomized, controlled or comparative trials, met the inclusion criteria. There was considerable heterogeneity in the design, setting, outcomes and measurement tools. Peer support was associated with statistically significant improvements in self-efficacy (two out of three trials), depression (four out of six trials) and perceived social support (two out of two trials).	No consistent pattern of effect related to any model of peer support emerged.
Elliott et al 2012		Several studies showed improvements in glycaemic control after CBT, but few found these to be statistically significant, except in subjects with particular co-morbidities. Meta-analysis confirmed no overall statistically significant impact on glycaemic control. Depression and other psychological outcomes improved in most cases. Further research is needed to identify particular groups of patients who might benefit from targeted CBT intervention both physiologically and psychologically, and to identify which interventions are both practical and cost effective.
Asante et al 2013	*Results not reported*	
El-Gayar et al 2013	*Results not reported*	
Fitzpatrick et al 2013	Problem solving interventions consistently have a positive effect on several psychosocial outcomes; evidence appeared strongest for effectiveness of intervention on depression in adults with diabetes.	

APPENDIX 10

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on outcomes relating to diabetes complications

Study	**Diabetes complications**
	Inconclusive effects
Nield et al 2007	*Results not reported*
Deakin et al 2009	*Results not reported*
Duke 2009	No data were available on the other main outcome measures of diabetes complications in these studies.
Hawthorne et al 2010	*Results not reported*
Jayasekara et al 2011	*Results not reported*
Amaeshi et al 2012	The overall result of the review favours the use of diabetic foot education for reducing/delaying the onset of diabetic complications, which ultimately result in amputation. Although diabetic foot education was found to be effective in delaying the onset of diabetes complications and reducing the incidence of LEA, it is cautioned that it should not be used in isolation.
Omran et al 2012	Effect of pharmacist interventions on this outcome cannot be established
Pal et al 2013	Current interventions do not show adequate evidence for improving depression, health-related quality of life or weight.

APPENDIX 11

Summary of the main findings of and authors' conclusions in included reviews regarding the effectiveness of interventions on other outcomes, mapped according to whether results favoured the intervention or were inconclusive

Study	**Other outcomes**	
	Favoured intervention	**Inconclusive effects**
Armour et al 2005	*Results not reported*	
Jackson et al 2006	Most studies reported overall positive results and found that IT-based interventions improved health care utilization, behaviours, attitudes, knowledge, and skills	
Nield et al 2007	*Results not reported*	
Deakin et al 2009	*Results not reported*	
Hawthorne et al 2010	*Results not reported*	
Dale et al 2012	*Results not reported*	
El-Gayar 2013	Overall, 74% of studies showed some form of added benefit, 13% articles showed no-significant value provided by IT, and 13% of articles did not clearly define the added benefit due to IT. Information technologies used included the Internet (47%), cellular phones (32%), telemedicine (12%), and decision support techniques (9%). Limitations and research gaps identified include usability, real-time feedback, integration with provider electronic medical record (EMR), as well as analytics and decision support capabilities.	
Pal et al 2013		Current interventions do not show adequate evidence for improving depression, health-related quality of life or weight.