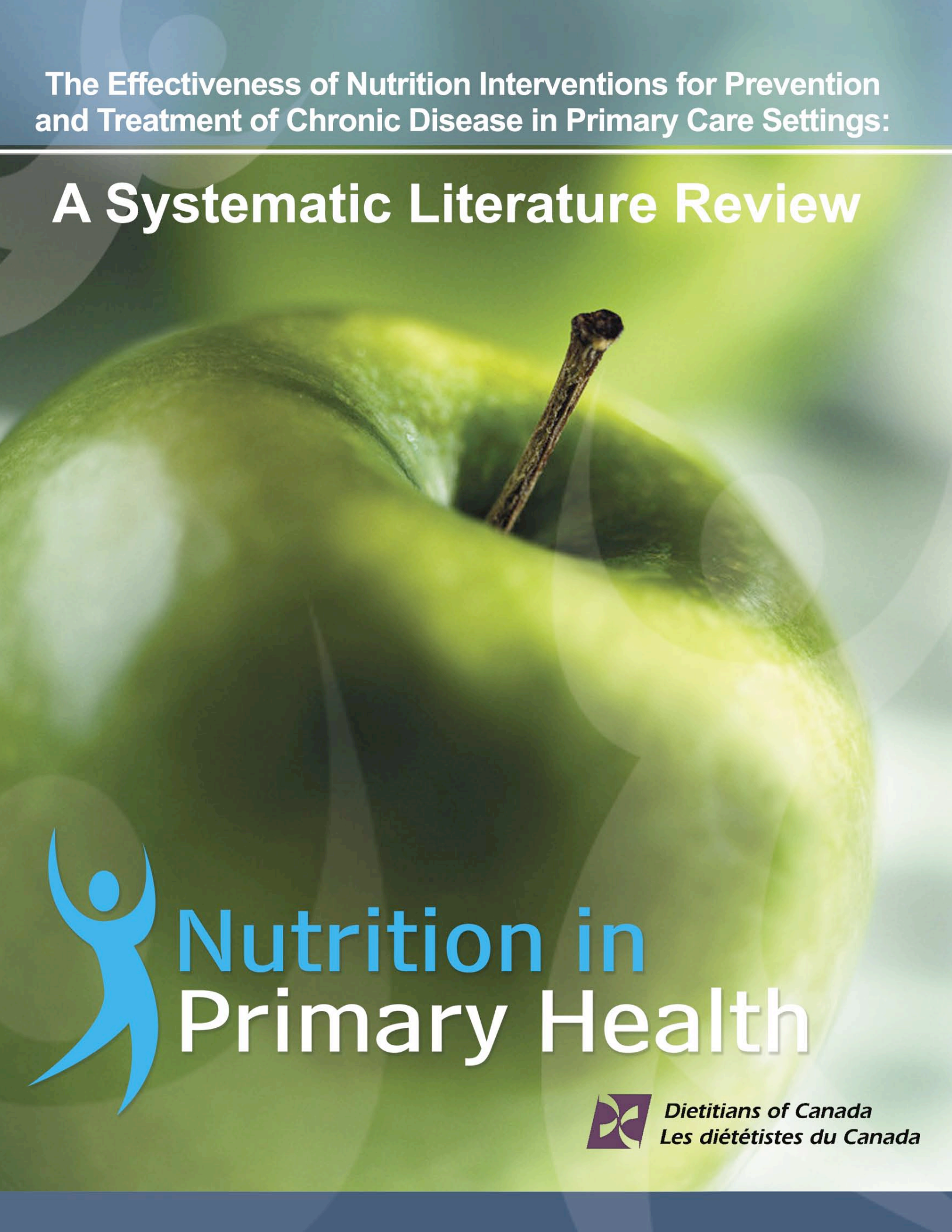
The Effectiveness of Nutrition Interventions for Prevention and Treatment of Chronic Disease in Primary Care Settings:

A Systematic Literature Review



Nutrition in Primary Health

Dietitians of Canada
Les diététistes du Canada

The Effectiveness of Nutrition Interventions for Prevention and Treatment of Chronic Disease in Primary Care Settings: A Systematic Literature Review

Prepared for:
Dietitians of Canada

Prepared by:
McMaster Evidence-Based Practice Centre
Hamilton, Ontario
http://hiru.mcmaster.ca/epc/index.asp

Authors:
Donna Ciliska, RN, PhD
Helen Thomas, RN, PhD
Cristina Catallo, RN, BScN
Mary Gauld, BA
Dawn Kingston, RN, BSc, MSc
Barbara Cantwell, RD, BScA
Connie Freeborn, RT (Cyt)
Rob Stevens, BA
Tara Gesgjorskyj
Patrick Jahn

Forward:
Paula Brauer, PhD, RD
University of Guelph

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Interdisciplinary Nutrition Services in Family Health Networks/Primary Care Model Sites: A Demonstration Project

Steering Committee:
Paula Brauer, PhD, RD
Department of Family Relations and Applied Nutrition
University of Guelph
Guelph, ON

Linda Dietrich, MEd, RD
Regional Executive Director
Dietitians of Canada
Toronto, ON

Bridget Davidson, MHSc, RD
Project Coordinator
Kitchener, ON

John Krauser,
Primary Health Care Team, Ontario Ministry of Health and Long Term Care
Toronto, ON

Karen Parsons,
Primary Health Care Team, Ontario Ministry of Health and Long Term Care
Kingston, ON

Edited by:
Stacey Curry Gunn
Flow Public Relations & Marketing
Guelph, ON

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Forward

Tips for Understanding This Literature Review

Primary health care reform presents new opportunities for Registered Dietitians to contribute to health promotion, disease prevention and treatment in interdisciplinary and collaborative primary health care settings. Since the evidence base for this broad mandate is very large and diverse, this literature review was commissioned to bring together recent reviews of nutrition interventions that were known to be feasible or to be potentially feasible in Canadian primary health care settings. This "review of literature reviews" was part of the evidence informing decision making in a formal consensus process to develop an interdisciplinary model for nutrition services in Ontario Family Health Networks and similar primary health care organizations (1). Family Health Networks (FHNs) are groups of family physicians who work with other allied health care professionals to provide accessible, coordinated care to enrolled patients. The search was limited to integrative, systematic or meta-analysis reviews conducted from 1999-2004.

It is hoped that this literature review will be a useful resource to dietitians in several practice areas. The review results will be most useful when readers are already familiar with both the strengths and limitations of newer systematic literature review methods. The goal of such methods is to review all the evidence or literature around a particular topic, using explicit criteria, databases and quality control methods. While we can never be sure all the evidence has been reviewed, systematic methods ensure that results can be replicated. This contrasts with older narrative reviews, where authors interpreted the literature, frequently emphasizing the results of particular studies over others.

As the entire health system has been moving toward evidence-based practice, the number and sophistication of systematic literature reviews has increased rapidly. Many health professionals have responded to this challenge by updating their critical appraisal skills and becoming familiar with systematic review methods and terminology, either through continuing education courses or by participating in review processes themselves. All critical readers need to be familiar with the Cochrane Collaboration and other groups sponsoring or conducting reviews; intention to treat analysis; the differences among efficacy, effectiveness and efficiency; effect size and weighted mean difference; as well as having a clear understanding of reliability, and internal versus external validity or generalizability.

As more diet and nutrition reviews have appeared in the literature, some of the strengths and limitations of both the review methods and the nutrition evidence base have become more obvious. The following comments are based on my experience in both conducting systematic reviews and teaching undergraduate and graduate students about these methods, and are meant to alert readers already familiar with systematic review methods to some of the issues that need to be considered in interpreting the results of this review.

In my mind, the major benefit of this systematic review has been the bringing together of the recent reviews across the many nutrition issues that arise in primary health care settings. The systematic process has ensured that most of the relevant, high quality work has been identified. This review revealed some gaps in our knowledge base that will require new research. Most of the reviews assessed diet or counselling interventions, but very few addressed the organizational aspects of nutrition services. Researchers in medicine and nursing, for example, have been assessing a range of organization of care interventions such scheduled follow-up appointments, use of electronic health records to track patients, and implementation of practice guidelines, etc. The Cochrane Effective Practice and Organisation of Care (EPOC) group focuses specifically on reviews of the organizational aspects of health care (2,3).

All critical readers of reviews are counselled to determine to what degree subjects in studies are representative of their own clients, but this issue is particularly problematic in reviews of diet, exercise and other lifestyle

interventions where only a percentage of primary care clients will have the motivation and resources to undertake long term behavioural change. Current quality rating systems for reviews penalize studies with low follow-up, yet the results from these studies may contain important insights that are generalizable to the health system. Undoubtedly, quality assessment tools to address this issue will be developed, but in the meantime it is important for readers to carefully review the methods of various reviews to see if the focus was on efficacy or effectiveness. If the focus of the review was on efficacy (i.e., does the intervention work in volunteer subjects who comply), rather than effectiveness (i.e., does the intervention work in typical practice settings), some important studies with high generalizability may have been excluded. Study quality assessment tools generally penalize studies with less than 80 per cent follow-up, while 60 per cent follow-up is more typical in community-based diet and exercise studies. Thus, readers should carefully evaluate the focus of the review (efficacy or effectiveness) and interpret what the "loss to follow-up" data means for their own practice.

Another point to consider is the complexity of diet interventions, because both the nutrient intake and the counselling process may have been manipulated. Community-based studies assessing the efficacy of low-fat diets, for example, may include very diverse interventions, ranging from providing pre-prepared foods, to offering simple advice and pamphlets. Once would expect to achieve very different outcomes with these diverse interventions.

Even when counselling is the only intervention, "diet counselling" and "diet advice" have been defined in a variety of ways and encompass a wide range of possible approaches and techniques, such as didactic (education only), psychosocial, enhanced education (e.g., skill practice, enlisting support) or combinations of behavioural, cognitive and affective therapies. Past efforts to improve the classification of behavioural interventions by their theoretical foundations have helped to some degree, but intervention details often remain inadequate to replicate. Additional work is needed to better characterize diet interventions. For example, Ammerman et al. (4) and Tabak et al. (5) have developed two possible schemes that can be further developed.

A Cochrane systematic review by Thompson et al. (6-8) illustrates how the complexity of dietetic interventions must be carefully interpreted. Their review compared the effects of advice from dietitians with advice from other health professionals or with self-help materials on reductions in blood cholesterol levels, and found that dietitians were more effective than physicians, but less effective than self-help materials. The primary studies included adult subjects over 18 years of age, with or without previous myocardial infarction or heart disease. Four studies compared dietitians with doctors, one with nurses, one with health counsellors, and seven with self-help resources. The pre-post changes for serum cholesterol within treatment groups varied considerably, but tests for study heterogeneity were null. This occurs when there are few studies being assessed. In the dietitian–physician comparisons, mean pre-post change in serum total cholesterol ranged from -1.00 to –0.47 mmol/L within the dietitian groups compared with –0.82 to -0.13 mmol/L for the physician groups. Meta-analysis showed that patients counselled by dietitians had greater reductions in blood cholesterol levels than those counselled by doctors.

In the dietitian versus self-help materials comparisons, baseline to follow-up declines within the dietitian groups varied from –0.60 to -0.05 mmol/L compared to -0.02 to +0.18 mmol/L in the self-help materials groups. The net difference comparing dietitians to self-help materials was not significant [−0.10 mmol/L, (95% confidence interval: –0.22 to 0.03)]. Note that the range of changes even within the dietitians groups is substantial, and greater reductions were seen in the dietitian to physician comparisons. None of the studies directly compared physicians to dietitians to self-help materials. The conclusion that there were no statistically significant changes in cholesterol levels in studies comparing dietitians with self-help resources is accurate, but a superficial and misleading interpretation of the data.

Another unique feature of diet studies (excluding supplement studies) is that two treatments are being compared, rather than a treatment and control or placebo. The goal of typical diet-focused reviews is to

determine if one diet is superior to a control diet. For example, low-fat diets were compared to restricted calorie diets in a moderate-quality meta-analysis by Astrup et al. (2000)(9). Sixteen trials (19 intervention groups and 1,910 participants) were included. Results showed that low-fat intervention groups had greater weight loss than calorie-restricted control groups. While these results seem to suggest that restricted calorie diets are of little value, most dietitians are aware that results of calorie-restricted diet studies can vary substantially based on the intensity, complexity and process of diet intervention, as discussed previously.

The Astrup review also illustrates another issue about understanding the different ways treatment effects are expressed in the various reviews. Typically, as in the Astrup review, the difference in weight loss between groups is reported [mean difference 3.2 kg, (95% confidence interval: 1.9 to 4.5 kg)](9), not the change from baseline within each group The pre-post mean weight loss in the restricted calorie control groups varied from - 2.3 kg to + 2.4 kg compared to the low-fat ad libitum diet groups where the pre-post weight change varied from -8.7 kg to +0.4 kg. Both the pre-post changes and the between-group changes are important to dietitians who may be advising clients on either diet, depending on client needs and preferences.

The Astrup study reported the weighted mean difference (WMD), the arithmetic average of the differences in outcomes across studies on the same outcome; each study is weighted by the precision of its estimate of effect (usually the inverse of the variance) (10-12). If variance (standard deviation squared) is large, then the inverse (one divided by variance) is a very small number. Thus the WMD gives more weight to studies with less variance. Studies with lower variance have some combination of larger numbers of subjects and/or more homogeneous groups.

Another way results can be presented is using the standardized mean difference (SMD) – the difference between means on outcome measurement, standardized by the pooled standard deviation of all studies in a meta-analysis. The units used in either WMD or SMD are similar to the natural units being clinically measured and can be understood as an adjusted mean difference.

Difficulty arises, however, when comparing review results, when effect size is used instead of mean difference. Effect size is defined as the difference in outcomes between the intervention and control groups, divided by some measure of variability, typically the standard deviation. Generally, an effect size of 0.2 is considered a small effect size, 0.5 a medium effect size, and 0.8 a large effect size. Effect size has often been used in the social sciences, as a dimensionless measure of effect when the outcome under consideration is a concept, such as depression or quality of life, which is measured by different questionnaires. While the effect size has a relationship to the biological measure under consideration, its clinical relevance will vary, depending on the underlying degree of change in the biological measure, its biological variability in the population and the implications for the degree of change. The two types of outcome (mean differences and effect size) cannot be compared directly, without additional calculations.

This disadvantage is offset to some degree by the fact that valuable insights can be gained within a review. For example, Mullen et al. (13) assessed patient counselling for several preventive health behaviours, including six weight loss studies and 12 miscellaneous nutrition interventions. They were able to demonstrate the positive effects of combined behavioural and cognitive interventions, self-monitoring, increased number of contacts and enhanced follow-up. In summary, readers are urged to read the reviews cited carefully to see if the issues identified above — relevance of subject characteristics to practice, description of interventions and outcome measurement — have been adequately addressed. This review contributes to the evidence base, documenting the evidence for nutrition services applicable to the primary health care system.

Paula Brauer
University of Guelph
March 2006

Summary

Purpose

Nutrition is a major lifestyle factor in health promotion and the prevention and treatment of several chronic illnesses. This systematic literature review was commissioned by the Dietitians of Canada as part of a demonstration project to develop practice management guidance materials for interdisciplinary nutrition services in primary health care settings in Ontario, Canada. Three questions guided this review:

1. What is the effectiveness of nutrition interventions for the prevention of chronic illness?
2. What is the effectiveness of nutrition interventions for the treatment of chronic illness?
3. What is the effectiveness of dietary advice given by dietitians versus other health care professionals or other self-help resources for the prevention or treatment of chronic illness?

Methods

Only literature reviews were considered in addressing the first two questions; both reviews and primary studies were considered in addressing the third question. All databases (MEDLINE, EMBASE, CINAHL, Cochrane Database of Systematic Reviews, PsycLit, PsycINFO and Scisearch) were searched from 1999 to July 2004. Search terms included the names of chronic diseases and conditions relevant to primary care as well as methodology terms for systematic reviews and randomized trials. “Gray” literature, professional literature outside of peer-reviewed journals, was sought from selected websites of disease-related foundations. Title and abstract screening, relevance determination, quality ratings and data extraction were done independently by two raters, using a web-based systematic review tool. Any conflicts were resolved by discussion and consensus. Only intervention studies were considered; all etiologic studies were excluded.

Findings

Twelve primary studies and 221 reviews were quality rated as strong (48), moderate (44) or weak (129). Data extraction was not done on the weak reviews, due to the large number of strong and moderate reviews on the topics. Data are reported by conditions of overweight and obesity, diabetes, cardiovascular disease and other conditions; by comparing differing intervention components; and by comparing interventions done by dietitians to those by other health care providers or self-help.

The review pointed out that there are numerous conditions for which there is no evidence or no strong evidence; however, there is solid evidence related to a few specific conditions and outcomes, as follows:

1. Diabetes self-management education can be effective in community settings, particularly for adolescents. Conducting such education in primary care settings may allow the interventions to be more closely tailored to the needs of particular populations.

2. Reducing overall and saturated fat intake and increasing omega-3 polyunsaturated fat intake has a greater effect on reducing overall mortality than focusing on weight reduction or lipid lowering alone.

3. Focusing on weight loss under current primary care models of practice is probably not intense enough to result in significant or maintained change.

4. Multiple risk factor interventions can be done in primary care. Such interventions have demonstrated reductions in blood pressure and cholesterol levels, but have not shown differences in total or cardiovascular mortality. None of the studies to date have had sufficient statistical power (due to inadequate sample sizes) to address this issue.

5. Improving the dietary intake of pregnant women does not affect the incidence of preterm birth, but it can significantly reduce the rates of low-birth-weight, very-low-birth–weight, and small-for-gestational-age infants.

Nutrition interventions, including diet counselling and advice, have been variously defined and encompass a wide range of possible approaches and techniques. This lack of clarity and standardization of interventions across various reviews is a significant barrier to determining the most promising approaches. Interventions are generally more effective when they are more intense (i.e., more than two sessions) rather than brief; when the number of intervention components are increased (more than two); when spouses or families are involved; and when participants are at risk or diagnosed with a disease rather than in good health.

Conclusions

There is a considerable body of high quality systematic reviews related to dietary interventions that could realistically be provided by dietitians in a primary care setting. This review is the first to bring together the reviews of diet interventions that may be applicable to the primary health care setting and the first to address both prevention and treatment across the range of conditions treated in this sector of the health system. It provides the available evidence for prioritizing dietetic services to maximize health outcomes for clients.

Introduction

Nutrition is a major lifestyle factor in health promotion and is important in the prevention and management of some common health conditions, such as diabetes, heart disease and obesity (14,15). The World Health Organization has declared obesity a global epidemic (16). Adult obesity is further implicated in a variety of chronic illnesses such as cardiovascular disease, hypertension and some cancers. It has been estimated that dietary factors account for 30 per cent of all cancers in the United States (17).

This review was commissioned by Dietitians of Canada as part of a demonstration project to develop a set of recommendations for interdisciplinary nutrition services in Ontario Family Health Networks (FHNs) and similar professional coordination service models (1). Lamarche and colleagues have described the professional coordination model where physicians actively coordinate services with other providers who are part of the team, in contrast to the professional contact model where physicians refer to separate services as needed. The FHN model encourages groups of family physicians to work together with other allied health care professionals, such as nurse practitioners, chiropractors and dietitians, to provide accessible, coordinated care to enrolled patients. However, there has been a limited number of dietitians working in these primary care settings. In a 2003 survey of Ontario physicians in FHNs or primary care networks, 23 per cent reported access to a dietitian (John Krauser, Family Health Networks, Ministry of Health and Long Term Care, personal communication, March 7, 2005). Seventeen per cent of family physicians in Canada reported access to a dietitian/nutritionist at some time during the week (18).

As a first step, this review was intended to provide information about the effectiveness of different nutrition interventions and the relative effectiveness of nutrition interventions by different providers. It was a resource for a consensus-based process conducted with a multidisciplinary advisory group that developed recommendations for implementing interdisciplinary nutrition services in similar primary care settings.

Review Questions

Three questions guided this review:

1. What is the effectiveness of nutrition interventions for the prevention of chronic illness?
2. What is the effectiveness of nutrition interventions for the treatment of chronic illness?
3. What is the effectiveness of dietary advice given by dietitians versus other health care professionals or other self-help resources for the prevention or treatment of chronic illness?

For the first two questions, the results are reported by disease or condition (i.e., overweight, heart disease, diabetes, osteoporosis, renal disease, pregnancy); by mental health (i.e., eating disorders and schizophrenia); and by other topics. Results for the third question are reported by comparator (i.e., other health care professionals and self-help resources) and also by condition.

Methods

There is a large body of research relevant to nutrition interventions, including several high quality systematic reviews for many conditions. A decision was made to do a review of reviews for the first two questions about the effectiveness of nutrition interventions for the prevention or treatment of chronic illness, and to include both reviews and primary studies for the third question comparing interventions delivered by dietitians versus other health care professionals or self-help.

Search strategy

The research team suggested databases and search terms. Two research librarians independently developed the search strategies for MEDLINE, and one combined both search strategies for the final process. The strategies were then modified for the other databases. All databases (MEDLINE, EMBASE, CINAHL, Cochrane Database of Systematic Reviews, PsycLit, PsycINFO and Scisearch) were searched from 1999 to July 2004. The search terms included the names of chronic diseases and conditions relevant to primary care as well as methodology terms for systematic reviews and randomized trials (See Appendix A).

It was felt that a search period beginning in 1999 would ensure that any references found would be currently germane. Potentially relevant references were reviewed to identify other citations published after 1994. Some "gray" literature was sought from websites (e.g., Canadian Task Force on Preventive Health Services, U.S. Preventive Services Task Force, Health Technology Assessment, Agency for Health Care Research and Quality, and several disease-specific organizations such as the Canadian and American diabetes associations and the Heart and Stroke Foundation). After the search was conducted, a decision was made to exclude studies or reviews addressing any type of nutritional supplementation.

Relevance criteria

All title and abstract screening, relevance and quality ratings, and data extraction were done directly on-line, using the web-based systematic review tool by TrialStat (Version 3.0). The online software permitted raters to see the progress of any article through the process and, after rating, to identify articles in conflict.

Two raters independently reviewed titles and abstracts for potential relevance. Articles that were clearly not on topic (as agreed by both raters) were deleted. The complete articles for all remaining citations, including those rated by either rater as having questionable relevance, were retrieved. Two raters independently reviewed all retrieved papers for relevance. To be included, a study had to meet all criteria. Disagreements were resolved through discussion and consensus. Studies were included that focused on interventions to alter food intake. There were no restrictions by target group of the interventions (individuals, families or groups), as long as the intervention could realistically be done in a primary care setting. Similarly, there were no age restrictions, as all age groups are represented in Canadian primary care.

Relevance criteria:

1. The article is written in English.

2. It includes a nutrition component.

3. The intervention is provided, or realistically could be provided, in a Canadian primary care setting.

4. The intervention is aimed at prevention or management of chronic diseases or other conditions, including obesity or overweight; dyslipidemia; hypertension; diabetes; cancer; cardiovascular disease; osteoporosis; iron-deficiency and other anemias; chronic obstructive pulmonary disease; gastrointestinal disease; HIV/AIDS; hepatitis; malnutrition in the elderly; feeding problems in infants and

children; pregnancy and prevention of low birth weight; and mental health issues, such as eating disorders or weight gain associated with pharmacologic treatment of schizophrenia.

5. Outcomes include change in nutrition behaviour or some physiologic parameter (e.g., weight, percentage body fat, lipid levels or glucose levels) and not just changes in knowledge, attitudes or stages of change.

6. Integrated and systematic reviews and meta-analyses, or primary studies comparing the effectiveness of interventions delivered by nutritionists with those provided by other health care providers or with self-help materials.

Exclusion criteria:

1. Etiological or cross-sectional studies of relations between food intake and various conditions or nutrition-related risk factors for development of various diseases.

2. Studies that focused only on supplementation of any kind (vitamins, minerals, protein powder or herbals) without a counselling or advice component.

3. Studies of school-based curricula or environmental or mass-media interventions.

4. Studies that reported only a change in knowledge.

Quality assessment

Two raters independently assessed the quality of all studies, entering their assessments into an on-line database and discussing any disagreements until consensus was reached. Separate quality assessment tools were used for reviews and for primary studies. The quality assessment tool for reviews was previously used for several reviews done by the Effective Public Health Practice Project (19) and was based on the guidelines of Oxman et al. (20). Criteria included a description of the search strategy; comprehensiveness of the search; level of evidence of primary studies; quality assessment of primary studies and comprehensiveness of quality assessment; integration of findings beyond listing primary study results; and conclusions based on reported data (See Appendix B). A score of one point was given for each criterion met, and scores were summed to give an overall rating of strong (6–7), moderate (4–5) or weak (3 or less).

Primary studies were assessed using a tool developed by the Effective Public Health Practice Project (5), which has been previously used for several reviews (21). Criteria included selection bias, study design, confounders, blinding, data collection methods and level of dropouts (See Appendix C).

Data extraction

A standardized instrument was developed based on information required to answer the three review questions and was pre-tested by the raters. The data extracted from the reviews included the publication dates of the primary studies within each review; the number of studies; the number of participants; the target population; the setting of interventions; and the outcomes. Data extracted from primary studies included the country of the review; the years data were collected; the number of intervention or control groups; the number of participants screened; the numbers of eligible and allocated participants in each intervention and control group; the number of dropouts; and the outcomes. Descriptions and definitions of interventions were listed according to the review authors' categories. One rater extracted data and a second checked the accuracy of all data tables. Evidence and summary tables were constructed to describe the most salient characteristics of the studies.

A meta-analysis that addresses question three already exists. The remaining primary studies addressing this

question focused on diverse interventions and outcomes, and it was decided that combining the results of these latter studies did not make clinical sense. Therefore, results of these studies will be discussed separately.

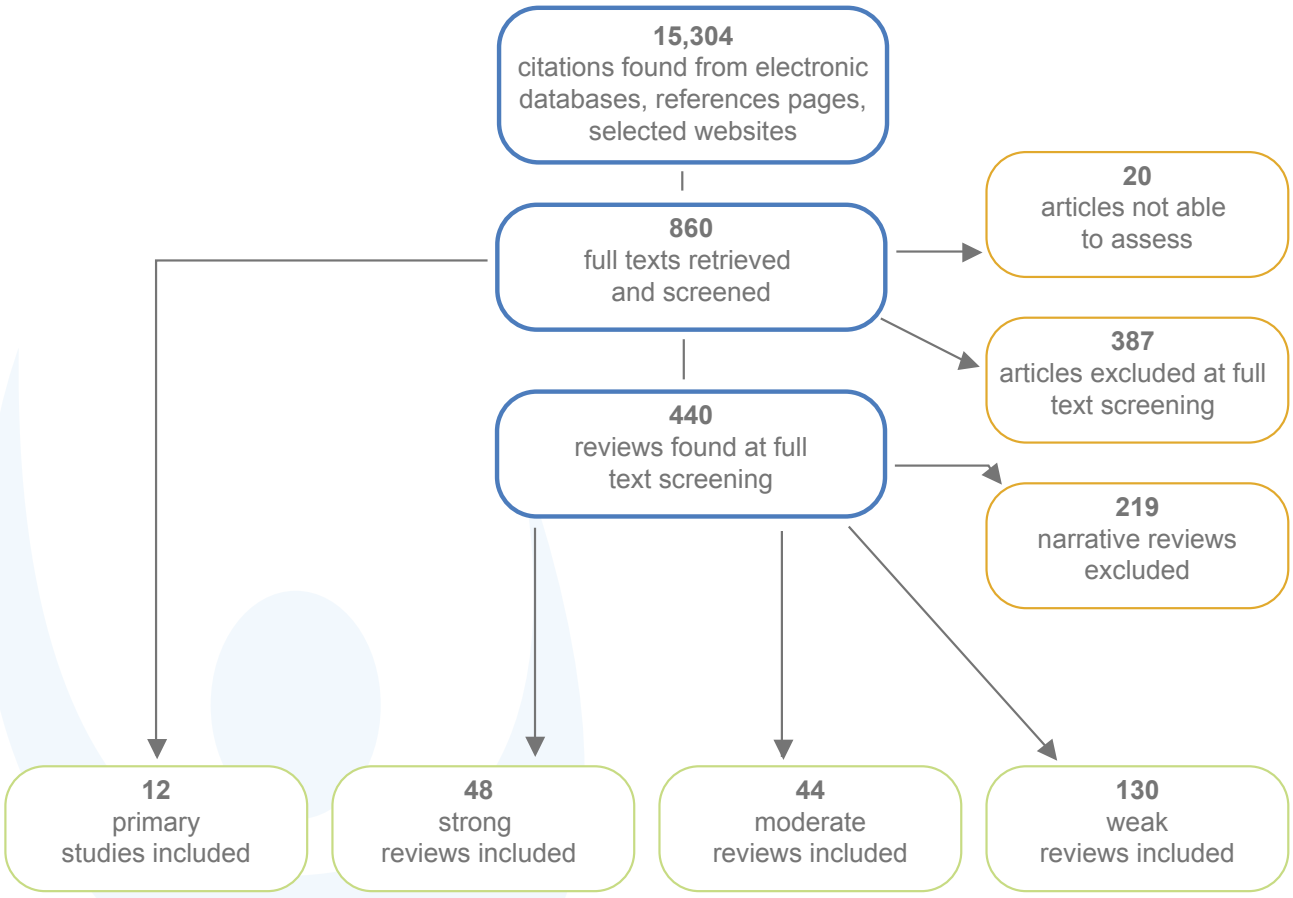
Results

Retrieval and ratings

Figure 1 illustrates the distillation of articles through the review process. Electronic databases, reference lists from reviews, and selected websites yielded 15,304 citations, after duplicates were removed. The title and abstract search resulted in the rejection of 14,444 articles as clearly not relevant; most citations were etiologic co-relational studies of risk factors, which were not the focus of this review. This process left 860 articles that were retrieved and rated for relevance. Of these, 387 were excluded as not relevant, leaving 12 primary studies and 440 reviews. Of the reviews, 219 were excluded because they were narrative reviews or opinion pieces. The remaining 221 reviews were quality assessed, with 48 rated as strong, 44 as moderate and 129 as weak. Only the strong and moderate reviews are reported here, as they have the greatest validity. Weak reviews most often did not report thorough search strategies and did not quality assess the included studies. A reference list of the weak-rated reviews is in Appendix D.

The results of the strong and moderate reviews are reported by condition: heart disease (including hypertension and hyperlipdemia); weight loss; diabetes; mental health (weight gain after pharmacologic treatment and eating disorders); pregnancy and newborn; and other conditions (renal diseases, malnutrition in the elderly, gastrointestinal disorders, phenylkentonuria, and liver disease). The reader is advised to look for more detail within the evidence tables. The evidence tables list reviews alphabetically by first author within each section or condition addressed. The details of interventions, such as the level of sodium or saturated fat intake, are found in the evidence tables, not often in the text. The two review questions on prevention and treatment were difficult to separate because most reviews analyzed the effects of interventions on treatment and prevention together. Even primary studies mixed the client populations, and prevention and treatment populations were not analyzed separately.

Figure 1. Search yield



Overweight or Obesity

Included studies

Overweight and obesity are global health problems that contribute to the non-communicable disease burden within our population (22). The prevalence of obesity and overweight is increasing in both adult and child populations throughout the world (23). Recent U.S. surveys estimate that one in every two adults is either overweight or obese (24). According to a recent U.S.-Canada Joint Survey of Health, approximately 21 per cent of Americans are obese compared with only 15 per cent of Canadians (25). This gap was primarily due to differences between American and Canadian women, with one in five American women obese compared to one in eight Canadian women (25). For children, overweight and obesity are known to have important effects on both physical and psychosocial health (23,26). Furthermore, childhood obesity is associated with a range of medical conditions, including poor pulmonary function, advanced growth and early maturity, hepatic steatosis and cholelithiasis (26). Weight loss may also be a component of managing some conditions, such as diabetes, hypertension and psychiatric conditions. Reviews of specific conditions should be consulted for additional information on weight loss.

Six reviews were rated as strong (13,22,23,26-28) and nine were rated as moderate (9,29-36) (See Quality Assessment Table 1). Among the methodologically strong reviews, four focused on treatment and two focused on prevention of overweight or obesity. Of the nine moderate reviews, six focused on treatment, one on

prevention, and two on both treatment and prevention of overweight or obesity. Typical methodological flaws included failure to assess and/or report the quality of included studies and failure to integrate findings beyond the description or listing of study results. Six systematic reviews were conducted in the U.S., four in the United Kingdom, two in Australia, one in Canada, one in Denmark, and one review had an unknown setting. The number of studies included in the reviews ranged from five to 108, and the studies were published between 1963 and 2003.

Strong and moderate reviews were grouped according to similar dietary interventions such as dietary advice, types of dietary interventions, behavioural interventions for adults, and behavioural and lifestyle interventions for children (See Evidence Table 1).

1. Diet focus

Low-fat diets versus calorie-restricted diets

Three recent reviews have focused on the potential of ad libitum and calorie-restricted, low-fat diets to achieve weight loss compared to traditional, balanced calorie-restricted diets. A moderate-quality meta-analysis by Astrup et al. (2000) examined changes in body weight, dietary fat intake and energy intake (9). Sixteen trials (19 intervention groups and 1,910 participants) were included. Results showed that low-fat intervention groups had greater weight loss than calorie-restricted control groups (mean difference 3.2 kg, 95% CI 1.9 to 4.5 kg) (9). Furthermore, having a pre-treatment body weight 10 kg higher than average was associated with weight loss of approximately 2.6 kg ($p = 0.011$) (9). Study duration varied from nine weeks to 12 months. Astrup et al. (2000) argued that weight loss was not related to the duration of the low-fat intervention; also weight loss reached a plateau after three to six months (9). Finally, the authors acknowledged that several factors might have influenced the reported magnitude of weight loss, including overestimation of effect because of flawed study designs whereby participants were aware of the intervention and made additional efforts to lose weight. As well, differences in weight-loss may have been due to the inconsistent application of the intervention (counselling provided at different intervals) and the high compliance behaviours of the participants (9).

In a more recent review, Schoofe et al. assessed the effects of advice about ad libitum low-fat diets versus calorie-restricted diets as a means of achieving sustained weight loss in studies at least six months long (22). Overweight or clinically obese participants were given dietary advice about low-fat diets. Four studies were included at six-month follow-up, five studies at 12 months, and three at 18 months. Although both the intervention and control groups lost weight, this difference was not statistically significant at six, 12 or 18 months. Clinically, the results indicate weight loss at six and 12 months for both intervention and calorie-restricted control groups but a slight weight gain at 18 months for the low-fat intervention groups (0.1 kg). Furthermore, there was significant heterogeneity in the results for weight loss at six and 12 months. Overall, results indicate that fat-restricted diets were as effective as calorie-restricted diets for long-term sustainable weight loss (22).

A review by Pirozzo et al. (2003) included six primary studies with a total of 594 participants (28). Comparisons included low-fat versus low-calorie diets; fixed-calorie, low-fat versus fixed-calorie, low-carbohydrate diets; low–fat, ad libitum versus low-calorie diets; and fixed-calorie, low-fat versus fixed-calorie diets. The duration of the interventions varied from three to 18 months with follow-ups of six to 18 months. There were no statistically significant differences between low-fat and other weight-reducing diets in terms of sustained weight loss. Mean weight loss at 12 to 18 months of follow-up in all studies was similar to that achieved in other longer term studies (2–4 kg) (28).

The methodological weaknesses of the studies included in the review by Pirozzo et al. (2003) included consistent failures to describe the method of random allocation of study subjects to groups; to report blinding procedures for caregivers or participants; to describe who assessed outcomes; and to describe whether

assessment was blinded to dietary intervention (28). Low-fat diets are as effective as other weight-reducing diets for overweight or obese individuals who are dieting for weight reduction. Pirozzo et al. (2003) suggest two main challenges in assessing the effectiveness of dietary interventions: the scarcity of long-term studies and large losses to follow-up. More research is required to identify which type of weight-loss diet is most effective in the long term for sustaining weight loss in overweight or clinically obese individuals.

Low-carbohydrate diets

Only one moderate-quality review by Bravata investigated the effects low-carbohydrate diets. This intervention has many popular forms and has sold many different consumer-oriented books and grocery store and restaurant "low-carb" foods. However, the authors found insufficient evidence to make recommendations for or against the use of low-carbohydrate diets (29).

Meal replacements

A strong meta-analysis by Heymsfeld et al. (2003) found that participants prescribed a partial meal-replacement (PMR) plan lost significant amounts of weight compared with those prescribed a conventional reduced-calorie diet (RCD). Subjects on PMR lost an average of 7 to 8 per cent of body weight, while those on conventional diets lost 3 to 7 per cent of body weight. The weighted mean difference between diets was significant (2.54 kg at 3 months, $p < 0.01$; and 2.63 kg at 12 months, $p < 0.01$)(27). The authors, upon finding no common definition of PMR, created an operational definition that included a plan or program involving one or more meals replaced by a commercially available, calorie-reduced product(s) fortified with vitamins and minerals as well as at least one daily meal consisting of regular foods. The authors acknowledged that their review was the first to systematically evaluate the results of randomized controlled trials of PMR plans for dietary management (13).

2. Behavioural or counselling focus — adults

Two reviews, rated as moderate-quality, assessed behavioural interventions such as counselling (15;22) in adults only, while two additional reviews considered interventions in both children and adults, with a focus on identifying key elements of successful interventions for weight loss or prevention (Glenny and McLean). McTigue et al. (2003) found that behavioural interventions, such as counselling, can promote modest weight loss when combined with pharmacotherapy (31). Weight loss had beneficial effects on blood pressure, lipid levels, glucose metabolism and diabetes incidence. The authors acknowledged that most efficacy trials included in their review were not done in clinical settings (31). This calls into question whether interventions such as behavioural counselling are easily incorporated into primary health care as currently organized. The authors recommended referral to programs offering intense counselling with behaviour therapy or combining office-based counselling with innovative approaches to delivery (e.g., videotapes or Internet-delivered adjuncts) (31). The authors also recommended future research into the efficacy and potential harms of long-term weight loss strategies. Dolan Mullen assessed the effects of education and counselling on various preventive health behaviours, including nutrition and weight loss (13). The standardized weighted effect size for nutrition/weight was 0.51 (95% CI 0.20 to 0.82). Multiple regression analysis indicated that the use of behavioural techniques, particularly self-monitoring, and the use of several communication channels produced larger effects.

Both McLean (2003) and Glenny (1997), in moderate-quality reviews, assessed behavioural interventions in adults and children (30,35). The effectiveness of interventions to prevent and treat obesity in adults remains unclear, although behavioural therapy and multi-component strategies may be useful (35). Continued therapist contact appears to be useful for maintaining weight loss. Surgery appears to be effective for patients with morbid obesity, and gastric bypass is more effective than gastroplasty (35). Both reviews concurred that the methodological quality of the studies was poor, with high loss to follow-up, high intervention dropout rates, and failure to describe allocation concealment (30,35).

McLean et al. concluded that pharmacological interventions appear to be effective for up to nine months, after which weight regain occurs (35). Another review by Poston et al. suggests that a substantial portion of the effects of pharmacological studies in obesity may be attributable to "placebo" effects and/or the lifestyle interventions that often accompany pharmacologic therapies for weight loss (34). They noted that a wide variety of lifestyle interventions are currently being used in these trials.

3. Behavioural and lifestyle focus — children

One strong review (26) assessed behavioural and lifestyle interventions for treatment of childhood obesity, and two moderate-quality reviews assessed the use of family therapy for weight loss in children (30,35). One strong review assessed the effects of dietary education on the prevention of childhood obesity (23).

Summerbell et al. (2003) included interventions with various components. Studies of behavioural interventions (n=13) addressed family therapy, cognitive-behavioural therapy, problem-solving and multi-component behavioural techniques. Multi-component techniques included an array of strategies such as goal-setting, record keeping of weight and food intake, and rewards. The remaining studies focused on diet, exercise, physical activity or the reduction of sedentary behaviours (26). The emphasis placed on each of these components varied and was dependent on the focus of the intervention. The authors included 18 randomized control trials with a total of 975 participants. Primary outcomes included weight, height and estimates of overweight and body mass index (BMI). Eighteen studies were found, most of which were very small and drawn from homogenous, motivated groups in specialist or hospital settings. Thus, the applicability to primary care may be limited. There was a limited amount of quality data on the components of programs for treatment of childhood obesity that favour one program over another. The authors found that no direct conclusions could be made (26).

Both McLean (2003) and Glenny (1997), in moderate-quality reviews, found that relatively few intervention studies examined the effectiveness of family-based behavioural interventions for maintenance of childhood weight loss (30,35). For obese children, family therapy and lifestyle modification appear to be effective for prevention and treatment respectively (35). Interventions targeting both parents and children for weight loss yielded positive results for obese children, with overall weight loss ranging from 1.4 per cent to 11.7 per cent (30). Parent training in behaviour change techniques appeared conducive to child weight loss (30), but may not apply to teenagers, as one study found greater weight loss when adolescents underwent treatment alone, without their mothers (18). Both reviews concurred that the methodological quality of the studies was poor, with high loss to follow-up, high intervention dropout rates, and failure to describe allocation concealment (30,35).

A strong review by Campbell et al. (2001) addressing obesity prevention in children, found seven studies, three with long-term follow-up (> 1 year) and four with short-term follow-up (> 3 months but < 1 year) (23). Two long-term studies showed a reduction in the prevalence of obesity in the intervention schools compared to the controls. One of these, Planet Health, focused on the combined effects of dietary education and physical activity. Although the prevalence of obesity declined for both boys and girls, the finding at two years post-intervention was statistically significant for girls only (odds ratio [OR] 0.47, 95% CI 0.24 to 0.93) (23). As well, girls in the intervention group had higher rates of remission of obesity than did girls in the control group (OR 2.16, 95% CI 1.07 to 4.35). The second long-term study evaluated the effects of a school-based dietary education intervention, the Multimedia Action (MA) strategy, in 1,321 children aged three to nine years. The MA strategy consisted of printed pamphlets, audiovisual aides and use of qualified staff who promoted the project within the school (23). At the 12-month follow-up, children in the intervention group had a statistically significant 12.2 per cent reduction in obesity and a 12.1 per cent reduction in overweight, compared to no change in the control group. Although statistically significant results were found, all seven studies included in the review by Campbell et al. (2001) had some methodological weaknesses including lack of allocation concealment or blinded assessment and protection against group contamination (23). Findings suggest that limited high-quality

data exist on the effectiveness of obesity prevention programs, and as such, no generalized conclusions can be drawn. The need for well-designed studies that examine a range of interventions remains a priority.

Summary

This Dietitians of Canada review focused on recent systematic reviews of obesity treatment. Many studies of obesity focused on dietary advice and calorie restriction. The majority of studies continue to demonstrate short-term weight loss effects, with modest long-term weight loss. More recent reviews have focused on possible effectiveness of calorie-restricted or ad libitum low-fat diets. These diets appear to achieve similar, modest sustained weight loss (22,24,37).

In terms of weight loss, other weight-reducing diets had low rates of sustained results at 12 and 18 months (28). Currently, there is insufficient evidence to recommend for or against the use of low-carbohydrate diets for the purpose of sustained weight loss (29). Behavioural interventions such as counselling can promote modest weight loss when combined with other interventions, including pharmacotherapy (31).

There is inconclusive evidence regarding multi-component weight-loss strategies targeting children (26). Some behavioural interventions such as family therapy and lifestyle modification appear to be effective in prevention and treatment of obesity in children (35). Further work in teenagers is needed to assess the effects of family therapy.

Data from existing reviews also calls into question the appropriateness of implementing certain interventions, such as behavioural counselling for weight loss, within current primary health care settings, where brief interventions are the norm (31). McTigue et al. (2003) recommend referral to programs that offer intense counselling with behavioural therapy or combining office-based counselling with innovative delivery approaches (e.g., videotapes or Internet-delivered adjuncts) (31). Dietitians were mentioned, among other health care providers, in the application of various weight loss interventions. Although the causes of obesity are multifactorial, trends suggest that obesity clusters in families, and interventions should therefore target children with parents who are overweight (26).

Diabetes Mellitus

Included studies

Fifteen reviews were found relevant to prevention or treatment of diabetes mellitus. Eleven reviews were methodologically strong and four were moderate. They are included in the tables (see Quality Assessment Table 2; Evidence Table 2) and in the discussion below. The 11 methodologically-strong studies all focused on treatment of diabetes (38-48). Of the four moderate studies, two focused on treatment, one on prevention, and one on both treatment and prevention (49-52). One review by McLean et al. focused on the possible benefits of omega-3 fatty acids on various conditions, including diabetes. The most frequent methodological flaws in the moderate studies were not reporting a comprehensive search strategy or a comprehensive assessment of primary studies.

Most of the reviews were conducted by investigators in the United States (n=8). Four were conducted by investigators in the United Kingdom, and one in each of the Netherlands, Belgium, Brazil and Australia. The reviews included a mean of 27 studies (range of 6 to 72), published from 1966 to 2003. The reviews are discussed below according to the intervention(s) they addressed. Since diet management is integral to diabetes management, virtually all multicomponent reviews for self-management of the condition include diet

interventions. Other reviews are more narrowly focused on specific diet interventions, including education, counselling and advice, as defined by reviewers.

1. Diabetes self-management education (DSME)

Six reviews focused on the effectiveness of diabetes self-management education (DSME). DSME has been defined most comprehensively by Norris et al. (40). It includes knowledge or information; diet, physical activity and other lifestyle behaviours; development of skills to improve gylcemic control and to prevent and identify complications; and coping skills. Knowledge may be gained through didactic or collaborative formats or some combination. Other aspects of treatment are usually collaborative to some degree. Collaborative formats refer to interactive techniques, including group discussions, hands-on practice, individual goal setting, and modeling. The reviews addressing DSME incorporated all of these components in various ways and focused on various target groups.

Norris et al. (45) reviewed the effectiveness of DSME in non-traditional settings including community gathering places such as community centres, libraries, non-clinical private facilities and faith institutions, as well as workplaces, homes, camps and schools. Based on reductions in glycated hemoglobin, fasting blood sugars and weight, they concluded that there was sufficient evidence to support the efficacy of DSME interventions in community gathering places for adults with Type 2 diabetes and at home for adolescents with Type 1 diabetes. There was insufficient evidence to support interventions in the workplace, recreational camps, or education of school personnel about diabetes.

In a separate review, Norris et al. (40) comprehensively reviewed the effectiveness of DSME in various settings for people with Type 2 diabetes. DSME included increasing knowledge, lifestyle behaviour changes, psychological and quality of life outcomes, and glycemic control. Positive effects were found for self-reported dietary habits and glycemic control in studies with up to six months of follow-up. Longer follow-up showed that interventions using regular reinforcement were sometimes effective in improving glycemic control.

In a review of eight randomized controlled trials, Van Dam et al. (42) concluded that interventions directly focused on enhancing patient participation in diabetic care (e.g., empowering group education or an automated telephone management program) improved patient self-care and diabetic outcomes.

Sarkisian et al. (41) reviewed the effectiveness of DSME for African-American and Latino adults over 55 years of age. The results are challenging to interpret because of the small number of studies in each population category and the variety of interventions assessed. Most interventions used some form of group counselling that was supplemented by one-to-one counselling. Various professionals delivered the programs, including pharmacists, nutritionists and diabetes educators. Interventions designed to be culturally appropriate appeared to be successful.

Eakin et al. (43) reviewed 10 studies that assessed the effectiveness of DSME among underserved groups (low income, minority or aged). There were mixed results among the outcomes that were measured. Three of nine studies reported significant reductions in any measure of blood glucose control. More than half of the studies (n=5) reported statistically significant weight reduction within the intervention groups at short term follow-up (less than one year).

2. Educational and behavioural interventions

Several other interventions related to diabetic control were the subject of strong reviews. A meta-analysis by Gary et al. (38) included 18 educational and behavioural interventions for clients with Type 2 diabetes. The interventions were similar to those in the DSME programs but not quite as comprehensive. Interventions varied

across studies: the duration ranged from one to 19.2 months (the median was five months); the frequency of visits ranged from two to 52 visits (median 8.5); 70 per cent of studies focused on calorie reduction and reducing fat intake; whereas 20 per cent emphasized self-monitoring of blood glucose. The pooled standardized effect size for glycated hemoglobin (GHb) was −0.43 (95% CI, −0.71 to −0.14), indicating a statistically significant moderate decline in the intervention group compared with the control group.

The effectiveness of educational and psychological interventions (similar to DSME) among adolescents with Type 1 diabetes was the subject of a meta-analysis by Hampson et al. (46). A wide variety of interventions were reported, the most common being skills training (38.7%) and dietary interventions (19.4%). Interventions were most often delivered by physicians, nurses, nutritionists and psychologists. Various outcomes were assessed, but GHb was measured in 62.9 per cent of studies. Despite the methodological shortcomings of the studies, small to medium effects for GHb reduction were found for the intervention groups. Methodological flaws included no sample size calculation, inadequate power to detect a difference if one was present, and the use of unreliable measures for some outcomes (particularly psychological outcomes). As well, studies guided by theory generated larger effect sizes than atheoretical ones.

A moderate quality meta-analysis of 21 randomized controlled trials by Ellis et al. (50) explored the effect of diabetic education on glycemic control. They also explored the potential components of education responsible for changes through a meta-regression. Included studies were done in outpatient settings. The teaching methods and intervention content varied from study to study, as did the duration of education and the number of teaching episodes. At the first post-intervention assessment, the intervention group had a weighted mean difference of 0.32 per cent (95% CI −0.571 to −0.069) reduction in HbA1c levels more than the control groups. Meta-regression indicated that face-to-face delivery, cognitive reframing and inclusion of exercise content accounted for 44 per cent of the variation.

Whittemore (52), in another moderate-quality review, integrated reviews and primary studies to examine the strategies and risk factors that influence lifestyle change in people with diabetes. The 72 studies clustered into the following broad areas: educational, behavioural, cultural, and health beliefs that positively or negatively impact behaviour change. The results were mixed, leading the investigator to call for theoretically-based research and better study methodology to improve the strength of outcomes in this area.

Ismail et al. (39) meta-analyzed the results of several psychological interventions directed at improving glycemic control among patients with diabetes. The random-effects model indicated a reduction in GHb favouring the intervention group (pooled standardized mean difference −0.32, 95%CI −0.57 to −0.07). There was no evidence that the intervention improved current blood glucose levels or produced a change in weight. Psychological stress was lower in the intervention groups (standardized mean difference −0.58, 95%CI −0.95 to −0.20).

3. Dietary management

Moore et al. (48) investigated the effect of initial dietary management on weight, glycemic control, morbidity, mortality and quality of life after the formal diagnosis of Type 2 diabetes. The studies had a variety of methodological flaws. Comparisons of dietary advice plus regular exercise compared to dietary advice alone showed a statistically significant improvement in glycemic control at six and 12 months in the groups with added regular exercise. The weighted mean difference in GHb was –1.0 per cent (95%CI -0.4 to -1.5) at one year. There were no high quality studies on the effectiveness of dietary treatment alone.

4. Disease management and case management

The review by Norris et al. (44) of the effectiveness and economic efficiency of disease management and case management formed the basis for recommendations of the Task Force on Community Preventive Services.

The essential components of disease management are identification of the entire population within a practice with diabetes; guidelines or performance standards for care; management of patients; and information systems for tracking and monitoring to assess effectiveness. Case management is characterized by five features: identification of eligible patients; assessment; development of an individualized plan of care; implementation of the plan; and ongoing monitoring. It is usually introduced where patients are at high risk for poor outcomes or high resource utilization, and the manager is often a nurse. The meta-analysis of results from 18 studies indicated that disease management resulted in improved GHb with a median change of −0.5 per cent (interquartile range −1.35% to −0.1%). These results are applicable to managed care organizations and community clinics in the United States and Europe. There was insufficient evidence of positive effects on other patient outcomes. Of the 11 studies assessing case management included in the meta-analysis, seven also had disease management in place. Improvement in GHb was similar in studies with case management only and those with both disease and case management. One of the gaps noted was that both disease and case management involve a variety of interventions, and it is important to determine which interventions are effective and encourage their future use. The follow-up period for most studies was less than two years. Long-term outcomes for patients involved in disease management and case management programs need to be determined.

5. Other multifaceted interventions

Renders et al. (47) examined the effectiveness of multifaceted interventions designed to enhance patient-oriented care with health professionals (n=12), the organization of care (n=9) and both (n=20) on the management of patients with diabetes. In 15 studies, patient education was added to the professional and organizational interventions. Multifaceted interventions, which include provider education and organization structures, such as a variety of reminder systems, can enhance the performance of health professionals in managing patients with diabetes. Few studies reported patient outcomes. Those that did had mixed results for GHb and other measures of glycemic control.

Gestational diabetes

In a meta-analysis comparing the effectiveness of treating gestational diabetes with diet plus insulin versus diet alone in preventing macrosomia, Giuffrida et al. (51) concluded that there was a potential benefit from the addition of insulin to diet modification, but not significantly enough to set treatment guidelines. They concluded that larger trials comparing the effects of these two interventions in preventing macrosomia were necessary. Current CDA guidelines for treatment of gestational diabetes recommend insulin therapy in addition to diet (53).

Low-glycemic index diet

The effectiveness of low-glycemic index (GI) diets versus conventional or high GI diets in lowering HbA1c was the subject of a meta-analysis by Brand-Miller et al. (49). Although low GI diets were more effective in reducing glycemic levels, more research is required because of the methodological shortcomings of many of the included studies. The weighted mean decrease in GHb was –0.43 per cent (95%CI -0.72 to –0.13). Many had small sample sizes and the duration of the diets varied from 1.9 to 52 weeks before the measurements were taken.

Summary

Interventions by professionals and organization of care delivery appear to improve performance results. However, it is difficult to assess whether these improvements translate to changes in patient outcomes because studies either did not measure these outcomes, or the results were mixed. Organizations planning such changes need to monitor patient outcomes as well. This would be particularly important when making decisions about organization of care based on efficiency or cost-effectiveness.

It appears that DSME is effective in community gathering places and a variety of outpatient settings (including primary care) in the short term. Long-term outcomes were mixed. It also appears that professionals other than physicians usually provide this care. Dietitians were listed among those professionals providing DSME care. DSME is also effective when culturally appropriate interventions are used. DSME should be encouraged in practice settings but still needs further evaluation to determine its effectiveness with older adults.

Two reviews included adolescents. One found evidence of effectiveness of at-home DSME for adolescents with Type 1 diabetes. The other found evidence of effectiveness over a much broader range of settings. Traditional outpatient and other settings should use DSME with adolescents. Disease management and case management are different but complementary processes for treating diabetes and thus should be encouraged.

Cardiovascular Disease

Hypertension

Included Studies
Six reports of five reviews rated as strong (54-59) and five reviews rated as moderate (60-64) (See Quality Assessment Table 3) were found regarding dietary management for treatment or prevention of hypertension (See Evidence Table 3). Many studies have focused on changes in intake of specific minerals, with fewer focusing on the effectiveness of diet counselling or advice to achieve such reductions.

1. Sodium, potassium, magnesium and calcium

Nine reports of eight reviews focused on the effects of reducing dietary salt (54-57,64). Two reports of one review by Hooper et al. (54,56) retrieved information from 11 trials involving a mixture of people with blood pressures reported as high normal (n=2326), untreated hypertension (n=387) or treated hypertension (n=801). Meta-analysis showed that systolic blood pressure was reduced by 1.1 mm Hg (95% CI –1.8 to –0.4), and diastolic blood pressure was reduced by 0.6 mm Hg (95% CI –1.5 to 0.3) at 13 to 60 months. Mortality and cardiovascular events were inconsistently reported. The review concluded that the intensive interventions (in terms of time and frequency of visits) are not suited to current models of primary care; they produce only small effects on blood pressure, and uncertain effects on morbidity and mortality. Promising results from two trials suggest that reduction of sodium intake may help some people stop antihypertensive medications. The same conclusions were supported by a review done jointly by the Canadian Hypertension Society, the Canadian Coalition for High Blood Pressure Prevention and Control, the Laboratory Centre for Disease Control at Health Canada, and the Heart and Stroke Foundation of Canada by Fodor et al. (64). They concluded that a reduction in dietary intake of 100 mmol Na per day produced a mean reduction of 3.7 mm Hg in systolic blood pressure and 1.0 mm Hg decrease in diastolic blood pressure. Effects were more pronounced in older subjects. A review by He and MacGregor (55), identified 17 trials (n=734) of people with hypertension and 11 trials (n=2220) of people with normal blood pressure, who underwent at least four weeks of modest salt restriction (2.5 g/day). They found a clinically and statistically significant reduction in both systolic (– 4.96 mm Hg, 95% CI –5.75 to –4.17) and diastolic blood pressures (–2.73 mm Hg, 95% CI –3.21 to –2.25) in people with hypertension and smaller reductions in people with normal blood pressure. The authors concluded that a reduction of six grams of salt per day (~ 100 mmol sodium /day) predicted a reduction in systolic/diastolic blood pressure of 7.11/3.88 mm Hg in participants with hypertension. The difference in the number of trials included by He and McGregor (55) and by Hooper et al. (54,56) (28 versus 11), was a result of different inclusion criteria. He and McGregor included any trial lasting at least four weeks, whereas Hooper et al. included trials lasting six months or more. The three trials in the review by He and McGregor, that were longer than six months, found no significant effect on blood pressure. He and McGregor also reported no significant changes in total cholesterol, triglycerides, low-density lipoprotein (LDL) or high-density lipoprotein (HDL) cholesterol levels. Thus results varied by differences in age, degree of hypertension and type of intervention as well as study design.

A meta-analysis by Jurgens and Graudal (2003) compared the effects of low-sodium and high-sodium diets on blood pressure in people with normal or elevated blood pressure (57). In 57 trials of mostly Caucasian people with normal blood pressure, low-sodium intake reduced systolic blood pressure by 1.27 mm Hg (95% CI –1.76 to –0.77) and diastolic blood pressure by –0.54 mmHg (95% CI –0.94 to –0.14). Median duration of interventions was eight days (range four to 1,100 days). Reductions were greater for Caucasians with elevated blood pressure (56 trials): systolic blood pressure was reduced by 1.89 mm Hg (95% CI –2.46 to –1.32); diastolic blood pressure by 4.18 mm Hg (95% CI –5.08 to –3.27); median duration was 28 days (range four to 365). Once again, these findings differ from those of Hooper et al. because of the studies with a duration of at least six months. The strength of this review was the attempt to conduct meta-analyses by ethnic groups. However, there were only eight trials of African-Americans, and the effect of salt reduction was significant only for reduction of systolic pressure (–6.44 mm Hg, 95% CI –9.13 to –3.74). The authors also analyzed renin, aldosterone and noradrenaline levels and found that all three increase with reduction of sodium, which would limit the impact on reducing blood pressure. At extremes of sodium reduction (200 mmol/day) there was a significant increase of five per cent in each of total cholesterol, LDL cholesterol and triglyceride levels. Once again, the impact of low sodium was only available for short-term follow-up.

Alam and Johnson assessed the effects of high salt intake in normotensive and hypertensive people with a mean age close to or greater than 60 years (65). A high-sodium diet (range 138 to >360 mmol Na/day) significantly increased both systolic (5.58 mm Hg) and diastolic blood pressure (3.5 mm Hg) in the entire sample, with a greater mean increases in blood pressure in elderly patients with higher sodium intakes.

Geleijnse et al. had a broader review question; they wanted to assess the effect on blood pressure of at least two weeks of changes in sodium and potassium intake and to assess the differences by age, sex, blood pressure, weight, and habitual sodium and potassium intake (60). Forty trials related to sodium and 27 related to potassium met their inclusion criteria. Sodium reduction (median: -77 mmol/day) was associated with a statistically significant reduction in systolic (– 2.54 mm Hg, 95% CI –3.16 to –1.92) and diastolic blood pressure (–1.96 mm Hg, 95% CI –2.41 to –1.51). Increased potassium intake (of 44 mmol/day) was also associated with statistically significant reductions in both systolic and diastolic blood pressure of similar magnitudes. Blood pressure response was larger in patients with hypertension, and was statistically significant for sodium but not potassium. The response persisted after adjustment for age, sex and habitual intake. Sodium reduction was associated with a larger diastolic response in participants over 45 years of age, but there was no apparent difference by sex.

Another review by Burgess considered the effects of potassium, magnesium and calcium (62) and included studies of both dietary counselling to reduce intake and supplementation. Diet counselling reduced sodium intake by 36 mmol/day, which was insufficient to achieve the modest blood pressure reductions cited previously. The conclusions were similar to those of the reviews described above: there was no evidence that potassium, calcium or magnesium supplementation would prevent the development of hypertension in people with normal blood pressure, nor reduce blood pressure in people with hypertension. A methodologically strong review by Griffith that separately meta-analyzed dietary (nine studies) and non-dietary (33 studies) intake of calcium found a statistically significant effect on blood pressure reduction from dietary changes (59).

2. Other dietary strategies to reduce blood pressure

Four more general reviews considered general dietary management of hypertension (58,61,63,66) (See Quality Assessment Table 3; Evidence Table 4). Two reviews by Campbell et al. and McAlister et al. were done to develop Canadian guidelines for treatment of hypertension (61,63). Both considered lifestyle modification and found that weight loss or maintaining healthy body weight and sodium restriction can help reduce blood pressure in people with hypertension (61,63). The third review by Mulrow et al. (two reports of one review) was concerned with the effectiveness of dieting to reduce body weight for controlling hypertension (58,67). Weight

loss was compared with regular diets and antihypertensive therapies. Six trials (n=361) compared weight reduction diets and normal diets. Weight loss of four to eight per cent of initial body weight was associated with a decrease in each of systolic and diastolic blood pressure of about 3 mm Hg, compared to mean declines of 6/5 mm Hg for anti-hypertensive medication (from evidence table). The pooled results for weight loss did not reach statistical significance. Patients who lost weight, however, required less intensive pharmacotherapy (58).

Campbell et al. (1999) reviewed the effects of alcohol intake on blood pressure (66). They identified 14 randomized trials and found among people who consumed alcohol at low levels at baseline, there was no difference (no change) in blood pressure in those who maintained low levels of intake compared with those who abstained. Among participants who drank more than two standard drinks per day, reducing alcohol intake reduced blood pressure in both individuals with hypertension and normal blood pressure.

Reducing cardiac risks

Included Studies

Nine recent reviews (68-76) considered the effects of reducing dietary fat on outcomes such as cholesterol levels, myocardial infarction, mortality, and other potential harmful effects. Older reviews have established the efficacy of low saturated fat diets in reducing serum cholesterol and low-density lipoprotein levels (77). These recent reviews have sought to establish a link between treatment and mortality and to assess the effectiveness of newer options for diet management such as soy and increased omega-3 fatty acid intake. Other groups have considered the effectiveness of diet management in the context of overall cardiovascular treatment. Three were rated strong (68,70,76) and six moderate (69,71-75) (See Quality Assessment Table 3; Evidence Table 5).

1. Decreasing dietary fat and saturated fat

Hooper et al. assessed the literature for the effect of dietary fat intake reduction on the prevention of cardiovascular disease (70). Meta-analysis of 27 studies found no significant effect of reducing dietary fat on total mortality or cardiovascular mortality. Cardiovascular events, however, were reduced by 16 per cent (rate ratio 0.84, 95% CI 0.72 to 0.99). Trials that lasted two years or longer provided stronger evidence of protection from cardiovascular events (rate ratio 0.76, 95% CI 0.65 to 0.90). The review by Pignone et al. assessing the effects of screening and diet therapy in subjects without coronary heart disease also found no significant effect of diet therapy on reducing total mortality, cardiovascular mortality levels or myocardial infarction, although serum total cholesterol declined by two to three per cent in the subset of studies that included diet therapy (72). Furthermore, Hu and Willet reviewed three trials of lowering total fat intake, five trials of increasing polyunsaturated fat intake, three trials of increasing omega-3 fat intake, and two trials of whole diet (Mediterranean diet) interventions (69). They found that simply lowering the percentage of energy from fat was not enough to improve lipid profiles or reduce coronary heart disease. However, they concluded that three strategies were effective in preventing coronary heart disease: substituting unsaturated fats for saturated and trans-fats; increasing consumption of omega-3 fatty acids from fish, fish oil or plant sources; and increasing consumption of fruits, vegetables, nuts, whole grains, and decreasing refined grain products (69). Hooper et al., in a review of secondary prevention, came to the same conclusions as Hu and Willett as to the most efficacious diet strategies (71).

Yu-Poth et al., in a review rated as moderate quality, evaluated the effects of the National Cholesterol Education Program's Step I and Step II dietary interventions in free-living subjects (74). The Step I diet specifies intake of less than 30 per cent of total energy from fat, less than 10 per cent of energy from saturated fat, and less than 300 mg of dietary cholesterol per day. The Step II diet recommends less than seven per cent saturated fat and less than 200 mg of dietary cholesterol per day. Study participants had to be free-living (i.e., not on a metabolic ward), and counselled on implementing low-fat diets. The intervention duration had to

be at least three weeks to stabilize plasma cholesterol levels. Thirty-seven trials were found. The Step I diet achieved statistically significant decreases in plasma total cholesterol (0.63 mmol/L, 10%), LDL . 0.49 mmol/L, 12%), triacylglycerol (0.17 mmol/L, 8%), and total cholesterol/HDL levels (0.50 mmol/L, 10%). The Step II diet achieved statistically significant decreases in plasma total cholesterol (0.81 mmol/L, 13%), LDL (0.65 mmol/L, 16%), triacylglycerol (0.19 mmol/L, 8%), and total cholesterol/HDL levels (0.34 mmol/L, 7%). Changes in dietary fat also had a significant impact on body fat: for every one per cent reduction in percentage energy from fat, body weight decreased by 0.28 kg.

Tang also considered the effect of dietary advice to lower total cholesterol (76). In a review of 19 trials, serum cholesterol reductions of 8.5 per cent at three months, 5.3 per cent at six months, and 8.5 per cent at 12 months could be attributed to dietary advice. Diets similar to Step II were more effective than those similar to Step I, and were of similar efficacy to diets aimed at lowering total fat intake or raising polyunsaturated/saturated fatty acid ratio (76).

2. Increasing omega-3 fatty acids

The effects of increasing fish oils (n-3 polyunsaturated fatty acids) from diet or supplements to control diets was assessed in a review by Bucher et al. that found 11 trials (n=15,806) (68). Although the review included both dietary and non-dietary fish oils, a separate meta-analysis of the two trials of dietary intake showed a reduction in overall mortality (relative risk [RR] 0.7, 95% CI 0.6 to 0.9), nonfatal myocardial infarction (RR 0.7, 95% CI 0.1 to 3.2), fatal myocardial infarction (RR 0.5, 95% CI 0.3 to 1.1), and sudden death (RR 0.1, 95% CI 0 to 1.1). The effect was due to an average 20 per cent reduction in triglyceride levels with little effect on LDL and HDL cholesterol levels.

Bucher et al. considered the effects of n-3 fatty acids (three trials) and other dietary interventions (16 trials) on reducing cholesterol levels and mortality, and total and coronary heart disease mortality (73). They found no significant effect on cholesterol levels or mortality. An Agency for Healthcare Research and Quality (AHRQ) evidence report that also considered both dietary and non-dietary intake of omega-3 fatty acids found no significant effect on total cholesterol, LDL, or HDL levels, but a favorable effect on triglycerides levels relative to placebo (pooled random effects estimate: -31.61, 95% CI -49.58 to -13.64) levels in patients with diabetes or metabolic syndrome (78).

3. Adverse effects of cholesterol reduction

In some older cholesterol lowering studies, non-illness mortality (suicide, accident or trauma) had increased in the treatment groups, suggesting adverse consequences of treatment. Muldoon considered both pharmacological and dietary interventions to identify potential harms associated with attempted cholesterol reduction (75). Nineteen trials were found: eight focused on primary prevention, 11 on secondary prevention, five on statins, and 13 on diet and non-statin drugs. Non-illness mortality (suicide, accident or trauma) was higher in the treated group than the untreated group (RR 1.28, 95% CI 0.94 to 1.74) in primary prevention trials, but the groups did not differ (RR 1.00, 0.65 to 1.55) in secondary prevention trials. In the 13 trials of dietary therapy and non-statin drugs, there was a trend toward increased deaths from suicide and violence in the treated group. No analysis was done of dietary interventions alone. The authors concluded that cholesterol-lowering interventions do not increase the risk of non-illness mortality.

4. Soy protein

A moderate-quality review by Costa considered trials of supplementation and dietary intake of soy protein (See Quality Assessment Table 4; Evidence Table 6) (79). Meta-analysis was not done. The review found a statistically significant decrease of six to eight per cent in mean LDL cholesterol levels in all participants

receiving dietary interventions, which included participants with both normal and elevated cholesterol levels. Interventions were of short duration (mostly five to six weeks). The average soy protein consumed to achieve these benefits was 30 to 47 grams per day. There were no effects on triglycerides or HDL cholesterol levels.

5. Preventive interventions for women and children

Three reviews evaluated interventions to reduce cardiovascular disease risk in women (See Quality Assessment Table 4; Evidence Table 8) (80-82). Wilcox et al. (2001) found that dietary interventions had a small, but significant, effect on weight reduction and total serum cholesterol levels (82). The effect was more likely to be significant in studies of women over 50 years of age and those with less than six months follow-up.

Krummel et al. (2001) considered more population-based interventions, although many of the interventions could have been done in primary care settings. They concluded that few cardiovascular interventions targeted women and they recommended qualitative research; evaluation of tailored programs; study of relapse prevention, motivation and maintenance; and evaluation of policy and environmental interventions (80).

One review by Poustie focused on dietary treatment of familial hypercholesterolemia in children and adults (81). Dietary intervention is the main treatment for children. Cholesterol-lowering diets were compared with no intervention or other dietary interventions. Of seven studies included, none found an effect on cholesterol levels of participants.

6. Multiple risk-factor interventions

Ten large trials of multiple risk-factor intervention were included in a review by Ebrahim and Davey Smith (83). Studies included OXCHECK, Gothenberg study, MRFIT study, and the Oslo diet and exercise study. The trials compared counselling and information with usual care. Meta-analysis showed significant effects on systolic (net difference –3.9 mm Hg, 95% CI –4.2 to –3.6) and diastolic blood pressure (net difference –2.9 mm HG, 95% CI –3.1 to – 2.7); when trials including pharmacological therapy for blood pressure were excluded, the effect was smaller but still significant. Blood cholesterol levels showed a small and non-significant reduction. The pooled effects on total and cardiovascular disease mortality were not significant. Interventions using personal or family counselling and education, with or without pharmacological treatment, appear to be more effective in reducing cardiac risk factors.

Summary

Over the short-term, but not the long-term, dietary sodium reduction resulted in lower blood pressure, with consistently greater responses in people with higher rather than normal blood pressure and in older rather than younger participants. There are few data to distinguish the effects of sodium reduction by sex or ethnicity. Dietary calcium and potassium intake had a statistically significant effect on blood pressure, although the effect may not be clinically significant; longer follow-up (over six months) is required to establish effects. Most studies have not reported the effect of sodium restriction on mortality.

Weight loss interventions modestly reduced blood pressure by about 3mm Hg. Antihypertensive medication resulted in greater reductions in blood pressure than weight loss; however, in patients who lost weight, less intensive pharmacotherapy was required to treat their hypertension (58).

For participants with hypertension, normal blood pressure and an initial intake of more than two standard servings of alcohol per day, reducing alcohol intake resulted in lower systolic and diastolic blood pressure. Again, the reduction in blood pressure is probably not clinically significant. Studies of soy protein were very short term and affected only LDL reduction.

Multiple risk factor interventions can be done in primary care and they have demonstrated reductions in systolic and diastolic blood pressure, as well as small but statistically significant reductions in total cholesterol levels. Total or cardiovascular mortality were not reduced (83).

There is a convergence of supportive data on reducing cholesterol levels and cardiac events by lowering overall fat and saturated fat intake, and increasing omega-3 polyunsaturated fat intake (Step I, Step II, Mediterranean diet) (70,74), rather than focusing on weight loss or lipid lowering alone (69,71). While successful weight loss modestly affects risk factors, long-term maintenance of lower weight is very difficult. Increasing n-3 fatty acids reduced overall mortality and fatal and non-fatal myocardial infarction.

Other Conditions

1. Chronic Obstructive Pulmonary Disease

Two reviews reported on interventions to improve nutrition in patients with chronic obstructive pulmonary disease (COPD) (See Quality Assessment Table 4; Evidence Table 9) (84,85). They are included here, although they report on a mixture of oral dietary versus supplementation interventions, and they do not separate them in the analysis. Ferreira found a small, statistically non-significant effect of supplementation (calories and fat) on improvements in anthropometric measures, lung function and functional exercise capacity (84). In another review, Ferreira concluded that high carbohydrate meals were associated with an increase in carbon dioxide production and a decrease in exercise capacity. As well, short-term (less than two weeks) high carbohydrate load increased stress on the ventilatory system, but no consistent effect was found for weight, anthropometry or exercise capacity in the longer term (85).

2. Phenylketonuria

Phenylketonuria (PKU) is usually treated in specialist centres, with ongoing follow-up of routine health issues in the primary care setting. One review by Poustie, rated methodologically strong, was found on the effectiveness of dietary interventions for PKU (See Quality Assessment Table 4; Evidence Table 10) (86). PKU is an inherited disease requiring dietary restriction of phenylalanine beginning in the neonatal period. The review considered the effectiveness of a low-phenylalanine diet begun early in life and whether the diet had to be continued for life or could be relaxed or discontinued during adolescence. Evidence from four quasi-randomized trials showed that blood phenylalanine levels were lower in those on a low-phenylalanine diet than in those on a less restricted diet. In addition, one study demonstrated a difference of five IQ points in favour of those on the low-phenylalanine diet compared to the less restricted diet. Within this review no studies evaluated the level of restriction required or if it was safe to relax the diet later in life (86).

3. Epilepsy

Epilepsy refractory to current medications is a serious condition in a small proportion of children. The efficacy of ketogenic diets for the reduction of seizure frequency in children with epilepsy was assessed by Lefevre in a review of 29 studies (See Quality Assessment Table 4; Evidence Table 11) (87). Outcomes were the proportion of children with complete elimination of seizures and those with greater than 50 per cent or 90 per cent reduction in seizures. The results consistently show significant reductions in seizures: 16 per cent of children had complete cessation; 56 per cent had a greater than 50 per cent reduction; and 32 per cent had a greater than 90 per cent reduction in seizures. However, the evidence is weak: of 11 studies, nine were retrospective case studies (all from the same institution) and two were prospective uncontrolled studies. There is also some concern that some children developed hypercholesterolemia and hypertricylceridemia because of the very high fat, low carbohydrate diet.

4. Irritable bowel syndrome

Irritable bowel syndrome is a functional gastrointestinal condition characterized by various combinations of pain, diarrhea and/or constipation. It is currently treated symptomatically, including lifestyle changes, to control symptoms. One review by Spanier considered multiple therapies (Chinese medicine, psychological, alteration of intestinal microflora) and exclusion diets (e.g., lactose and fructose avoidance) for irritable bowel syndrome (See Quality Assessment Table 4; Evidence Table 12) (88). The review was inconclusive, as most studies were not controlled.

5. Inflammatory bowel disease

Crohn's disease and ulcerative colitis are the most common inflammatory bowel diseases (IBD) in Canada. Malnutrition is common in these patients and diet is an adjunct therapy to medications and/or surgery. MacLean et al. (2004) found 13 studies of the effects of omega-3 fatty acids (mixed dietary and supplemental studies) on IBD. Effects were mixed for clinical score, sigmoidoscopy score, histology score, and induced remission and relapse, with no statistically significant reduction in the need for corticosteroids (78) (See Quality Assessment Table 4; Evidence Table 13).

6. Renal disease

Diet therapy is an accepted therapy in treatment of renal disease, usually in specialist settings. Recent reviews have focused on the possible benefits of newer therapies and the ongoing controversy regarding the utility of low-protein diets in slowing progression to renal failure. The review by MacLean et al. also considered the effects of omega-3 fatty acids on renal disease (See Quality Assessment Table 4; Evidence Table 13) (78). The results of nine studies showed varying effects on serum creatinine levels and creatinine clearance and no effect on progression to end-stage renal disease. Two reports of one review by Fouque tried to determine the efficacy of low-protein diets in non-diabetic adults with chronic renal failure (89,90). Seven trials (n = 1494) randomized participants to reduced protein intake or higher protein intake, and followed patients for at least one year. The primary outcome was a number of "renal deaths," defined as the need to start dialysis. Fewer renal deaths occurred in the low-protein group than in the high-protein group (odds ratio 0.62, 95% CI 0.46 to O.83); the number of patients needed to treat for one year in order to avoid one renal death ranged from four to 56.

Another review by Waugh considered whether protein restriction slowed or prevented progression of diabetic nephropathy to renal failure (91). Five studies were found. Overall, a protein-restricted diet of 0.3 to 0.8 g/kg for at least four months appeared to slow the progression of diabetic nephropathy, but the review was not able to specify the level of protein to recommend or the level that would be acceptable to patients. In addition, the included studies used proxy measures of outcome, such as creatinine clearance instead of longer-term outcomes such time to dialysis or prevention of end-stage renal failure.

7. Fatty liver disease

Non-alcoholic fatty liver disease is an emerging issue, and diet treatment is currently infrequently prescribed. Weight reduction was assessed as a treatment for nonalcoholic fatty liver disease in a moderate quality review by Wang (See Quality Assessment Table 4; Evidence Table 15) (92). Fifteen trials met inclusion criteria, but only one was a randomized trial, and most studies had small samples. The overall quality of evidence was poor. All 15 studies demonstrated an improvement in liver outcome after weight reduction, but half did not report histologic findings. The authors concluded that there was little evidence to support or refute recommendations for weight loss for patients with fatty liver disease.

8. Protein-energy malnutrition in the elderly

Baldwin et al. (2004) examined evidence regarding dietary advice and improvement of nutritional intake for adults with illness-related protein-energy malnutrition, both in hospital and in the community (See Quality Assessment Table 4; Evidence Table 16) (93). This review reported no statistically significant differences

in weight change for the following groups: those receiving dietary advice compared with no advice, those receiving dietary advice compared with advice plus supplements, and those receiving dietary advice plus supplements compared with no advice (93). Groups receiving supplements lost significantly less weight than did those receiving dietary advice only (weighted mean difference 1.09 kg, 95% CI 0.29 to 1.90) (93). This review highlights the lack of evidence on the provision of dietary advice for management of illness-related protein-energy malnutrition. Results suggest that oral nutritional supplements may be more effective than dietary advice alone or may provide an additional benefit in enhancing short-term weight gain. However, it remains uncertain whether such benefits can be sustained or whether survival and morbidity can also be improved. A large, adequately-powered randomized controlled trial is needed to compare the efficacy of different forms of therapy to increase dietary intake in people with illness-related malnutrition and to examine the effects on clinical function and survival.

9. Mental health

Patients with mental illnesses may have varying nutrition problems either as a result of their condition, such as in eating disorders, and/or as a side effect of the medications used in treatment. Weight gain is a frequent side effect of anti-psychotic medication. Two reviews by Sharpe and Werneke of moderate quality focused on weight loss in psychiatric patients taking anti-psychotic medications (See Quality Assessment Table 4; Evidence Table 17) (32,33). Both reviews concluded that behavioural approaches involving diet, exercise and drug treatment may be effective for weight loss in patients with mental illness (32,33). They also suggested that behavioural interventions may need to be adapted for such patients. In addition, the authors cautioned that clinicians need to be persistent in monitoring and intervening if weight gain occurs (32,33). Currently, many methodologically-weak studies exist on behavioral weight-loss interventions for psychiatric populations. Weaknesses include small sample sizes, lack of suitable control groups, insufficient study duration and follow-up, and failure to use random allocation procedures (33). Both authors agreed that further high-quality research is needed.

Another systematic review by Faulkner on weight gain control in schizophrenics identified 16 studies, seven of which focused on behavioural interventions (94). Diet alone (calorie restrictions of 1,000 to 2,500 cal/day) was effective for short-term weight loss, but education and behavioural reinforcement produced better maintenance of weight loss. As in other weight loss programs, those incorporating multiple behavioural components and exercise were also associated with better limitation of weight gain and weight maintenance. Dropout rates were similar to those found in commercial community programs.

Bianchi-Demicheli et al. identified seven treatment studies in a review of premenstrual dysphoric disorder (95). One study found that increased carbohydrate intake was effective for symptom reduction, but reductions in salt, sugar, alcohol or caffeine intake were not effective. The beneficial effect of increased carbohydrate intake was confirmed by an in-hospital study, which found that a carbohydrate-rich and protein-poor evening meal during the late luteal phase reduced depression, tension, anger, confusion, sadness and fatigue, and improved alertness and calmness.

Two reviews by Pratt and Austin on the prevention of eating disorders are of interest, as dietitians in primary care may be in a position to influence prevention activities if they are found to be effective (96,97). The primary studies identified did not assess eating disorder diagnosis as an outcome, but instead used proxy measures, such as eating, eating attitudes, restraint and body dissatisfaction. The conclusions of the reviews are not promising, but reveal only short-term changes in restraint, body dissatisfaction and self-esteem.

10. Pregnancy and newborns

Four reviews related to pregnancy and childbirth were summarized (See Quality Assessment Table 4; Evidence Table 18) (98-101). Preventing low birth weight was the subject of a wide-ranging review by Lu et al. (2003). Dietary interventions, including 17 evaluations of the Special Supplementation Food Program

for Women, Infants, and Children (WIC) in the United States, were considered (99). WIC participation, a community based program, was associated with a 25 per cent reduction in the incidence of low-birth-weight infants and a 44 per cent reduction in very-low-birth–weight infants. The review did not find any specific macronutrient or micronutrient supplementation to be protective for preterm birth. These results were supported in a second review, by Kramer, which found that dietary goals and maternal weight gain were achieved, with reductions in small-for-gestational-age infants (odds ratio 0.68, 95% CI 0.56 to 0.84), but no effect on rates of preterm birth (98).

Salt restriction is not currently recommended to prevent or treat pregnancy induced hypertension or pre-eclampsia (102). This recommendation is consistent with the results of the review by Duley of the effect of reduction of salt intake during pregnancy on the risk of pre-eclampsia. Only two trials were identified (101). The authors concluded that there was insufficient evidence to provide reliable recommendations regarding salt intake for prevention of pre-eclampsia, and no evidence to support reduced salt intake for treatment of pre-eclampsia.

Broader interventions, identified as pre-conception care, including screening and nutrition interventions, were reviewed by Korenbrot (100). All studies of women with diabetes found that pre-conception care resulted in improved glycosylated hemoglobin levels, fewer maternal hospitalizations, shorter in-patient stays during pregnancy, and reduced use of neonatal intensive care. In addition, early identification of hyperphenylalanine was addressed in four trials. Dietary restrictions resulted in lower rates of maternal hyperphenylalanine during early pregnancy and were associated with improved birth weight and head circumference and reduced incidences of fetal malformations and neonatal deaths (100).

Data from one review on support of breastfeeding were not extracted, as none of the interventions were done by nutritionists; most were done by lactation consultants (103). However, nutritionists could potentially provide such support in primary care. The review did find that professional support statistically reduced cessation rates of any breastfeeding (RR=0.89, 95% CI 0.81 to 0.97), but not exclusive breastfeeding (RR= 0.90, 95% CI 0.81 to 1.01).

Summary

No research evidence exists that the diet strategies assessed in the current reviews improves outcomes in patients with COPD (84,85), irritable bowel syndrome (88), inflammatory bowel disease (78), or fatty liver disease (92). Evidence is inconclusive regarding effective weight loss strategies for psychiatric patients on anti-psychotic medications. Dieting resulted in short-term weight loss in people receiving pharmacological treatment for mental illness; education and behavioural approaches helped with maintenance of weight loss (32,33,94). There is also insufficient evidence to make recommendations about salt intake and its effect on pre-eclampsia in pregnancy (101) and on dietary advice for management of malnutrition in elderly people (93).

Although the quality of the evidence is weak, seizures were significantly reduced in children with epilepsy who received ketogenic diets; however, this positive effect must be carefully balanced with the findings that cholesterol and triglyceride levels increased (87). Protein restriction reduced the need to start dialysis in non-diabetic adults with chronic renal failure and slowed the progression of nephropathy in patients with diabetes (89-91).

Improving the diet of pregnant women can reduce the incidence of low-birth-weight, very-low-birth-weight (99), and small-for-gestational-age infants, but does not affect preterm births (98). As well, infant birth weights were improved in women with hyperphenylalaninemia (100).

Inside The Black Box: Which Interventions Alter Dietary Intake?

The reviews discussed in the previous section often did not provide detailed descriptions of the interventions. Interventions were likely to be classified by type, with some detail of duration and, perhaps, intensity and intervention provider. However, 11 reviews specifically compared intervention types or components of interventions that resulted in significant changes (See Quality Assessment Table 5; Evidence Table 19) (4,31,104-112). In addition, one review provided some economic evaluation (106). Furthermore, while the preceding studies usually focused on treatment of specific health conditions, the following reviews are directed to the promotion of a healthy diet or lifestyle, or to the primary or secondary prevention of disease.

Hardeman et al. (2000) reviewed the literature to identify effective behavioural interventions for the prevention of weight gain (excluding interventions aimed at weight loss) (113). Behavioural interventions were based on various theoretical concepts and models, such as the health education model, the behavioural model, social learning theory and social cognitive theory. Diet and physical activity usually resulted in positive effects, although outcomes were based on self-report. Effects on weight were mixed, and follow-up was generally short. Smaller effects on weight gain were found among participants who had low incomes, were students, or those who smoked, which may reflect barriers to program participation. Many participants in community-based studies were overweight or obese. Study dropout was higher among participants who were thinner and had lower incomes. They were not able to identify specific interventions that were more effective.

Pignone et al. (2003) reviewed the evidence on the effects of counselling for promoting healthy diet, not treatment of disease. They found 21 trials of at least three months duration. Dietary counselling produced modest changes in self-reported consumption of fat, fruits and vegetables, and fibre. More intensive interventions were more likely to produce important changes than brief interventions, as were interventions using interactive health communications or computer-generated phone or e-mail messages. Brief counselling produced small dietary changes, but the effect on health outcomes was unclear, usually because these were not assessed in the primary studies. Counselling components included dietary assessment, family involvement, social support, group counselling, emphasis on food interaction (taste testing and cooking), goal setting encouragement, and advice appropriate to the target audience. Interventions that included three or more of these components resulted in larger effects than studies using one or two components (112).

A review by Ammerman et al. (4) assessed the effectiveness of behavioural dietary interventions in promoting dietary change (i.e., reducing fat intake and increasing fruit and vegetable intake) related to chronic disease risk. This extensive review included studies of more than 40 participants of any age that were published in English since 1975. It identified 104 articles reporting on 92 studies.

More than three quarters of the studies reported significant increases in fruit and vegetable intake, with an average increase of 0.6 servings per day and a significant 7.3 per cent decrease in per cent of calories from fat (for example, from 34 per cent of calories to 26.7 per cent). While fat reduction is thought to be potentially clinically significant, it is unclear if the fruit and vegetable increase is clinically important. This review included school-based and work-site interventions, as well as health-care facility interventions for adults who were healthy, at risk, or diagnosed with disease. Interventions were more successful in adults at risk or diagnosed with a disease than in healthy adults. Goal setting and use of small groups showed particular promise for modifying dietary behaviour.

A review by Newell of interventions to improve compliance with non-pharmacologic management of cardiovascular disease found that partner-focused and structural strategies, such as giving aids (nicotine chewing gum), monitoring compliance and giving feedback about monitoring compliance, showed the most consistent benefits. Patient-focused strategies had mixed benefits, and physician-focused strategies were not

effective (108). In a review on dietary compliance, five of 15 primary studies found significant improvements in dietary compliance. All included patient educational counselling, one with additional behavioural counselling, two with additional spouse participation, and four with additional patient monitoring (108). Seven studies assessed multi-strategy interventions for weight loss. Three found significant improvements in compliance with weight loss and included intensive education programs with behavioural intervention of goal-setting, self-monitoring and feedback. An older review by Burke of compliance in heart disease treatment found 11 studies targeting eating behaviour (110). Once again, the successful strategies included behavioural skill training, self-monitoring, telephone/mail contact, self-efficacy enhancement, and external cognitive aids such as appointment reminders and reminder charts.

Cooper et al. (2001) reviewed 12 meta-analyses of education for people with chronic illness (111). The educational interventions were poorly described, and no description of theoretical models or adherence to such models was provided. The effects of education were usually small and reported for only six months of follow-up. In general, effects were larger for knowledge and smaller for self-care and psychological outcomes; physical effects fell between the two extremes. There was no consistent pattern of effect across outcomes in terms of frequency or duration of contact. Details of educational approaches were inadequate to replicate, and mostly presented content as opposed to approach. Effects by educational approach could not be differentiated, but some evidence indicated that didactic (education only) and psychosocial strategies produced smaller effects than enhanced education (e.g., skill practice, enlisting support) or combinations of behavioural, cognitive and affective therapies, particularly in people with diabetes and hypertension.

McTigue et al. gathered evidence on treatment of obesity in adults (31). They identified 17 trials of counselling, which showed modest effects on weight loss (three to five kg) over six to 12 months. Counselling was most effective when intense and combined with behavioural therapy.

Specific strategies aimed at weight maintenance, such as self-monitoring, were effective. In turn, weight reduction improved blood pressure, lipid levels and glucose metabolism, and decreased diabetes incidence.

Another review, by McClure et al., rated as moderate quality, assessed whether providing feedback on individual biomarker status (e.g., cholesterol levels, blood pressure and weight) could promote behaviour change (107). Eight studies were included, which focused on tobacco use, weight change and physical activity. Three studies evaluated the effects of dietary changes to lower fat intake, using cholesterol level as the biomarker of interest. Participants received education and printed materials and set goals. Those who were given information about their cholesterol levels were more likely to report greater intent to change dietary habits “a lot” and to report eating less red meat, cheese, butter and fast food. However, the groups did not differ for cholesterol levels at last follow-up. In another review by Bankhead, of 30 studies of dietary change after cholesterol screening, 28 reported positive changes in diet and two reported no change; 19 of 21 studies found reductions in cholesterol levels and two found no change (104). In addition, 11 of 15 studies reported an increase in exercise, and eight of 11 studies reported weight loss. Thus, cholesterol screening can have a positive effect on health behaviours. The applicability of this review to primary care is limited by the fact that volunteers for screening were solicited at malls and community fairs, so that those screened may be more likely to be motivated to make changes as compared with routine screening done in a primary care setting. Also, blood cholesterol levels were reported at follow-up only for those who were screened.

Ashendon, Silagy and Weller (1997) reviewed the effectiveness of promoting lifestyle changes, including dietary changes in general practice. Ten trials were identified, six on dietary advice alone and four on broader lifestyle counselling, mainly by physicians (109). Interventions were usually done by physicians; other sources of interventions included nurses, dietitians and mailed letters. The specific effects on changing diet were mixed in terms of fat and fibre intake, and no significant differences were found for lipid levels, blood pressure or weight

loss. The authors concluded that although many interventions showed promise in effecting small changes, none appear to produce substantial changes.

Norton et al. (2003) reviewed evidence on the effect of parental involvement on primary prevention of cardiovascular disease in children. Seventeen studies were found, five of which were trials that included a parental component. In addition, some studies were community, rather than primary care, interventions. However, the authors concluded that positive parental modeling could have a significant effect on children's lifestyle health beliefs and behaviours, which last beyond adolescence. Parents were effective teachers of health habits at home when prompted by health educators. However, parental influences vary by ethnicity, race, sex and socioeconomic factors (105).

Lastly, Pavlovich et al. (106) conducted a systematic review of studies of the cost-effectiveness of nutrition services in outpatient settings for any condition. Thirteen studies were included and provided consistent evidence to support the cost-effectiveness of nutrition services in reducing serum cholesterol levels (US$20 to $1,268, per mmol/L decrease in LDL levels) and blood glucose levels ($5/mmol/L decrease). However, these findings were based on nine studies of cholesterol reductions (weak or inconclusive evidence) and only one study of glucose reductions (weak evidence), and thus confidence in these findings is limited.

Summary

Interventions that are feasible for physician- and nurse-based primary care settings as currently set up may not be effective (31,109). More intense interventions are required (31), in terms of frequency, number and duration of contacts, and effectiveness is increased as the number of components increases beyond two (112). Integrating dietitians into primary care may be a way to increase intensity of interventions. Involving a spouse or families increased the likelihood of significant outcomes (105,108). Brief interventions produced self-reported dietary changes, but effects on health outcomes were unclear (112).

Interventions were more successful in people at risk or with a diagnosed disease than in healthy populations. Goal setting and use of small groups showed particular promise for modifying dietary behaviour (4).

Dietary Advice Given by a Dietitian Compared with Other Health Care Professionals or with Self-Help Materials

Included studies

As previously stated, dietitians are not usually found in primary care offices in Ontario and may only be available to consumers through hospital clinics (e.g., diabetes education or cardiac rehabilitation) or through private consultation. Therefore, dietary education in primary care is usually done by family physicians, practice nurses or by self-help materials. In order to answer this question, we considered systematic reviews and randomized or clinical controlled trials of any dietary advice given by dietitians compared with that given by other health care professionals or with any print, Internet or other audiovisual materials.

Two reports of one systematic review (See Quality Assessment Table 6; Evidence Table 20) (114,115) and 14 reports of 13 additional primary studies were found (See Quality Assessment Table 7; Evidence Table 21). Five of the primary studies were primarily focused on prevention (116-121), whereas eight focused on treatment (122-129). Nine studies were conducted in the United States, three in Canada and one each in Israel and the Netherlands. Overall, the quality of the included studies was quite good Strengths included randomized design (11 trials), outcome measures with known reliability and validity, over 80 per cent follow-up (10 studies), and

intention-to-treat analysis (11 studies). Weaknesses included lack of reporting on selection bias (number of people eligible for participation and the proportion eligible who agreed to participate); inclusion of a sample size calculation (about half of studies); and inadequate reporting of potential confounders (about half of studies).

The target population of all studies was adults, except one which focused on children with hypercholesterolemia and their parents (120). Dietitians were compared with doctors, nurses, chiropractors, commercial weight loss programs and self-help materials. Outcomes of interest varied across studies, but most related to cholesterol levels. The systematic review (114,115) and eight additional primary studies that aimed to reduce cholesterol levels were identified (116,117,119,121,124,127-129). Other relevant studies assessed effects on weight loss in a general population (122,125); reducing or preventing weight gain in women with breast cancer (118,126); and reducing blood pressure (123). Only one study explicitly identified the theoretical basis of the interventions, the Transtheoretical Model of Change (129). The individual studies are briefly described below.

1. Studies primarily targeting cholesterol levels and cardiovascular conditions

The Cochrane systematic review by Thompson et al. compared the effects of advice from dietitians with advice from other health professionals or with self-help materials on reductions in blood cholesterol levels (114,115). The primary studies included adults over 18 years of age, with or without previous myocardial infarction or heart disease. Four studies compared dietitians with doctors, one with nurses, one with health counsellors and seven with self-help resources. The pre-post changes for serum cholesterol within treatment groups varied considerably, but tests for study heterogeneity were null. In the dietitian–physician studies, mean change in serum total cholesterol from baseline to follow-up ranged from -1.00 to -0.47 mmol/L in the dietitian groups compared with -0.82 to -0.13 mmol/L for the physician groups. Meta-analysis showed that the net mean difference between dietitians and physicians was ~ 0.25 mmol/L, (95% CI –0.37 to –0.12), favouring dietitians. In the dietitian to self-help materials comparisons, baseline to follow-up declines in the dietitian groups varied from -0.60 to -0.05 mmol/L compared to -0.02 to +0.18 mmol/L in the self-help materials groups. The net mean difference between dietitian and self-help materials was ~ 0.10 mmol/L, (95% CI –0.22 to 0.03), which was not statistically significant. Thus, it was reported that dietitians were better at lowering blood cholesterol levels than doctors, but there was no evidence that they were better than self-help resources or nurses. More detailed analysis suggests substantial differences in the interventions and/or subjects in the various studies. Additional studies directly comparing providers within the same study design, with similar patients and similar intervention intensities, are needed to definitely assess the relative merits of differing providers. Of interest, the one study comparing dietitians to health counsellors, achieved similar declines in serum total cholesterol of -0.85 mmol/L vs. -0.82 mmol/L. Secondary outcomes were not significantly different, except in patients in dietitian groups, who had greater reductions in HDL cholesterol levels than did patients in nurse-educated groups (~ 0.06, 95% CI – 0.11 to –0.01) and patients in the dietitian groups, who had greater reductions in body weight than did patients in health counsellor groups (~ 5.9 kg, 95% CI –8.91 to ~ 2.69).

Beyond the 12 studies included in the systematic review, eight additional primary studies were found that aimed to reduce cholesterol levels (116,117,119,121,124,127-129). A study on children with hypercholesterolemia (in two reports by Brannon and Tershakovec) compared two low-intensity interventions (a parent-child auto-tutorial with audiotaped stories, picture books, paper-and-pencil activities and a parent manual; and a single 45 to 60 minute session with a registered dietitian) and an “at risk” control group (116,120). Participants were followed up for one year post-intervention. Within-group improvements occurred in both intervention groups, but no significant differences were observed across intervention groups in LDL cholesterol levels. Both interventions resulted in significant reductions in fat intake compared with the at-risk control group. The auto-tutorial group, but not the dietitian group, had a significant increase in knowledge compared with the control group. There were no differences across groups in caloric or cholesterol intake. Thus, there is no evidence from this study to support use of a low-intensity intervention delivered by dietitians over audiovisual materials.

Another study by Bemelmans et al. compared dietitian-led group education on the Mediterranean diet with

mailed information on the Dutch nutritional guidelines in adults (119). Participants who received group education were given specific instructions from a dietitian to have five to seven servings of bread and two servings of fruit per day; two servings of fish per week; and to reduce consumption of red meat, eggs and cheese. Instruction took place in three meetings of two hours each. The control group was mailed leaflets about the Dutch nutritional guidelines. Both groups were assessed after 16 weeks and 52 weeks. There was no difference in change in cholesterol levels between groups. The dietitian education group had a statistically significant reduction (mean net difference) in total fat and saturated fat intake, although the mean difference in each case was less than 2 per cent. The intervention group also significantly increased their intake of poultry and bread. Despite these changes in dietary intake, cholesterol levels did not differ.

Four studies compared advice from dietitians with advice from physicians or physicians plus other health care providers (117,121,124,128). Reid et al. compared three interventions: physician advice in individual appointments for a low-fat diet, dietitian-led group classes and telephone follow-up for a fat-reduced diet, and dietitian-led group classes and telephone follow-up for a fibre-enhanced diet (128) in adults with moderate dyslipidemia. The fat-reduced diet was based on the American Heart Association Step II guidelines. There were no significant differences in results after 26 weeks; all groups reduced their LDL levels (−5.3%) and total cholesterol/HDL ratios (−4.6%), and weight (−1.9%). Peiss et al. (1995) compared brief interventions by primary care physicians and their practice nurses versus dietitians (121). Study participants were referred for hyperlidemia, stable coronary artery disease, or cardiac rehabilitation after infarction or bypass grafting. After six weeks, there were no between-group differences in any risk factors, weight, or calculated dietary fat or cholesterol intake; only knowledge scores were higher in the dietitian group.

The third randomized trial by Rhodes of adults with elevated LDL cholesterol levels or documented coronary heart disease compared nutrition therapy by a dietitian with regular physician counselling over a three-month period (117). All participants received 10 minutes of dietary instruction from the study cardiologist or nurse, based on the Step I diet. Group 1 received no further intervention; Group 2 received a copy of the Grocery Shopping Guide and viewed a 10-minute video explaining the guide; Groups 3 and 4 participated in a one-hour consultation with a dietitian that included individualized assessment and recommendations; and Group 4 received additional 30-minute consultations at weeks three and seven. Subsequently, Groups 1 and 2 (non-dietitian groups) were merged as were Groups 3 and 4 (dietitian groups). As in several other studies, both groups achieved improvements in serum cholesterol levels, with no differences between groups. Patients in the dietitian group had statistically significant reductions in per cent fat intake and dietary cholesterol levels, and increases in nutrition knowledge scores. The dietitian group also achieved a significant difference in triglycerides and a significant difference in BMI (−1.1 vs.–0.6 kg).

The fourth study by Henkin et al. (124) was slightly different in that it compared physician advice alone with physician plus dietitian advice for patients with hypercholesterolemia. Physician advice sessions were about 30 minutes in length and included counselling about smoking cessation, physical activity, weight control and dietary modifications related to the Step I diet. Those randomized to physician plus dietitian advice also attended two to four individual sessions with a dietitian within three months. At three months, patients who received physician plus dietitian advice had statistically significant reductions in total cholesterol and LDL cholesterol levels compared with those who received physician advice only, but the difference was not maintained at six months or one year. There were no differences, even in the short term, in HDL levels, HDL/total cholesterol ratios or trigylceride levels. Both groups improved in the short term, but lost much of their gains by the end of the 12-month follow-up. These four studies support the findings of the systematic review (114), demonstrating the wide variety of interventions currently being offered by dietitians in these studies.

Timlin et al. (129) studied patients attending six weeks of cardiac rehabilitation. Participants were assigned to two dietitian-led group sessions plus one individual session focused on reducing dietary fat based on the Step II diet, or they were assigned to usual cardiac rehabilitation (control group). Usual cardiac intervention

included a dietary intervention that comprised handouts, videotapes, recipes and reference books, and was delivered by cardiac rehabilitation therapists (occupational therapists and/or exercise physiologists) in a one-hour session. Cholesterol/saturated fat index, percentage of energy from carbohydrates, knowledge scores and diet habit survey scores improved in both groups; only the knowledge scores of "restaurants and recipes" and self-efficacy scores improved more in the dietitian group at the three-month follow-up. Actual differences, while statistically significant, were small.

Advice and spinal manipulation from a chiropractor was compared with advice from a dietitian in a randomized trial of people with high-normal blood pressure or stage I hypertension by Goertz (123). Both interventions included treatment three times per week for four weeks and the written information was the same in both groups. Both groups had reductions in blood pressure, with no statistically significant difference between groups.

Another study by McCarron et al., compared nutrition-guided dietary advice with the provision of pre-packaged meals. Inclusion criteria for this study were essential hypertension, dyslipidemia, non-insulin dependent diabetes mellitus or any combination of these diseases (127). Participants were randomized to receive three pre-packaged meals per day or two sessions with a nutritionist counselling on self-selection of food from a prescribed number of servings (American Heart Association Step I and Step II diets) plus a food allowance of $40 per week. At 10 weeks, lipid levels, blood pressure, glycated hemoglobin levels and weight improved in both groups; all within-group changes were statistically significant except for HDL/LDL ratio. However, there were no statistically significant differences between groups, except that the meal replacement group had greater reductions in systolic blood pressure and weight loss.

2. Studies targeting weight loss or weight control

Two studies primarily focused on weight loss (122,125). In one study, by Ashley, pre-menopausal women were randomized to three increasingly intensive interventions of 26 sessions each, over a one year period. The first group had one-hour, dietitian-led, small group sessions and 1,200 kcal/day of self-selected foods; the second had one-hour, dietitian-led, small group sessions and interventions incorporating meal replacements for two of three meals per day; and the third had primary care (physician or nurse visits of 10 to 15 minutes each) with meal replacements for two of three meals per day (122). All participants received the LEARN program manual, a self-directed, behaviourally-oriented weight control workbook. The dropout rate was 35 per cent, but all analyses were done by intention-to-treat with the last observation carried forward. At the end of the intervention year, Group 2 achieved the greatest percentage weight loss, which was significantly greater than the weight change in the other two groups (−9.1% vs. –4.1% in Group 1 and vs. –4.3% in Group 3). This dietitian-led intervention was more effective than the physician-led intervention even though both groups had meal replacements.

The other study of weight loss by Heshka compared dietitian advice plus self-help intervention with a 26-week commercial weight loss program (Weight Watchers) for obese adults (BMI 27 to 40 kg/m2) (125). The dietitian provided two 20-minute sessions, printed materials and other self-help resources. Participants in the commercial program had a greater decrease in mean body weight (−4.8 vs. –1.4 kg) and BMI (−1.7 vs. –0.5). Twenty-five per cent of participants in the commercial program lost 10 per cent or more of their initial weight compared with eight per cent of participants in the dietitian group. The dietitian intervention in this study was labelled a "selfhelp" intervention, alluding to the low intensity of the intervention compared with weekly attendance at the commercial program.

Two other trials involved weight control in breast cancer survivors (118,126). Chemotherapy is often associated with weight gain, and weight gain, in itself, may negatively effect prognosis (118). Loprinzi et al. designed a study for pre-menopausal women starting chemotherapy for breast cancer. Women were randomly allocated

to monthly counselling from a dietitian, aimed at weight maintenance, or to the control condition, in which physicians and nurses spoke of possible weight gain but offered no additional counselling. At six months, median weight change and caloric consumption were lower in the dietitian group but not significantly different from that in the control group.

More intensive interventions assessed weight loss in obese breast cancer survivors (126). Jen randomly allocated 48 women to a control group (no nutrition counselling); to Weight Watchers (free coupons to attend weekly meetings); to an individualized group where a dietitian provided one-on-one counselling; or to a comprehensive group, which included individualized one-on-one counselling (weekly for the first three months, biweekly for the next three months and monthly for the last six months) plus free coupons for weekly Weight Watchers. The comprehensive and individualized groups lost significantly more weight and reduced BMI compared to the control or Weight Watchers groups (−9.5 and –8 kg vs. 1.1 and –2.7 kg, respectively). There were no other statistically significant differences across groups for dietary fat intake, total/HDL ratio, or levels of serum total cholesterol, triglyceride, glucose, insulin or leptin. Sample sizes were too small (≤ 12 per group) to detect moderate changes.

Summary

In the systematic review comparing dietitian and physician advice, the dietitian group achieved significant reductions in fat and cholesterol intake and serum cholesterol and triglyceride levels (117). The additional primary studies had mixed results of effects for dietitians compared with physicians on cholesterol outcomes, with some studies finding no between-group differences (117,121,128) and one favouring dietitian advice (114). Comparisons of dietitian advice with cardiac rehabilitation specialists (129) or chiropractor advice plus spinal manipulation (123) showed no differences in outcomes.

Comparison of dietitian advice with provision of pre-packaged meals showed greater blood pressure reduction and weight loss in women in the meal replacement group (127). In the comparison of dietitians and self-help resources, there was no difference in cholesterol levels in adults (114,115,119) or in children with hypercholesterolemia, who, with their families, used an audiotaped tutorial and picture book (116,120). However, these interventions were very brief.

Conclusions and Recommendations

There are several high-quality systematic reviews related to dietary interventions for prevention and treatment of chronic disease. In addition, one high-quality review (115) and 13 primary studies compared dietary interventions delivered by a dietitian with those delivered by other health care professionals and with self-help strategies. This review provides useful information for setting priorities for dietetic practice within primary care settings.

Although the systematic reviews were of high quality, the primary studies included in these reviews had variable quality, which affects the conclusions that can be drawn. Common flaws in the primary studies included small sample sizes (lack of power), short follow-up (less than six months), no blinding of participants or providers, no measure of intervention fidelity, and outcomes often based on self-report (particularly dietary intake). On the other hand, many of the included studies were randomized trials and most used valid and reliable outcome measures. Another concern is that the interventions tested were often not very different from usual care, and so it would be unrealistic to expect significant differences in outcome. Finally, many studies provided little detail about the active interventions or usual care.

The questions about prevention and treatment were difficult to separate. However, there was some evidence that changes in outcomes are more likely in people with existing disease or at high risk, rather than people who are not at risk. In comparing dietitians with other health care professionals, dietitian-counselled groups were more likely to achieve outcomes related to changes in fat and cholesterol intake. There were no differences in patient outcomes when dietitian advice was compared with cardiac rehabilitation specialists, chiropractors or self-help materials.

There are multiple steps involved in changing health outcomes. First, health care professionals need to be aware of and carry out the intervention. Then, patients must undergo the complexities of behaviour change and maintenance long enough to show differences in actual behaviour, and subsequently to show changes in intermediate outcome measures. Finally, the behaviour has to be maintained long enough to show potential impact on actual morbidity and mortality. For most people, environmental stimuli counter any attempted movement towards healthy dietary changes. There is some solid evidence related to a few specific conditions and outcomes:

1. Diabetes self-management education is effective in community settings, particularly for adolescents. Conducting such education in primary care settings may allow the interventions to be more closely tailored to the needs of particular populations.

2. Reducing overall and saturated fat intake and increasing omega-3 polyunsaturated fat intake has a greater effect on reducing overall mortality than focusing on weight reduction or lipid lowering alone.

3. Focusing on weight loss in primary care as currently practised is probably not intense enough to result in significant or maintained change.

4. Multiple risk factor interventions can be done in primary care and have demonstrated reductions in blood pressure and cholesterol levels, but no differences in total or cardiovascular mortality.

4. Improving the dietary intake of pregnant women does not affect preterm birth, but can have a significant impact on reducing rates of low-birth-weight, very-low-birth–weight, and small-for-gestational-age infants.

5. Interventions are more effective when they are more intense (i.e., more than two sessions) rather than brief; when the number of intervention components are increased (more than two); when spouses or families are involved; and when participants are at risk or diagnosed with a disease rather than in good health.

Furthermore, there are some recommendations for research:

1. Evaluations should move away from assessment of brief interventions, as little evidence exists of longer-term effectiveness for any condition or outcome.

2. Research design should ensure adequate power, randomization, blinding of providers and outcome assessors, longer-term follow-up, and use of valid and reliable outcome measures.

3. Interventions should be clearly described. More detail is needed about the actual components of usual care and the active interventions.

4. When multiple strategies are used, more effort should be focused on determining which combinations are most effective for which populations.

5. More research should focus on differences in outcomes (for the same intervention) by age, sex, ethnicity and risk status.

6. Evaluations of interventions by different providers should compare similar interventions with similar intensities and durations in order to identify true differences by providers.

7. Interventions should be specifically developed for subgroups (sex, age and ethnicity).

8. Studies should focus on evaluation of interventions that are based on stated theoretical frameworks.

9. Evaluations should be designed to show the potential for harm.

10. Meta-analyses should attempt to examine differences in outcome by intensity of intervention and duration of follow-up.

Finally, there are a few policy recommendations arising from this review:

1. Funding for nutrition research should be a national priority.

2. Funding for a given study must be adequate to allow for follow-ups of at least two to three years.

3. Many interventions require a level of team work and intensity of intervention that will not be possible in typical family physician practices, but feasibility should be evaluated in larger interdisciplinary team-based practices and community health centres.

Quality Assessment Table 1:
Reviews about Overweight Obesity

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Astrup A(9)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Bravata DM(29)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Campbell K(23)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Dolan-Mullen P(13)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Glenny AM(35)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Heymsfield SB(27)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
Leiter LA(36)	yes	no	yes	yes	no	yes	yes	moderate (4-5)
McLean N(30)	yes	yes	yes	yes	no	no	yes	moderate (4-5)
McTigue KM(31)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Pirozzo S(28)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Poston WS(34)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Schoofe M(22)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
Sharpe JK(32)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Summerbell CD(26)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Werneke U(33)	yes	yes	yes	no	no	no	yes	moderate (4-5)

Quality Assessment Table 2:
Reviews about Diabetes

Author	Describe search strategy Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Brand-Miller J(49)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Eakin EG(43)	yes	no	yes	yes	yes	yes	yes	strong (6-7)
Ellis SE(50)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Gary TL(38)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Giuffrida FM(51)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Hampson SE(46)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Ismail K(39)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Moore H(48)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Norris SL(40)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Norris SL(44)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Norris SL(45)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
Renders CM(47)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Sarksian CA(41)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
van Dam HA(42)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Whittemore R(52)	yes	yes	no	no	no	yes	yes	moderate (4-5)

Quality Assessment Table 3:
Reviews about Cardiovascular Disease

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Hypertension- reducing sodium								
Alam S(65)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Burgess E(62)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Fodor JG(64)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Geleijnse JM(60)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Griffith LE(59)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
He F(55)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Hooper L(54)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Jurgens G(57)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
Other dietary strategies to reduce blood pressure								
Campbell NR(63)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Campbell NR(66)	yes	no	yes	no	no	yes	yes	moderate (4-5)
McAlister FA(61)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Mulrow C(58)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Dietary Fats								
Bucher HC(68)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Hu FB(69)	yes	no	yes	yes	no	yes	yes	moderate (4-5)
Hooper L(70)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Hooper L(71)	yes	no	yes	no	no	yes	yes	moderate (4-5)

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Muldoon MF(75)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Pignone MP(72)	yes	no	yes	yes	no	yes	yes	moderate (4-5)
Yu-Poth S(74)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Tang JL(76)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Bucher HC(73)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Soy Protein								
Costa (83)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Prevention of cardiovascular disease in women and children								
Krummel DA (80)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Poustie VJ (81)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Wilcox S(82)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Multiple interventions								
Ebrahim S(83)	yes	no	yes	yes	yes	yes	yes	strong (6-7)

Quality Assessment Table 4:
Reviews About Other Conditions

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
COPD								
Ferreira IM(84)	yes	yes	yes	yes	yes	no	yes	strong (6-7)
Ferreira IM(85)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Epilepsy								
Lefevre F(87)	yes	yes	no	no	no	yes	yes	moderate (4-5)
Gastrointestinal Disorders								
Spanier JA(88)	yes	no	yes	yes	yes	yes	yes	strong (6-7)
MacLean CH(78)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Liver Disease								
Wang RT(92)	yes	yes	yes	no	no	no	yes	moderate (4-5)
Malnutrition								
Baldwin C(93)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Mental health								
Austin SB(97)	yes	yes	no	yes	no	no	no	moderate (4-5)
Bianchi-Demicheli F(95)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Faulkner G(94)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
Pratt BM(96)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Sharpe JK(32)	yes	yes	yes	no	no	no	no	moderate (4-5)
Werneke U(33)	yes	yes	yes	no	no	no	no	moderate (4-5)

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
PKU								
Poustie VJ(86)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Pregnancy and newborn								
Duley L (101)	yes	yes	yes	yes	no	no	yes	moderate (4-5)
Kramer MS (98)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Korenbrot CC (100)	yes	no	yes	yes	no	yes	yes	moderate (4-5)
Lu MC (99)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Renal								
Fouque D(89)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Fouque D(90)	yes	yes	yes	yes	no	yes	yes	strong (6-7)
MacLean CH(78)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Waugh NR(91)	yes	yes	yes	yes	no	no	yes	moderate (4-5)

Quality Assessment Table 5:
Reviews about Intervention Components

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Ammerman AS(4)	yes	yes	yes	yes	yes	yes	yes	moderate (4-5)
Ashenden R(109)	yes	yes	yes	yes	yes	yes	yes	moderate (4-5)
Bankhead CR(104)	yes	yes	yes	yes	yes	yes	yes	moderate (4-5)
Burke LE(110)	yes	no	yes	no	no	yes	yes	moderate (4-5)
Cooper H(111)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Hardeman W(113)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
McClure JB(107)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
McTigue KM(31)	yes	yes	yes	yes	no	yes	yes	moderate (4-5)
Newell SA(108)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Norton DE (95)	yes	yes	no	no	no	yes	yes	moderate (4-5)
Pavlovich WD(106)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)
Pignone MP(112)	yes	yes	yes	no	no	yes	yes	moderate (4-5)
Sikorski J(103)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)

Quality Assessment Table 6:
Review Comparing Dietitians to Other Health Care Providers or Self-Help

Author	Describe search strategy	Search Comprehensive	Describe level of evidence in the primary studies they included?	Assess the quality of the primary studies beyond the level of evidence?	Did the quality assessment meet 4/7 requirements?	Integrate the findings beyond describing or listing primary study results?	Does data from all studies adequately support the review's conclusions?	Total Score
Thompson RL(115)	yes	yes	yes	yes	yes	yes	yes	strong (6-7)

Quality Assessment Table 7:
Primary Studies Comparing Dietitians to Other Health Care Providers or Self-Help

Study Identification (First Author, year)	Selection Bias section:	Allocation Bias section:	Confounders section:	Blinding section:	Data Collection section:	Withdrawals and Drop-Out:
Ashley JM, 2001(122)	weak	strong	strong	weak	strong	moderate
Bemelmans WJE, 2000(119)	weak	moderate	strong	strong	strong	stong
Brannon SD, 1997(116)	weak	strong	weak	weak	strong	weak
Goertz CH, 2002(123)	weak	strong	strong	weak	strong	strong
Henkin Y, 2000(124)	weak	strong	strong	strong	strong	strong
Heshka S, 2000(125)	weak	strong	strong	strong	strong	strong
Jen KL, 2004(126)	weak	strong	strong	weak	strong	strong
Loprinzi CL, 1996(118)	weak	strong	weak	weak	strong	strong
McCarron DA, 1997(127)	weak	strong	weak	strong	strong	strong
Peiss B, 1995(121)	moderate	moderate	weak	weak	strong	weak
Reid R, 2002(128)Reid R, 2002(128)	moderate	strong	strong	strong	strong	moderate
Rhodes KS, 1996(117)	weak	strong	strong	strong	strong	strong
Timlin MT, 2002(129)	moderate	moderate	strong	strong	strong	strong

Evidence Table 1.
Systematic reviews of dietary interventions for management of overweight and obesity

Review	Inclusion	Results
Author: Astrup A, 2000(9) Purpose: To evaluate the efficacy of ad libitum low-fat diets in reducing body weight in nondiabetic individuals from the results of intervention trials. Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: Not reported Dates of Article Review: January 1966 to July 1999 Total number of studies: 19 Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? Yes	Results: Before the interventions the mean proportions of dietary energy from fat in the studies were 37.7% (95% CI, 36.9 ± 38.5) in the low-fat groups, and 37.4% (36.4 ± 38.4) in the control groups. The low-fat intervention produced a mean fat reduction of 10.2% (8.1 ± 12.3). Low-fat intervention groups showed a greater weight loss than control groups (3.2 kg, 95% confidence interval 1.9 ± 4.5 kg; P<0.0001), and a greater reduction in energy intake (1138 kJ=day, 95% confidence interval 564 ± 1712 kJ=day, P=0.002). Having a body weight 10 kg higher than the average pre-treatment body weight was associated with a 2.6 ± 0.8 kg (P=0.011) greater difference in weight loss. Conclusions: A reduction in dietary fat without intentional restriction of energy intake causes weight loss, which is more substantial in heavier subjects.

Review	Inclusion	Results
Author: Bravata DM, 2003(29) Purpose: To evaluate changes in weight, serum lipids, fasting serum glucose, and fasting serum insulin levels, and blood pressure among adult using lowcarbohydrate diets in the outpatient setting Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: 1. Studies that described adult, outpatients 2. Low carbohydrate diets of 4 days or more in duration and 500 kcal/day where both carbohydrate content and total calories consumed were reported. 3. Report sufficient data to calculate both carbohydrate content (grams per day) and total calories consumed (kilocalories per day). 4. Studies had to evaluate lowcarbohydrate, ketogenic, higher protein, or higher-fat diets for non-pregnant adults. Dates of Articles Reviewed: 1966-2003 Total number of studies: 107 articles, 94 dietary interventions, 3268 participants Interventions: Diet, Low Carbohydrates vs. High Carbohydrates Health Condition(s): Weight Change, Cholesterol, Diabetes, Blood Pressure Meta-analysis Performed? Yes	Results: Among obese patients, weight loss was associated with longer diet duration (p=.002), restriction of calorie intake (p=.03), but not with reduced carbohydrate content (p=.90). Low carbohydrate diets had no significant adverse effect on serum lipid, fasting serum glucose, and fasting serum insulin levels or blood pressure. Conclusions: Restriction of carbohydrate intake was not significantly associated with changes in weight, serum lipid levels, change in fasting serum glucose levels, or systolic blood pressure. There is insufficient evidence to make recommendations for or against the use of low-carbohydrate diets, particularly among participants older than age 50 years, for use longer than 90 days, or for diets of 20 g/d or less of carbohydrates. There is insufficient evidence to make recommendations for or against the use of low-carbohydrate diets, particularly among participants older than age 50 years, for use longer than 90 days, or for diets of 20 g/d or less of carbohydrates.

Review	Inclusion	Results
Author: Campbell K, 2001(23) Purpose: To assess the effectiveness of interventions designed to prevent obesity in childhood Quality Assessment: Strong Major Topic Area: Childhood obesity	Inclusion Criteria: 1. Randomized controlled trials (RCTs) and non-RCT with concurrent control group 2. Initially, minimum 1 year follow-up, but amended to include studies with a minimum follow-up time of three months. Dates of Article Reviewed: January 1985-October 1999 Total Number of Studies: 7 Interventions: Education, diet modification Health Condition(s): Weight loss Meta-analysis Performed? No	Results: Seven studies were included, three long-term (>1 years) and four short-term (>3 months and <1 years). The studies included were diverse in terms of study design and quality, target population, theoretical underpinning of intervention approach and outcome measures. As such, it was not appropriate to combine study findings using statistical methods. One intervention , Planet Health, reduced prevalence of obesity in girls but not boys. Conclusions: Findings suggest that currently there is limited quality data on the effectiveness of obesity prevention programmes and as such no generalizable conclusions can be drawn. The need for well-designed studies that examine a range of interventions remains a priority.
Author: Dolan Mullen, 1997(13) Purpose: To examine the overall effectiveness of patient education and counselling on preventive health behaviours and to examine the effects of various approaches for modifying specific types of behaviours. Quality Assessment: Strong Major Topic Area: Weight Loss	Inclusion Criteria: 1. RCT and non-randomized controlled trials 2. Measuring behaviour in clinical settings 3. Patients without diagnosed disease. Dates of Articles Reviewed: 1971 to 1994 Total number of studies: 12 studies focusing on nutrition, 5 focusing on weight Interventions: Nutrition, Weight Health Condition(s): obesity Meta-analysis Performed? Yes	Results: A behaviour orientation, two or more contacts, and use of media-plus-personal communication had larger effects for the groups where the desired direction of change meant subtracting an existing behaviour, ie. smoking/alcohol, and nutrition/weight studies, but these characteristics had no effect or adverse effect when a new behaviour was to be added. The adjusted (homogeneity) nutrition model accounted for 65% of the variance, with follow-up of 30 days or more, higher score on the Behaviour Change Support Factor and use of self-monitoring all significantly associated with larger effects. Conclusions: Patient education and counselling contribute to behaviour change for primary prevention of disease. Some techniques are more effective than others in changing specific behaviours.

Review	Inclusion	Results
Author: Glenny AM, 1997(35) Purpose: To determine the effectiveness of interventions designed to prevent and treat obesity, and maintain weight loss Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCTs evaluating the effectiveness of interventions for treatment of obesity and maintenance of weight loss. 2. RCTs an nonrandomized studies with a concurrent control group for studies on prevention of obesity 3. 1 year minimum (duration of intervention or combination intervention and follow-up) 4. outcomes at baseline and postintervention: (1) weight change, (2) measures of fat content, or (3) measures of fat distribution Dates of Articles Reviewed: Start date of database to end of 1995 Total number of studies: 99 Interventions: Diet Health Condition(s): Weight Change Meta-analysis Performed? No	Results: For obese children, family therapy and lifestyle modification are effective in prevention and treatment. The effectiveness of interventions to prevent and treat obesity in adults remains unclear, although behavioural therapy and multicomponent strategies may be useful. Continuous therapist contact appears to be useful for maintaining weight loss, pharmacological interventions appear to be effective for up to 9 months, after which regain occurs. Surgery appears to be effective for the morbidly obese and gastric bypass is more effective than gastroplasty. In general, methodological quality of included studies was poor. Conclusions: Due to problems with methodological quality, recommend that research findings of promising interventions be repeated.

Review	Inclusion	Results
Author: Heymsfield SB 2003(27) Purpose: To review the safety and effectiveness of a partial meal replacement plan (PMR) using one or two vitamin/mineral fortified meal replacements as well as regular foods for longterm weight management. Quality Assessment: Strong Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCT's 2. 3 month duration 3. comparing PMR plan (replacing one or two meals with a commercially available, energyreduced product that is vitamin and mineral fortified with at least one meal of regular food vs. a conventional reduced calorie diet (RCD) Dates of Article Review: 1960-2001 Total Number of Studies: 6 Interventions: Diet, PMR, diet vs. RCD Health Condition(s): Weight Change, Diabetes Meta-Analysis Performed? Yes	Results: 12 Month Followup: Dropout rate: PMR=47%, RCD=64%, ($p<0.001$) % weight loss: PMR ~7-8%, RCD ~3-7% PMR weight loss > RCD weight loss; level of significance varied with analysis method: Fixed-effect meta-analysis: 3.39 kg ($p<0.001$) Random-effect meta-analysis: 2.43 kg ($p=0.142$) Pooling analysis of completers: 2.63 kg ($p=0.003$) Weight loss from completers range: PMR 6.97 to 7.31 kg; RCD 2.61 to 4.35 kg All methods of analysis indicated a significantly greater weight loss in subjects receiving the PMR plan compared to the RCD group No difference in weight loss between diabetic and non-diabetic; diabetic patients as a group did not maintain their loss at 1year Conclusions: This first systematic evaluation of randomized controlled trials utilizing PMR plans for weight management suggests that these types of interventions can safely and effectively produce significant sustainable weight loss and improve weight-related risk factors of disease.
Author: Leiter LA, 1999(36) Purpose: To provide updated, evidencebased recommendations concerning the effects of weight loss and maintenance of healthy weight on the prevention and control of hypertension in otherwise healthy adults (except pregnant women). Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: Not Reported Dates of Articles Reviewed: 1992 to 1996 Total number of studies: Not reported Interventions: Diet Health Condition(s): Hypertension, Diabetes Meta-analysis Performed? No	Results: Cross-sectional studies demonstrated an association in both sexes, between body weight and BP. Hypertension 5-fold higher for those with BMI greater than 30. Conclusion: Weight loss and the maintenance of healthy body weight reduces the blood pressure of both hypertensive and normotensive people. The indirect benefits of a healthy body weight are well known. The negative effects of weight loss are primarily the frustrations associated with attaining and maintaining a healthy weight.

Review	Inclusion	Results
Author: McLean N, 2003(30) Purpose: A systematic review the nature and effectiveness of family involvement in weight control, weight maintenance and weight-loss interventions Quality Assessment: Moderate Major Topic Area: Weight loss	Inclusion Criteria: 1.RCT 2.published 3.at least 1 year follow-up 4. targeted either children or adults alone, or children and adults together. Trials that compared a family-based component to another type of family-based component or non family-based component, Studies that examined behavioral change for weight loss with family involvement Dates of Article Review: 1975 to 1994 Total Number of Studies: 16 Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: Effectiveness of family involvement: Adults: treating index members and spouses together: 3 studies: SS larger effects than index members alone; 2 studies: NS; overall change in weight loss ranged from 0.3 to 6.1kg 3 studies: treating index members alone; 1 of these studies reached SS. Overall weight loss ranged 1.3 to 5.9 kg 1 study: both index member and spouse targeted for weight loss vs. no spouse treatment; spousal loss: -7.4 vs. 1.7kg Adolescents: Adolescents targeted separately from their mothers lost significantly more weight than when targeted together with their mothers: 10.6kg Children: targeting both parents and children for weight loss seems to yield positive results for the children. The overall effect ranged from 1.4% to 11.7% drop in weight in children; the results for parent weight loss were conflicting. Parent training in behavior change techniques appears conducive to child weight loss. There was a suggestion that spouse involvement increased effectiveness but that adolescents achieved greater weight loss when treated alone. In studies including children, beneficial effects were seen when greater numbers of behavior change techniques were taught to both parents and children. Conclusions: Weight-loss interventions targeting food intake and /or physical activity might be most effective if they incorporate psychological and education theory and involve family members appropriately.

Review	Inclusion	Results
Author: McTigue KM, 2003(31) Purpose: To examine evidence for screening and treating obesity in adults treatment of obesity Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCT or systematic reviews of randomized trials; in absence of randomized trials, cohort and non-randomized controlled trials were considered 2.minimum 6 months follow-up Dates of Article Review: January 1994 to February 2003 Total Number of Studies: Not Reported Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: No trials evaluated mass screening for obesity so authors evaluated indirect evidence for efficacy. Pharmacotherapy and counselling interventions produced modest weight loss over at least 6 or 12 months. Counselling was most effective when intensive and combined with behavioural therapy. Maintenance strategies helped retain weight loss. Selected surgical patients lost substantial weight. Weight reduction improved blood pressure, lipid levels, and glucose metabolism and decreased diabetes incidence. Conclusions: Counselling and pharmacotherapy can promote modest sustained weight loss, improving clinical outcomes.
Author: Pirozzo S, 2003(28) Purpose: To determine the effectiveness of low-fat diets in achieving sustained weight loss when used for the express purpose of weight loss in obese or overweight people. Quality Assessment: Strong Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCT 2. participants either overweight or obese 3.comparison of a low-fat diet with another type of weight-reducing diet, 4.follow-up period that was at least 6 months in duration 5.inclusion of participants 18 years or older without serious disease). Dates of Article Review: Up to January 2002 Total Number of Studies: 6 Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? Yes	Results: No significant differences between low-fat diets and other weight-reducing diets in terms of sustained weight loss. Furthermore, the overall weight loss at the 12–18-month follow-up in all studies was very small (2–4 kg). Conclusions: In overweight or obese individuals who are dieting for the purpose of weight reduction, low-fat diets are as efficacious as other weight reducing diets for achieving sustained weight loss, but not more so.

Review	Inclusion	Results
Author: Poston WS, 2001(34) Purpose: To evaluate the types of lifestyle interventions provided in obesity drug studies and to assess their contribution to weight loss. Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCTs published reports in peer reviewed journals 2.English 3.direct comparison between an another treatment modality or a control group of obese individuals 4.provided sufficient outcome data to compute an effect size based on weight loss. 5. study was published on or before December 1999. Dates of Article Review: up to 1999 Total Number of Studies: 108 Interventions: Lifestyle and pharmacotherapy Health Condition(s): obesity Meta-Analysis Performed? Yes	Results: In drug trials with no lifestyle component, 28.3% of weight loss attributed to placebo effect. Any two lifestyle components that were included in drug treatments contributed most to the overall weight loss (53.7%), whereas one or three lifestyle components only contributed to 45.8% and 46.5% of weight losses among patients receiving obesity drugs. Diet interventions were single strongest lifestyle component since responsible for 49.5% of weight loss among patients receiving drug treatment versus 26.5% for those without that component. Lifestyle components included: VLCD, low-cal diet, balanced-deficit diet, prepackaged food, aerobics, weight-lifting, walking, calisthenics, lifestyle exercise, self-monitoring, stimulus control, eating management, contingency management. Lifestyle treatments, with the exception of dietary components, have not been widely used in randomized, placebo-controlled obesity-drug trials. A balanced-deficit diet (41.4%) was the most used dietary component and overall lifestyle intervention. Low-cal diets were second (24.5%). Approximately 31.1% of the studies did not report who delivered the lifestyle intervention. The two most reported professions were nurses (10.4%) and nutritionists (9.4%). Conclusions: Balanced-deficit diets, low-calorie diets, and self-monitoring were the most used lifestyle treatments in published obesity studies. Physical activity and other behavioral or psychotherapeutic interventions rarely were used. A substantial portion of weight loss experienced by patients was attributable to both “placebo effects” and to the lifestyle treatments.

Review	Inclusion	Results
Author: Schoofe, M, 2003(22) Purpose: To assess the effects of advice about ad libitum low-fat diets as a means of achieving sustained weight loss, using all available randomized clinical trials Quality Assessment: Strong Major Topic Area: Weight loss	1.randomized controlled trials of low-fat diets versus other weight-reducing diets 2. the primary purpose of the study was weight loss 3.participants were followed for at least six months 4. the study participants were adults (18 years or older) who were overweight or obese Dates of Articles Reviewed: to February 2002 Total number of studies: 12 Interventions: Diet Health Condition(s): Weight change Meta-analysis Performed? Yes	Results: There was no significant difference in weight loss between the two groups at six months. There was no significant difference in weight loss between the two groups at 12 months (WMD 1.1 kg, 95 percent CI, 1.6 to 3.8 kg). The WSWL in the low-fat group was 2.3 kg (95 percent CI, 3.2 to 1.4 kg) and in the control group was 3.4 kg (95 percent CI, 4.2 to 2.6 kg). There was no significant difference in weight loss between the two groups at 18 months (WMD, 3.7 kg; 95 percent CI, 1.8 to 9.2 kg). The WSWL in the control group was 2.3 kg (95 percent CI, 3.5 to 1.2 kg), and in the low-fat group there was a weight gain of 0.1 kg (95 percent CI, 0.8 to 1 kg). Except for one study that showed a slight but statistically significant difference in total cholesterol in the low-fat group at one year follow-up, there were no significant differences between the dietary groups for other outcome measures, such as serum lipids, blood pressure, and fasting plasma glucose level. Studies measuring other factors, such as perceived wellness and quality of life, reported conflicting results. Conclusions: Fat-restricted diets were no better than calorie restricted diets in achieving long-term weight loss in overweight or obese people. Overall, participants lost slightly more weight on the calorie restricted control diets, but this was not significantly different from the weight loss achieved through dietary fat restriction and was so small as to be clinically insignificant.

Review	Inclusion	Results
Author: Summerbell CD, 2003(26) Purpose: To assess the effects of a range of lifestyle interventions designed to treat obesity in childhood Quality Assessment: Strong Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCTs 2.lifestyle interventions 3.obese children 4. minimum of six months duration. Dates of Article Review: 1985 to 2001 Total Number of Studies: 18 Interventions: all having some form of dietary input, physical activity and behavioural therapy, with or without the support of associated family members. Health Condition(s): weight change Meta-Analysis Performed? No	Results: Most of the studies included in this review were too small to have the power to detect the effects of the treatment. No meta-analysis was conducted since so few of the trials included the same comparisons and outcomes. Conclusions: There is a limited amount of quality data on the components of programs to treat childhood obesity that favour one program over another. We conclude that no direct conclusions can be drawn from this review with confidence.

Evidence Table 2.
Systematic reviews of dietary interventions for diabetes

Review	Inclusion	Results
Author: Brand-Miller J, 2003(49) Purpose: Low-glycemic index diets in the management of diabetes to determine whether low-GI diets, compared with conventional or high-GI diets, improved overall glycemic control in individuals with diabetes, as assessed by reduced HbA1c or fructosamine levels. Quality Assessment: Moderate Major Topic Area: Diabetes (glucose)	Inclusion Criteria: 1.RCT, or cross-over RCT 2.English 3.published between 1981 and 2001 4.at least 12 days duration 5.HbA1c or fructosamine level as outcome measure of glycemic control 6. Modification of at least 2 meals per day (or>50% total carbohydrate) to constitute a high or low GI diet. Dates of Articles Reviewed: 1981 to 2001 Total number of studies: 14 Interventions: Low-glycemic index diet Health Condition(s): Diabetes Meta-analysis Performed? Yes	Results: Low-GI diets reduced HbA1c by 0.43% (95% CI 0.72– 0.13) over and above that produced by high-GI diets. Taking both HbA1c and fructosamine data together and adjusting for baseline differences, glycated proteins were reduced 7.4% (8.8–6.0) more on the low-GI diet than on the high-GI diet. This result was stable and changed little if the data were unadjusted for baseline levels or excluded studies of short duration. Systematically taking out each study from the meta-analysis did not change the CIs. Conclusions: Choosing low-GI foods in place of conventional or high-GI foods has a small but clinically useful effect on medium-term glycemic control in patients with diabetes. The incremental benefit is similar to that offered by pharmacological agents that also target postprandial hyperglycemia.

Review	Inclusion	Results
Author: Eakin E, 2002(43) Purpose: To assess the effectiveness of DSME among underserved groups(i.e. racial and ethnic minorities, low literacy groups, low income groups and older adults with a variety of chronic conditions). Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.RCTs or quasirandomized trials 2.a comparison group that targeted underserved groups. 3.Reach, efficiency, adoption, implementation and maintenance (RE-AIM) framework used. Dates of Articles Reviewed: 1987 to 2001 Total Number of Studies: 10 Interventions: Combinations of group and individual sessions, peer support, videotapes and handouts, 8 to 26 sessions Health Conditions: Diabetes Meta-analysis performed: No	Results: Less than half (4/10) of the studies described the theoretical basis for the intervention. 5/9 studies reported significantly greater weight reduction in the intervention group. 3/9 studies reported significant reductions in various measures of glycemic control. Reach was reported in5/10 studies and participation ranged from 33-90%. Representativeness of the sample of the population from which they were drawn was only reported in one study. Adoption is unknown because no one reported the number of settings approached to participate. Only one study reported the integrity of the implementation of the intervention. Long-term effects (>12 months) on blood glycemic control were mixed and weight reduction differences between intervention and control groups disappeared. Conclusions: Need further research involving the socio-contextual factors that impact on the underserved receiving appropriate care that they can use to improve their health.
Author: Ellis SE, 2004(50) Purpose: To quantitatively assess and characterize the effect of patient education on glycated hemoglobin (glycemic control) Quality Assessment: Moderate Major Topic Area: Diabetes (glucose)	Inclusion Criteria: 1.study reports on educational interventions in adults with diabetes 2.primarily in outpatient setting, 3.gives pre- and post-glycemic values 4.includes post-intervention values at least 12 wks afterwards. Dates of Article Review: 1990 to 2000 Total Number of Studies: 21 Interventions: Education, diet Health Condition(s): Diabetes Meta-Analysis Performed? Yes	Results: Studies included 28 interventions and 21 control groups. Three interventions used a didactic teaching method, 10 used dictated goal setting, 12 used negotiated goal setting, 15 used situational problem solving, 4 used cognitive reframing and 13 reported other teaching methods. The number exceeds 28 because some studies used multiple methods. At time period one(at least12 weeks), the net change inHbA1c in the intervention group was-0.32 (-0.571 to -0.069. Conclusions: Patient education had a positive effect on glycemic control. Interventions that included face-to-face delivery, cognitive reframing and exercise content were more likely tone successful (these factors accounted for 44% of the variance in glycemic control).

Review	Inclusion	Results
Author: Gary TL, 2003(38) Purpose: This meta-analysis was conducted to assess the effect of educational and behavioural interventions on body weight and glycemic control in type 2 diabetes. Quality Assessment: Strong Major Topic Area: Diabetes (glucose)	Inclusion Criteria: 1.RCTs 2. evaluated education and behavioral interventions in type 2 diabetes 3.sample size >10 Dates of Articles Reviewed: 1984 to1997 Total number of studies: 18 Interventions: Diet Health Condition(s): Weight Change, Diabetes Meta-analysis Performed? Yes	Results: Most of the interventions produced a decline in glycohemoglobin compared with controls. The pooled effect size was -0.43,(95%CI -0.71to -0.14) which was statistically significant (p=.003). All other glycemic measures were statistically significantly reduced in the intervention groups. There was significant difference in the effect size for weight changes in the intervention groups. Conclusions: There was considerable variation in the duration (1-19.2 months, median 5 months) and frequency (2-52 visits, median 8.5) of interventions as well as length of follow-up. There is little evidence to suggest that longer more intense interventions are more effective. Future work needs to address these issues.
Author: Giuffrida, F.M. 2003 (51) Purpose: To assess the influence of insulin plus diet compared to diet alone on the incidence of fetal macrosomia in mothers with gestational diabetes. Also assessed secondary outcomes such as birth weight (as a numerical parameter), hypoglycemia, hypocalcemia, hyperbilirubinemia, respiratory distress and congenital malformations. Quality Assessment: Moderate Major Topic Area: Diabetes (glucose) Fetal macrosomia -gestational diabetes	Inclusion Criteria: 1.RCTs 2.published in English, Spanish or Portuguese 3.pregnant women with gestational diabetes 4.compared diet alone with diet plus insulin Dates of Article Review: 1972-2001 (Medline) Total Number of Studies: 6 Interventions: Diet, Insulin Health Condition(s): Gestational Diabetes, Fetal Macrosomia Meta-Analysis Preformed? Yes	Results: Meta-analysis of the data resulted in a risk difference of -0.098 (95%CI: -0.168 to -0.028), and a number necessary-to-treat of 11 (95%CI: 6 to 36), which means that it is necessary to treat 11 patients with insulin to prevent one case of macrosomia. Conclusions: This indicates a potential benefit of insulin, but not significantly enough to set treatment guidelines. Because of the heterogeneous evidence available in the literature about this matter, we conclude that larger trials addressing the efficacy of these two therapeutic modalities in preventing macrosomia are warranted.

Review	Inclusion	Results
Author: Hampson SE, 2001(46) Purpose: To examine the effectiveness of educational and psychosocial interventions for adolescents with Type I diabetes designed to improve their diabetes management Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1. patients with Type 1 diabetes 2. age range 9-21 yrs 3.educational or psychosocial intervention or discussion of such an intervention Dates of Article Review: 1966 to June 1999 Total Number of Studies: 62 Interventions: education, psychosocial Health Condition(s): Diabetes Meta-Analysis Performed? Yes	Results: Effect sizes were calculated for 14 studies. The mean effect size for glycated hemoglobin was 0.33, indicating that the interventions had a medium effect size on diabetes management. Conclusions: 1. The evidence, arising primarily from studies in the U.S.A., provides a starting point for the design of interventions in the UK. 2. Quantitative and narrative analysis of the evidence suggested that interventions are more likely to be more effective if they demonstrate the inter-relatedness of various aspects of diabetes management. The effectiveness of interventions should be evaluated by assessing outcomes that the intervention explicitly targets for change, and at the appropriate point in time post-intervention to reflect the impact of the intervention. 3. Interventions need to be evaluated by well-designed studies, such as RCTs, including adequately powered patient-preference trials reporting results in such as way as to enable effect sized to be calculated. 4. An important gap in the evidence is that there is no systematic understanding whether interventions should be targeted (e.g. modified for different disease stages, different types of diabetes management problems or the different age groups subsumed by adolescence). 5. There is a lack of cost-effectiveness studies that fully address the resource implications of educational interventions for adolescents and long-term consequences.
AuthorL Ismail K, 2004(39) Purpose: To assess the effectiveness of psychological interventions in increasing glycemic control and reducing psychological distress and body weight among adults with Type 2 diabetes. Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.RCTs 2. psychological intervention: supportive or counselling, cognitive, brief psychodynamic psychotherapy, interpersonal psychotherapy 3. in adults with DM2 or NIDDM Dates of Article Review: 1966 to January 2003 Total Number of Studies: 25 Interventions: Psychological Health Condition(s): Diabetes	Results: In 12 trials, the mean percentage glycated hemoglobin was lower in people assigned a psychological intervention than in the control group (usual care, education, waiting list, or attention control); the pooled standardized mean difference was –0•32 (95% CI –0•57 to –0•07) equivalent to an absolute difference of –0•76%. There were non-significant differences in blood glucose concentration (eight trials; – 0•11 [–0•65 to 0•42]) and weight gain (nine trials; 0•37 [–0•18 to 0•93]). Psychological distress was significantly lower in the intervention groups (five trials; – 0•58 [–0•95 to –0•20]). Conclusions: In type 2 diabetes, there are improvements in long-term glycemic control and psychological distress but not in weight control or blood glucose concentration in people who received psychological therapies. This review shows that adjuvant psychological treatments can be effective in improving certain features of diabetes control but the type of therapy that is most effective and the subgroups of patients most likely to benefit are not clear.

Review	Inclusion	Results
Author: Moore H, 2004(48) Purpose: To assess the effect of type and frequency of different types of dietary advice to all adults with type 2 diabetes on weight, measures of diabetic control, morbidity, total mortality and quality of life. Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.RCT 2.six months or longer 3.dietary advice was the main intervention 4.adults with type 2 diabetes mellitus. Dates of Articles Reviewed: 1966 to October 2003 Total number of studies: 36 Interventions: Diet and exercise Health Condition(s): Diabetes, Weight Loss Meta-analysis Performed? Yes	Results: Dietary advice versus dietary advice plus exercise: small, yet significant changes seen in mean glycated haemoglobin at six months (mean decrease in pooled weighted mean difference) 0.9% (95% CI 0.4 to 1.3) and twelve months (mean decrease in pooled weighted mean difference) 1.0% (95% CI 0.4 to 1.5). Low-fat diet versus other weight reducing diets; no difference, though small, but non-significant differences in weight loss between control and intervention groups. (also calls this “clinically insignificant”) Clinically meaningful differences in glucose profile were not achieved. Insufficient data to permit meta-analysis -minority of trials examined hard clinical endpoints Conclusions: There are no high quality data on the efficacy of the dietary treatment of type 2 diabetes, however the data available indicate that the adoption of exercise appears to improve glycated haemoglobin at six and twelve months in people with type 2 diabetes. Adoption of regular exercise is a good way to promote better glycemic control in type 2 diabetic patients.

Review	Inclusion	Results
Author: Norris SL, 2004(40) Purpose: To examine evidence for screening and treating obesity in adults treatment of obesity Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.people with type 2 diabetes 2.>18 years Dates of Article Review: January 1994 to February 2003 Total Number of Studies: 72 Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: Outcomes for 72 studies were presented individually. Glycemic control improvement in 14 studies in the intervention group compared with the control group. Glycated hemoglobin % change ranged from mean differences of -26 to +4% in the intervention groups, from -33 to +15% in the control groups. Glycated hemoglobin decreased more in the control group (3 studies), although significant in only one. Total cholesterol (5 studies) improved (range -0.9 to -0.07 mmol/dl) LDL (1 study) improved (-0.4mmol/dl), other studies NS HDL (1 study) improved (+0.1 mmol/dl), other studies NS Some studies showed no beneficial effects on lipids Blood pressure improved in 4 studies, NS change in 4 studies Positive effects of self-management training on knowledge, frequency and accuracy of self-monitoring of blood glucose, self-reported dietary habits, and glycemic control were demonstrated in studies with short follow-up (<6 months). Effects of interventions on lipids, physical activity, weight, and blood pressure were variable. With longer follow-up, interventions that used regular reinforcement throughout follow-up were sometimes effective in improving glycemic control. No studies demonstrated the effectiveness of self-management training on cardiovascular disease-related events or mortality. Conclusions: Evidence supports the effectiveness of self-management training in Type 2 diabetes, particularly in the short term. Results where follow-up was more than one year were mixed

Review	Inclusion	Results
Author: Norris SL, 2002(44) Purpose: A systematic review of the effectiveness and economic efficiency of disease management and case management for people with diabetes Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.all types of comparative study designs were included, including studies with concurrent or before-and-after comparison groups. 2. conducted in established market economies 3.provide information on one or more outcomes of interest preselected by the team 4.meet minimum quality standards. Dates of Article Review: 1966 to December 2000 Total Number of Studies: 42 Interventions: Disease and case management Health Condition(s): Diabetes Meta-Analysis Performed? No	Results: Data on glycemic control provide sufficient evidence that self-management education is effective in community gathering places for adults with type 2 diabetes and in the home for adolescents with type 1 diabetes. Evidence is insufficient to assess the effectiveness of self-management education interventions at the worksite or in summer camps for either Type 1 or Type 2 diabetes or in the home for type 2 diabetes. Evidence is also insufficient to assess the effectiveness of educating coworkers and school personnel about diabetes. Conclusions: Self-management is critical to the health of the person with diabetes, and the objectives for ideal self-management interventions in diabetes are clear: behavioral interventions must be practical and feasible in a variety of settings; a large percentage of the relevant population must be willing to participate; the intervention must be effective for long-term, important physiologic outcomes as well as behavioral endpoints and quality of life; patients must be satisfied; and the intervention must be relatively low cost and cost-effective. Evidence shows that DSME is effective in improving glycemic control when delivered in community gathering places for adults with type 2 diabetes and in the home for children and adolescents with type 1 diabetes. Further research is needed, however, to delineate interventions for optimizing long-term health and quality of life outcomes in these settings. Work is also needed to identify which racial, ethnic, and socioeconomic populations may benefit the most, and how best to identify and recruit these people. Effective strategies have yet to be demonstrated for DSME interventions in the settings of recreational camps and the worksite or for educating coworkers and school personnel about diabetes.

Review	Inclusion	Results
Author: Norris SL, 2002(45) Purpose: To evaluate the effectiveness of DSME delivered outside of traditional clinical settings: community centres, faith institutions, home, worksite, recreational camps, and schools Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.English 2.conducted in established market economies 3.have data on one or more of pre¬selected outcomes Dates of Article Review: 1966 to 2000 Total Number of Studies: 30 Interventions: Diabetes self-management education Health Condition(s): weight change Meta-Analysis Performed? No	Results: Self-management education is effective in community gathering places for adults with Type 2 diabetes and in the home for adolescents with Type 1diabetes. Evidence is insufficient to assess the effectiveness in the work place, summer camps for type 1 or 2, or in the home for type 2. Evidence is also insufficient to assess the effectiveness of educating coworkers and school personnel about diabetes. Conclusions: Behavioural interventions must be practical and feasible in a variety of settings; a large percentage of the relevant population must be willing to participate; the intervention must be effective for long-term, important physiologic outcomes as well as behavioural endpoints and quality of life; patients must be satisfied; and the intervention must be relatively low cost and cost-effective.
Author: Renders CM, 2001(47) Purpose: To assess the effects of different interventions, targeted at health professionals or the structure in which they deliver care, on the management of patients with diabetes in primary care, outpatient and community settings Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.RCTs, clinical controlled trials, interrupted time series 2. professional, financial and organizational strategies 3.aimed at improving care for people with Type 1 or Type 2 diabetes 4.participants were health care professionals, including physicians, nurses, and pharmacists. Dates of Article Review: 1966 to 1999 Total Number of Studies: 41 Interventions: multifaceted professional interventions Health Condition(s): Diabetes Meta-Analysis Performed? No	Results: The studies were homogeneous in terms of interventions, participants, settings and outcomes. The methodological quality of the studies was often poor. In all studies the intervention strategy was multifaceted, targeted at health professionals (12), the organization of care (9), and both (20). In 15 studies patient education was added to the professional and organizational interventions. A combination of professional interventions improved process outcomes. The effect on patient outcomes remained less clear as these were rarely assessed. Arrangements for follow-up (organizational intervention) also showed favourable effect on process outcomes. Multiple interventions in which patient education was added or in which the role of the nurse was enhanced also reported favourable effects on patients' health outcomes. Conclusions: Multifaceted professional interventions can enhance the performance of health professionals in managing patients with diabetes. Organizational interventions that improve regular prompted recall and review of patients (central computerized tracking systems or nurses who regularly contact patients) can also improve diabetes management. The addition of patient-oriented interventions can lead to improved patient health outcomes. Nurses can play an important role in patient-oriented interventions, through patient education or facilitating adherence to treatment.

Review	Inclusion	Results
Author: Sarkisian CA, 2003(41) Purpose: To identify and examine published self-care interventions designed to improve glycemic control or quality of life among older, African American, or Latino adults. Quality Assessment: Strong Main Topic Area: Diabetes	Inclusion Criteria: 1.focused on changing behaviour rather than simply educating patients Studies focusing on African American, Latino adults, diabetic, > 55y. Dates of Article Review: 1985 to 2000 Total Number of Studies: 12 Interventions: education and counselling Health Condition(s): diabetes Meta-Analysis Performed? No	Results: Only 1 of the 6 studies specifically targeting older adults demonstrated sustained improvement in glycemic control beyond the duration of the intervention. Glycemic Control: RCT's (8 studies): Improvement in 5 at completion Uncontrolled Studies (4 studies): Statistically significant improvement in 2 studies at completion Significant improvement in 1 study at 1 month after a 2 month intervention, no change in 1 study. Quality of Life: (4 RCT) 3 studies reported no difference, 1 study had statistically significant improvement $p<.05$ Conclusions: With the exception of the pharmacist-led intervention, all of the successful interventions used some form of group counselling; many also supplemented the group sessions with one-on-one sessions with nutritionist or diabetes educators. While the heterogeneity of the studies makes it impossible to compare results across interventions, interventions that were designed according to specific cultural criteria appeared to be successful. Studies with larger sample sizes and longer-term follow-up are necessary to ascertain the effectiveness of culturally appropriate interventions

Review	Inclusion	Results
Author: Van Dam HA, 2003(42) Purpose: Provider-patient interaction in diabetes care: effects on patient self-care and outcomes. Quality Assessment: Strong Major Topic Area: Diabetes	Inclusion Criteria: 1.studies of provider-patient interaction and communication and on provider consulting style 2.effects on patient self-care behaviour and diabetes outcomes. Dates of Article Review: 1980 to 2001 Total Number of Studies: 8 Interventions: Training and reminders to care providers, education to patients Health Condition(s): Diabetes Meta-Analysis Performed? No	Results: Intervention #1: Provider consulting behaviour 1. Training of providers (GP's and nurses) for a more patient-centered consulting style: - did not improve diabetes control (GHb intervention group 7.07%, control group 7.17%) after 1year -Weight and lipid control, diabetes knowledge slightly worsened 2. Trained diabetes nurses: outcomes not stated 3. Training of providers (GP's and nurses): - no improvement in outcome measures (GHb intervention group +0.69%, control group +1.14%) after 2 years 4. GPs setting realistic individual goals with patients and using prompting, guidelines. Feedback and medical education - improved quality of diabetes care, risk factor scores and diabetes control (GHb intervention group -1.7%, control group -1.2%) after 6 years. Intervention #2: Patient behaviour changes: 5. Automated telephone diabetes management programme: improved patient self-efficacy, diabetes control (GHb intervention group -0.7%, control group -0.2%) after 1year. 6. Patient empowerment group education programmed: improved diabetes control (GHb intervention group -0.73%, control group -0.04%) after 12weeks. 7. Assistant-guided, short, structured, individualized, empowering patient preparation: improved diabetes control (GHb intervention group -1.53%, control group +0.35%) after 9 months 8. Group consultations: kept diabetes control stable, improved blood lipids, BMI, diabetes health behaviour & knowledge (GHb intervention group +0.1%, control group +0.9%) after 2 years. Conclusions: The most effective interventions are those with a direct approach to support patient participation in diabetes care and self-care behaviour (the automated telephone management programme, the patient empowering group education, the group consultation), while interventions which focus on change of provider behaviour were less effective.

Review	Inclusion	Results
Author: Whittemore R, 2000(52) Purpose: To critically examine the state of the science regarding strategies to facilitate lifestyle change in people with diabetes mellitus and to recommend directions for nursing practice, research and theory development. Quality Assessment: Moderate Major Topic Area: Diabetes	Inclusion Criteria: 1.empirical studies 2. of lifestyle change 3. participants who are insulin-or non-insulin dependent Dates of Article Review: 1985 to 1999 Total Number of Studies: 72 Interventions: Diet Health Condition(s): Diabetes Meta-Analysis Performed? No	Results: Diabetes education combined with behavioural strategies had a moderate to large effect on knowledge and glycemic control. A significant decrease in weight was associated with the intervention, no significant improvement was reported in self-efficacy. Nutrition education plus social learning intervention found that social learning did not improve outcomes more than nutrition education. Greatest barriers to lifestyle change were related to dietary and exercise behaviour with few barriers associated with medication and glucose testing. Conclusions: Positive outcomes are associated with diabetes education programs that focus on self-management, emphasize behavioural strategies, and provide culturally relevant information.

Evidence Table 3.
Systematic reviews of dietary interventions related to hypertension-sodium, potassium, magnesium

Review	Inclusion	Results
Author: Alam & Johnson (1999)(65) Country of study: Australia Review Purpose: To evaluate the effect of chronic high NaCl diet on elderly BP and to examine the differential effects on SBP and DBP. Major Topic Area: Sodium and blood pressure Population: elderly >/= age 60 years	Inclusion Criteria: 1.RCTs 2.chronic NaCl ingestion 3.outcomes systolic (SBP) and diastolic (DBP) blood pressure 4.in the elderly where age data were provided. Dates article reviewed: 1966-May 1998 Total number of studies in review: 11 Meta-analysis Performed? Yes	Results: mean erect SBP and DBPs, diet low and high NaCl Pooled mean 95% CI treatment effect SBP 5.58 mmHG (4.31-6.85) DBP 3.50 mmHG (2.62-4.38) Pooled across 11 trials, subjects aged less or greater than 60 years For consumption of NaCl diet from low to high for subjects aged 60 years or greater - The standardized weighted mean increase in SBP was 1.59 times more when compared with DBP, which suggests that the effect of NaCl on SBP is greater than on DBP. For consumption of NaCl diet from low to high for subjects less than age 60 years, the standardized weighted mean increase in SBP was 0.75 times more when compared with DBP. For all subjects across 11 trials, the standardized weighted mean increase in SBP was 1.10 times more when compared with DBP which suggests the effect of NaCl on SBP is greater than on DBP. Regression analysis of all 11 trials revealed a significant (P=0.05) association between the level of SBP and the level of NaCl intake, with Na intake accounting for 37% of the variability in SBP participants of these trials. Conclusion: These data suggest that a chronic high NaCl diet in elderly subjects with essential hypertension is associated with an increase in SBP and DBP. The association is significant for both SBP and DBP but more marked for SBP than DBP. The effect is more pronounced the older the subject and the NaCl does strongly predict SBP in older subjects.

Review	Inclusion	Results
Author: Burgess E, 1999(62) Purpose: To provide updated, evidence¬ based recommendations on the consumption, through diet and supplementation of potassium (K), magnesium and calcium for the prevention and treatment of hypertension in otherwise healthy adults (except pregnant women). Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not clear Dates of Article Review: 1966 to 1996 Total Number of Studies: Not Reported Interventions: Supplements Health Condition(s): Blood Pressure Meta-Analysis Performed? No	Results: A 10 mmol increase in daily K intake was associated with a 40% reduction in risk of death from stroke ($p<0.001$). All data taken from one study. Reduction in BP with either low NaCl diet or high K diet was significant relative to the control diet. Combination diet (low Na, high K) did not result in any greater reduction in BP than a single dietary change. Counselling provided to subjects in a low Na/ high K diet resulted in a decrease in Na intake by approx 36 mmol/day but no change in K intake. After 3 years no greater reduction in BP in the low Na/ high K group than low Na group. Results taken from one study.. No reliable or consistent relationship found between Mg intake or Ca intake and hypertension prevention. Conclusion: Increasing intake of or supplementing diet with K, Mg or Ca is not associated with prevention of hypertension, nor is effective in reducing high BP. K supplementation may be effective in reducing BP in patients with hypokalemia during diuretic therapy.
Author: Fodor JG, 1999(64) Purpose: To provide evidence-based recommendations concerning the effects of dietary salt intake on the prevention and control of hypertension in adults (except pregnant women). Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2. dietary salt restriction 3.outcome – systolic and diastolic blood pressure Dates of Article Review: 1966 to 1996 Total Number of Studies: 81 Interventions: Diet Health Condition(s): elevated blood pressure Meta-Analysis Performed? No	Results: A reduction in daily Na of 100 mmol was associated with a decrease in BP of 3.7 mmHg SBP and 0.99 mmHg DBP Effect more pronounced if age > 44 years. reduction in daily NA of 100 mmol produced a reduction in SBP (6.3 mmHg) and DBP (2.2 mmHg). For <44 years, decrease was 2.4 mmHg for SBP and negligible for DBP. In a cohort study, participants whose daily consumption of Na at <89 mmol had a 4¬fold greater likelihood of MI. Safety of restriction of Na to <89 mmol has not been established. Conclusions: For normotensive subjects, a marked change in sodium intake is required to achieve a modest reduction in blood pressure there is a decrease of 1 mmHg in systolic BP for every 100 mmol decrease in daily sodium intake. For hypertensive patients, effects of dietary salt restriction are most pronounced if age is greater than 44 years. A diet in which Na is moderately restricted appears not to be associated with health risks.

Review	Inclusion	Results
Author: Geleijnse JM, 2003(60) Purpose: Tto assess the blood pressure response to changes in sodium and potassium intake and examine effect modification by age, gender, blood pressure, body weight and habitual sodium and potassium intake. Quality Assessment: Moderate Major Topic Area: Heart Disease (BP, Cholesterol, Lipids)	Inclusion Criteria: 1.RCT 2.participants over 18 years 3.publication date after 1966 4) alterations in Na/K intake 5. intervention lasted longer than 2 weeks. Dates of Articles Reviewed: January 1995 to March 2001 Total number of studies: 67 Interventions: Diet, Sodium reduction, Potassium supplements Health Condition(s): Blood Pressure Meta-analysis Performed? Yes	Results: Sodium reduction (median decrease in intake : -77 mmol/24 h) was associated with a weighted mean change of -2.54mmHg (95% CI: -3.16, -1.92) in systolic blood pressure and -1.96mmHg (-2.41, -1.51) in diastolic blood pressure. Corresponding values for increased potassium intake (median intake: 44 mmol/24 h) were -2.42mmHg (-3.75, -1.08) and -1.57mmHg (–2.65, –0.50). Blood pressure response was larger in hypertensives than normotensives, both for sodium (systolic: -5.24 versus -1.26 mm Hg, P <0.001; diastolic: -3.69 versus ¬1.14 mm Hg, P <0.001) and potassium (systolic: -3.51 versus -0.97 mm Hg, P<0.089; diastolic: -2.51 vs -0.34mmHg, P <0.074). Conclusions: Reduced intake of sodium and increased intake of potassium could make an important contribution to the prevention of hypertension, especially in populations with elevated blood pressure.
Author: Griffith LE, 1999(59) Purpose: The effect of supplemental calcium on blood pressure. Quality Assessment: Strong Main Topic Area: Heart Disease	Inclusion Criteria: 1.2.RCT studying the effect of calcium supplementation on blood pressure 3. in nonpregnant normotensive or hypertensive patients. Dates of Article Review: 1966 to May 1997 Total Number of Studies: 42 Interventions: Supplements Health Condition(s): elevated blood pressure Meta-Analysis Performed? No	Results: A reduction in systolic blood pressure of -1.44 mm Hg (95% CI -2.20 to -0.68) and in diastolic blood pressure of -0.84 mm Hg (95% CI -1.44 to -0.24). There was a trend toward larger effects with dietary interventions compared with non-dietary (supplements), none of the possible mediators of blood pressure reduction explained differences in treatment effect. Conclusions: Calcium supplementation leads to a small reduction in systolic and diastolic blood pressure. The effect of supplemental calcium in the diet is at least as great as nondietary supplementation.

Review	Inclusion	Results
Author: He FJ, 2002(55) Purpose: To assess the effect of a modest salt reduction on blood pressure Quality Assessment: Strong Main Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2. modest salt reduction (40mmol (2.5 g/d) 3.intervention lasted >4 weeks 4. excluded children and pregnant females Dates of Article Review: 1966 to 2001 Total Number of Studies: 28 Interventions: Diet Health Condition(s): High Blood Pressure Meta-Analysis Performed? Yes	Results: The median reduction in 24-hour urinary sodium excretion was 78 mmol (equivalent to 4.6g of salt/day) in hypertensives and 74 mmol in normotensives . Meta-analysis of blood pressure change: a)hypertensives: -4.96/2.73±0.40mmHg (mean ±SE) (95% CI: -5.75 to -4.17 mm Hg) for systolic and -2.73± 0.24 mm Hg (95% CI: -3.21 to -2.25 mm Hg) for diastolic b) normotensives: -2.03±0.27 mm Hg (95% CI -2.56 to -1.50 mm Hg) for systolic and -0.97±0.21mm Hg (95% CI: -1.39 to -0.55 mm Hg) for diastolic A reduction of 100 mmol/day (6g) in salt intake predicted a fall in blood pressure of 7.11/3.88 mmHg ($p<0.001$ for both systolic and diastolic) in people with hypertension and 3.57/1.66 mmHg in people with normal blood pressure Conclusions: A modest reduction in salt intake for a duration of 4 or more weeks does have a significant and, from a population viewpoint, important effect on blood pressure in both hypertensive and normotensive individuals.

Review	Inclusion	Results
Author: Hooper L, 2003(54) Purpose: To assess in adults the long term effects of advice to restrict dietary sodium Quality Assessment: Strong Major Topic Area: Heart Disease (BP, Cholesterol, Lipids)	Inclusion Criteria: 1.RCT 2.healthy adults 3.aiming to reduce sodium intake over at least 6 months 4.compared to a usual or control diet group; 5. the intervention was not multifactorial 6.excluded children, acutely ill, pregnant or institutionalized adults 7. follow-up was at least 26 weeks; 8. data on any of the outcomes of interest were available. Dates of Article Review: 1966 to May 1998 Total Number of Studies: 11 Interventions: Diet, reduction of salt intake Health Condition(s): Blood Pressure Meta-Analysis Performed? Yes	Results: Deaths and cardiovascular events were inconsistently defined and reported; only 17 deaths equally distributed between intervention and control groups occurred. Systolic and diastolic blood pressures were reduced at 13 to 60 months in those given low sodium advice as compared with controls, weighted mean difference (systolic by 1.1 mm Hg, 95% CI 1.8 to 0.4, diastolic by 0.6 mm Hg, 95% CI 1.5 to -0.3), as was urinary 24 hour sodium excretion (by 35.5 mmol/ 24 hours, 95% CI 47.2 to 23.9). Degree of reduction in sodium intake and change in blood pressure were not related. People on anti-hypertensive medications were able to stop their medication more often on a reduced sodium diet as compared with controls, while maintaining similar blood pressure control. Conclusions: Intensive interventions, unsuited to primary care or population prevention programs, provide only minimal reductions in blood pressure during long-term trials.

Evidence Table 4.
Systematic reviews of other dietary strategies to reduce blood pressure.

Review	Inclusion	Results
Author: Campbell NR, 1999(66) Purpose: To provide updated, evidence-based recommendations concerning the effects of alcohol (ETOH) consumption on the prevention and control hypertension in otherwise healthy adults (except pregnant women). Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not specified Dates of Article Review: 1966 to 1996 Total Number of Studies: 14 Interventions: ETOH reduction or abstention from alcohol Health Condition(s): Hypertension Meta-Analysis Performed? No	Results: For people who consumed ETOH at low levels, BP was no different from or was slightly lower than from those who abstained from ETOH use. Other studies found the association between ETOH and blood pressure is linear. Many discrepancies among results due to quality of studies. Conclusion: A reduction in alcohol consumption from more than 2 standard drinks per day reduces the blood pressure of both hypertensive and normotensive people. The lowest overall mortality rates in observational studies were associated with drinking habits that were within these guidelines.
Author: Campbell NR, 1999(63) Purpose: To provide updated, evidence based recommendations for health care professionals on lifestyle changes to prevent and control hypertension in otherwise healthy adults (except pregnant women). Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not specified Dates of Article Review: 1966 to September 1996 Total Number of Studies: Not reported Interventions: Diet Health Condition(s): Blood Pressure Meta-Analysis Performed? No	Results: Intervention — RR — 95%CI ↓calorie, ↓ ETOH & ↑ activity — 0.49 — 0.29-0.83 ↓ calorie, ↓Na, ↓ETOH & ↑activity — 0.46 P<0.027 — NR ↓ Na, ↑K intake — 0.65 — NR Weight loss — 0.87 P=0.06 — NR ↓ Na intake — 0.86 P=0.04 — NR Conclusions: Lifestyle modification by means of weight loss (or maintenance of healthy body weight, regular exercise and low alcohol consumption will reduce the blood pressure of appropriately selected normotensive and hypertensive people. Sodium restriction and stress management will reduce the blood pressure of appropriately selected hypertensive subjects.

Review	Inclusion	Results
Author: McAlister FA, 2001(61) Purpose: To provide updated, evidence- based recommendations for the therapy of hypertension in adults Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not reported Dates of Article Review: May 1998 to October 2000 Total Number of Studies: 12 Interventions: Pharmaceuticals Health Condition(s): Blood Pressure Meta-Analysis Performed? No	Results: High quality evidence was found for control of hyptertension with medication, reduction of alcohol intake in those with >2 drinks/day, aerobic exercise, weight management, and DASH diet . Conclusions: For patients with hypertension, there are a number of lifestyle manoeuvres and antihypertensive agents that may control blood pressure. In certain settings, and for specific classes of drugs, blood pressure lowering has been associated with reduced cardiovascular morbidity and/or mortality.
Author: Mulrow CD, 2000(58) Purpose: To evaluate whether weight-loss diets are more effective than regular diets or other antihypertensive therapies in controlling blood pressure and preventing morbidity and mortality in hypertensive adults. Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2.one group assigned to a weight-loss diet and the other group assigned to either normal diet or antihypertensive therapy 3.ambulatory adults with a mean blood pressure of at least 140 mm Hg systolic and/or 90 mm Hg diastolic 4.active intervention consisting of a calorie-restricted diet intended to produce weight loss 5.excluded studies simultaneously implementing multiple lifestyle interventions where the effects of weight loss could not be disaggregated 6. outcome measures included weight loss and blood pressure. Dates of Article Review: 1966 to June 1998 Total Number of Studies: 18 Interventions: Diet Health Condition(s): Blood Pressure Meta-Analysis Performed? No	Results: Only one small study of inadequate power reported morbidity and mortality outcomes. Six trials involving 361 participants assessed a weight-reducing diet versus a normal diet. The data suggested weight loss in the range of 4% to 8% of body weight was associated with a decrease in blood pressure in the range of 3 mm Hg systolic and diastolic. Three trials involving 363 participants assessed a weight-reducing diet versus treatment with antihypertensive medications. The stepped-care approach with antihypertensive medications produced greater decreases in blood pressure (in the range of 6/5 mm Hg systolic/diastolic) than weight-loss diet alone. Trials that allowed adjustment of participants' antihypertensive regimens suggested that patients required less intensive antihypertensive drug therapy if they followed a weight-reducing diet. Conclusions: Weight-reducing diets in overweight hypertensive persons can affect modest weight loss in the range of 3-9% of body weight and are probably associated with modest blood pressure decreases of roughly 3 mm Hg systolic and diastolic. Weight-reducing diets may decrease dosage requirements of persons taking antihypertensive medications.

Evidence Table 5.
Systematic reviews of dietary interventions to reduce cardiac risk factors - Dietary fat

Review	Inclusion	Results
Author: Bucher HC, 1999(73) Purpose: To investigate the effects of dietary and non-dietary (supplement) intake of n-3 polyunsaturated fatty acids on heart disease. Quality Assessment: Strong Major Topic Area: Heart disease	Inclusion Criteria: 1.RCT 2.compared dietary or nondietary n-3polyunsaturated fatty acids with control diet or placebo 3. patients with coronary heart disease Dates of Articles Reviewed: 1966 to 1999 Total number of studies: 11 Interventions: dietary and supplemented n¬3polyunsaturated fatty acids Health Condition(s): Heart disease Meta-analysis Performed? Yes	Results: Dietary Intervention vs. controls: Nonfatal MI: RR0.7 (95% CI: 0.1 to 3.2) Fatal MI: RR 0.5 (95% CI: 0.3 to 1.1) Sudden death (1 trial): RR 0.1 (95% CI: 0. to 1.1) Dietary Intervention vs. non-dietary intake Overall Mortality: RR 0.7 (95% CI: 0.6 to 0.9) vs. 0.8 (95% CI: 0.7 to 0.9) Intervention vs. control diet or placebo: Nonfatal MI: RR 0.8 (95% CI 0.5 to 1.2, p=0.16; heterogeneity p =0.01) Fatal MI: RR 0.7 (95% CI: 0.6 to 0.8, p<0.001; heterogeneity p>0.20) Sudden death (5 trials): RR 0.7 (95% CI :0.6 to 0.9, p<0.01; heterogeneity p>0.20) Overall Mortality: RR 0.8 (95% CI: 0.7 to 0.9, p<0.001; heterogeneity p>0.20) Total cholesterol: -8.8% to 6.0% mean change LDL cholesterol: -10.9% to 8.8% mean change Triglyceride levels: -3.6% to 40.4% mean change Conclusion: This meta-analysis suggests that dietary and nondietary intake of n-3 polyunsaturated fatty acids reduces overall mortality, mortality due to myocardial infarction, and sudden death in patients with coronary heart disease

Review	Inclusion	Results
Author: Bucher HC, 1999(73) Purpose: To systematically review the efficacy of antilipidemic interventions on major mortality outcomes in relation to drug classes Quality Assessment: Moderate Major Topic Area: Heart disease	Inclusion Criteria: 1.trials that reported mortality outcomes 2.any duration 3.any type of cholesterol-lowering intervention (multifactorial or unifactorial cholesterol-lowering intervention) 4.any setting (primary or secondary prevention trials of coronary heart disease). Dates of Articles Reviewed: 1966 to 1996 Total number of studies: 59 Interventions: Diet, pharmaceuticals, hormones Health Condition(s): cholesterol Meta-analysis Performed? Yes	Results: In addition to 43 trials of pharmacotherapy, there were 3 trials of n-3 fatty acids and 16 trials of other dietary interventions. Only statins showed a large and statistically significant reduction in mortality from coronary heart disease and from all causes. Meta-regression demonstrated that variability in results across trials could be largely explained on the basis of differences in the magnitude of cholesterol reduction. Conclusions: Statins have the largest effect on reduction of cardiovascular and all-cause mortality.

Review	Inclusion	Results
Author: Hooper L, 2001(70) Purpose: To assess the effect of reduction or modification of dietary fats on prevention of cardiovascular disease: total and cardiovascular mortality and cardiovascular morbidity Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2. intention to reduce or modify fat or cholesterol intake (excluding exclusively omega-3 fat interventions) 3.not multi factorial 4.healthy adult humans 5. intervention of at least six months 6.mortality or cardiovascular morbidity data available. Dates of Article Review: 1966 to May 1999 Total Number of Studies: 27 Interventions: Dietary reduction of total fat Health Condition(s): Cardiovascular disease Meta-Analysis Performed? Yes	Results: There was no significant effect on total mortality (rate ratio 0.98, 95% CI 0.86 to 1.12), a trend towards protection from cardiovascular mortality (rate ratio 0.91, 95% CI 0.77 to 1.07), and significant protection from cardiovascular events (rate ratio 0.84, 95% CI 0.72 to 0.99). The latter became non-significant on sensitivity analysis. Trials where participants were involved for more than 2 years showed significant reductions in the rate of cardiovascular events and a suggestion of protection from total mortality. The degree of protection from cardiovascular events appeared similar in high and low risk groups, but was statistically significant only in the former. Conclusions: The findings are suggestive of a small but potentially important reduction in cardiovascular risk in trials longer than two years. Lifestyle advice to all those at high risk of cardiovascular disease (especially where statins are unavailable or rationed), and to lower risk population groups, should continue to include permanent reduction of dietary saturated fat and partial replacement by unsaturated.

Review	Inclusion	Results
Author: Hooper L, 2001(71) Purpose: To assess the effect of reduction or modification of dietary fats on secondary prevention of cardiovascular disease: total and cardiovascular mortality and cardiovascular morbidity Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1.randomized trials 2. intervention was some type of dietary advice 3. participants had existing cardiovascular disease 4. outcomes reported were risk factors, disease, surgery or death. Dates of Article Review: Up to 1998 Total Number of Studies: Not clear Interventions: Dietary advice including increasing omega-3 fatty acids plus fruits and vegetable. Health Condition(s): Cardiovascular disease Meta-Analysis Performed? No	Results: Dietary advice that saves lives includes the following elements: a)Increase omega-3 fat intake (oily fish and rapeseed oil) b)Increased fruit and vegetable intake c)Reduce saturated fats, and totally or partially replace with usaturated fats Conclusions: Lowering fat intake can modify risk factors, as well as reduce mortality and morbidity.
Author: Hu FB, 2002(69) Purpose: To review metabolic, epidemiologic, and clinical trial evidence regarding diet and CHD prevention Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1.metabolic, epidemiologic and clinical studies 2.of major dietary fat factors: fat, holesterol,omega-3 fatty acids, trans-fatty acids, carbohydrates, glycemic index, fiber, folate, specific foods, and dietary patterns Dates of Article Review: up to May 2002 Total Number of Studies: 147 Interventions: Diet Health Condition(s): CHD Meta-Analysis Performed? No	Results: At least 3 dietary strategies are effective in preventing CHD: a)substitute non-hydrogenated unsaturated fats for saturated and trans-fats; b) increase consumption of omega-3 fatty acids from fish, fish oil supplements, or plant sources; c) consume a diet high in fruits, vegetables, nuts, and whole grains and low in refined grain products.” Conclusions: Substantial evidence indicates that diets using hydrogenated unsaturated fats at the predominant form of dietary fat, whole grains as the main form of carbohydrates, an abundance of fruits and vegetables, and adequate omega-3 fatty acids can offer significant protection against CHD

Review	Inclusion	Results
Author: Muldoon MF, 2001(75) Purpose of study: To investigate the association between cholesterol lowering interventions and death from suicide, accident or trauma (non¬illness mortality). Quality Assessment: Moderate Major Topic Area: Dietary Fat	Inclusion Criteria: 1. randomized trials 2. stable mean serum cholesterol concentration in the control group. 3. outcomes of clinical events and mortality Dates Articles Reviewed: 1966 to 2000 Number of Studies Included : 19 Meta-analysis Performed? Yes	Across all trials, the odds ratio of non-illness mortality in the treated groups, relative to control groups, was 1.18 (95% confidence interval 0.91 to 1.52; P = 0.20). The odds ratios were 1.28 (0.94 to 1.74; P = 0.12) for primary prevention trials and 1.00 (0.65 to 1.55; P = 0.98) for secondary prevention trials. Randomized clinical trials using statins did not show a treatment related rise in non-illness mortality (0.84, 0.50 to 1.41; P = 0.50), whereas a trend toward increased deaths from suicide and violence was observed in trials of dietary interventions and non-statin drugs (1.32, 0.98 to 1.77; P = 0.06). No relation was found between the magnitude of cholesterol reduction and non-illness mortality (P = 0.23). Conclusions: Currently available evidence does not indicate that non-illness mortality is increased significantly by cholesterol lowering treatments. A modest increase may occur with dietary interventions and non-statin drugs.
Author: Pignone MP, 2001(72) Purpose: To examine the harms and benefits of screening and treatment of lipid disorders in adults without known CHD Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1. CTs 2.at least 1 year's duration 3. examined drug or diet therapy; diet or exercise 4. patients without previously known CHD 5. measured clinical end points, including total mortality, CHD mortality, and nonfatal MI, cholesterol levels Dates of Article Review: 1994 to July 1999 Total Number of Studies: Not reported Interventions: Diet Health Condition(s): CHD, cholesterol Meta-Analysis Performed? Yes	Results: Intervention did not reduce total mortality, CHD mortality or non-fatal MIs. Diet therapy: subset of six studies found mean total cholesterol decreases of 2%-3%. In three trials, subjects learning their cholesterol level had no net improvement in total cholesterol with dietary therapy compared with subjects who were not given their results. Diet therapy has not been demonstrated to reduce CHD events in free-living primary prevention populations. Data are insufficient to determine in advance which patients are most likely to achieve and maintain important reductions in cholesterol. Conclusions: On the basis of effectiveness of treatment, the availability of accurate and reliable tests, and the likelihood of identifying people with abnormal lipids and increased CHD risk, screening appears to be effective in middle-aged and older adults and in young adults with additional cardiovascular risk factors.

Review	Inclusion	Results
Author: Tang J, 1998(76) Purpose: To estimate the efficacy of dietary advice to lower total blood cholesterol in free-living participants. Quality Assessment: Strong Major Topic Area: Heart disease	Inclusion Criteria: 1.RCTs 2.dietary advice to lower cholesterol levels; 3.included diets to reduce fat intake in women at risk for breast cancer; trials had to last at least 4 weeks. 4.excluded supplementation. Dates article reviewed: from 1966 Total number of studies: 19 Interventions: education, behavioural counselling, included mailed, telephone or computer-based communication, strategies, self-monitoring Health Condition(s): patients with no disease, or current coronary heart disease, hypercholesterolemia, hypertension, at risk for breast cancer Meta-analysis Performed? Yes	Results: After at least 6 months duration, total serum cholesterol reduction of 5.3% (95% CI 4.7 to 5.9) could be attributed to dietary advice. The effect was 8.5% at 3 months and 5.5% at 12 months. Diets similar to Step II were moderately more effective than those similar to Step I, and of similar efficacy to diets aimed at lowering total fat intake or raising polyunsaturated/saturated fatty acid ratio. Conclusion. Individualized dietary advice for reducing cholesterol concentration is modestly effective. More intensive diets achieved greater reductions in serum cholesterol. On the basis of reported food intake, targets for change in food intake were rarely achieved, providing a likely explanation for limited efficacy.

Review	Inclusion	Results
Author: Yu-Poth S, 1999(74) Review Purpose: To evaluate the effects of the National Cholesterol Education Program's Step I and II dietary interventions on major cardiovascular disease risk factors Quality Assessment Rating: Moderate Major Topic Area: Heart Failure	Inclusion Criteria: 1. RCTs 2. dietary intervention studies designed to lower blood cholesterol concentrations or decrease body weight for the primary purpose of preventing CVD 3. Dietary intervention included step I diet, step II diet, or both 4. Subjects were free-living, prepared their own food, and were counselled by dietitians or other professionals about implementing low-fat diets 5. The intervention lasted >3 weeks to stabilize plasma cholesterol concentrations Dates of Articles Reviewed: 1981 to 1997 Total number of studies: 37 Interventions: diet Health Conditions: cholesterol, diet Meta-analysis Performed? Yes	Results: Step I and II dietary interventions significantly decreased plasma lipids and lipoproteins. Plasma total cholesterol, LDL cholesterol, triacylglycerol, and TC-HDL cholesterol decreased by 0.63 mmol/L (10%), 0.49 mmol/L (12%), 0.17 mmol/L (8%), and 0.34 (7%) respectively. HDL cholesterol decreased by 7% (p=.05) in response to step II but not step I dietary interventions. Positive correlations between changes in dietary total and saturated fatty acids and changes in TC and LDL and HDL cholesterol were observed (r = 0.59, .61, and .46 respectively, p<.001). For every 1% decrease in energy consumed as dietary saturated fatty acid, TC decreased by 0.056 mmol/L and LDL cholesterol by 0.05 mmol/L. For every 1-kg decrease in body weight, triacylglycerol decreased by 0.011 mmol/L and HDL cholesterol increased by 0.011 mmol/L Exercise resulted in greater decreases in TC, LDL cholesterol, and triacylglycerol and preventing the decrease in HDL cholesterol associated with low-fat diets Conclusions: Step I and II dietary interventions have multiple beneficial effects on important cardiovasclur disease risk factors

Evidence Table 6.
Systematic reviews of dietary interventions to reduce cardiac risk factors - soy protein

Review	Inclusion	Results
Author: Costa RL, 2000(79) Purpose: To review the effects of soy on blood lipids and to provide guidance on the clinical relevance of soy's health effects with respect to hyperlipidemia. Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not reported Dates of Article Review: 1966 to January 1999 Total Number of Studies: Not reported Interventions: Diet Health Condition(s): Cholesterol Meta-Analysis Performed? No	Results: Soy resulted in modest reductions in low-density lipoprotein cholesterol (<10%). Conclusions: Soy can improve blood lipid parameters in both normocholesterolemic and hypercholesterolemic subjects, although the use of soy alone may not allow patients with hyperlipidemia to achieve target lipid parameters, as indicated by the National Cholesterol Education Program.

Evidence Table 7.
Systematic reviews of dietary interventions to reduce cardiac risk factors - prevention in women and children

Review	Inclusion	Results
Author: Krummel DA, 2001(80) Purpose: To discuss recommendations for community-based tobacco, physical activity and diet interventions Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: Not reported Dates of Article Review: 1980 to 1998 Total Number of Studies: 65 Interventions: diet Health Condition(s) cardiovascular health Meta-Analysis Performed? No	Results: The effects of cardiovascular interventions in women have been inappropriately understudied in women. Conclusions: Intervention research to improve women's cardiovascular health is sorely needed.

Review	Inclusion	Results
Author: Poustie VJ, 2001(81) Purpose: To examine the effectiveness of cholesterol-lowering diet in children and adults with familial hypercholesterolaemia Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1. RCT 2. in people with familial hypercholesterolaemia 3.compared dietary interventions. Dates of Article Review: 1966 to 2002 Total Number of Studies: 7 Interventions: Diet Health Condition(s): Heart Disease, cholesterol Meta-Analysis Performed? No	Results: Only short-term outcomes could be assessed in this review due to the length of included studies. Compliance to treatment, quality of life, mortality and evidence of ischaemic or atheromatous disease were not assessed. No differences were found between the cholesterol-lowering diet and other diets for the outcomes assessed. Conclusions: No conclusions can be made about the effectiveness of cholesterol-lowering diets, or other dietary interventions for familial hypercholesterolaemia, due to the lack of adequate data. A randomised controlled trial is needed to investigate dietary treatment for this condition
Author: Wilcox S, 2001(82) Purpose: To investigate the effects of physical activity or dietary advice on CVD risk factors Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1.studies published in English, 2.included women 18 yrs or older 3.includes a control group or minimal intervention group, 4. done in a health care setting Dates of Article Review: 1980 to 2000 Total Number of Studies: 45 Interventions: Diet Health Condition(s): CHF Meta-Analysis Performed? No	Results: Interventions were relatively modest (1-2kg) but statistically significant for physical activity, BMI or weight, dietary fat, BP, and total and LDL serum cholesterol. Intervention effects were generally large for samples with a mean age greater than 50 yrs, and for studies with less than 6 months follow-up. Type of comparison group, type of intervention, and use of a behaviour therapy did not have a consistent impact on intervention effects. Few studies focussed on people of colour, although the results of these studies are promising. Conclusions: The few studies done to date with persons of color show promising results in reducing CVD risk factors. A common component of these studies is that the interventions are culturally relevant and tailored to the target population.

Evidence Table 8.
Systematic reviews of dietary interventions to reduce cardiac risk factors - multiple risk factor interventions

Review	Inclusion	Results
Author: Ebrahim S, 2000(83) Purpose: To assess the effects of multiple risk factor intervention for reducing cardiovascular risk factors, total mortality, and mortality from coronary heart disease among adults without clinical evidence of established cardiovascular disease. Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.Randomized controlled trials 2. at least 6 months duration 3.with parallel group design 4.involving counselling or educational interventions with or without pharmacological treatments 5.which aim to reduce more than one cardiovascular risk factor (ie., blood pressure, smoking, total blood cholesterol, physical activity, diet) Dates of Article Review: 1966 to April 1995 Total Number of Studies: 18 Interventions: pharmaceuticals, counselling, education Health Condition(s): CHF Meta-Analysis Performed? Yes	Results: Net changes in systolic and diastolic blood pressure, smoking prevalence, and blood cholesterol were -3.9mmHg (95% CI -4.2,-3.6 mmHg), -2.9 mmHg (95% CI -3.1,-2.7 mmHg), -4.2% (95% CI -4.8, -3.6%), and -0.08mmol/L (95% CI ¬ 0.1.-0.06 mmol/L) respectively. In the ten trials with clinical event end-points, the pooled odds ratios for total and coronary heart disease mortality were 0.97 (95% CI 0.92-1.02) and 0.97 (95% CI 0.88-1.04) respectively. Statistical heterogeneity between the studies with respect to mortality and risk factor changes was due to trials focusing on hypertensive participants and those using considerable amounts of drug treatment. Only these trials demonstrated significant reductions in mortality. Conclusions: The pooled effects suggest multiple risk factor intervention has no effect on mortality. However, a small, but potentially important, benefit of treatment (about a 10% reduction in CHD mortality) may have been missed. Risk factor changes were relatively modest, were related to the amount of pharmacological treatment used, and in some cases may have been over-estimated because of regression to the mean effects, lack of intention to treat analyses, habituation to blood pressure measurement, and use of self-reports of smoking. Interventions using personal or family counselling and education with or without pharmacological treatments appear to be more effective at achieving risk factor reduction and consequent reductions in mortality in high risk hypertensive populations.

Evidence Table 9.
Systematic reviews of dietary interventions to manage other conditions -Chronic Obstructive Pulmonary Disease

Review	Inclusion	Results
Author: Ferreira IM, 2000(84) Purpose: To clarify whether nutritional supplementation (caloric supplementation for at least 2 weeks) improved anthropometric measures, pulmonary function, respiratory muscle strength, and functional exercise capacity in patients with stable COPD Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.trials must have included stable patients among whom at least 75% had COPD characterized by a FEV1 2.subjects received oral, enteral, or parenteral nutritional support versus placebo or versus their usual diet or other treatment regimens such as anabolic substances. 3.Studies involving patients with COPD undergoing treatment in the ICU were excluded Dates of Article Review: 1966 to 1998 Total Number of Studies: 9 Interventions: diet Health Condition(s): COPD Meta-Analysis Performed? Yes	Results: For each of the outcomes studied, the effect of nutritional support was small and not statistically significant. The effect of nutritional support was homogeneous across studies. Conclusions: Nutritional support had no effect on improving anthropometric measures, lung function, or functional exercise capacity among patients with stable COPD.

Review	Inclusion	Results
Author: Ferreira I, 2001(85) Purpose: To clarify the contribution of nutritional supplementation for patients with stable COPD. Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCTs 2.English-language RCTs Dates of Articles Reviewed: 1966 to 1999 Total number of studies: 21 Interventions: Diet Health Condition(s) of Interest: COPD Meta-analysis Performed? No	Results: High carbohydrate meals were associated with an increase in carbon dioxide production and a decrease in exercise capacity. Short-term crossover studies in which diets of various compositions were administered supported the notion that high carbohydrate loads increase the stress on the ventilatory system. The influence of longer-term supplementation (> 2 weeks) on weight, anthropometry, and exercise capacity varied, without there being a consistent effect. Lean body weight was only occasionally reported and health related quality of life too rarely to be included as an outcome. Conclusions: This systematic overview in patients with COPD supports the notion that those with marginal ventilatory reserve might benefit from a dietary regimen in which a high percentage of calories are supplied by fat. Trials of > 2 weeks failed to show consistent benefit on body weight. Evaluating nutritional repletion is hampered by the absence of information regarding body composition, exercise, and health-related quality of life.

Evidence Table 10.
Systematic reviews of dietary interventions to manage other conditions - Phenylketonuria

Review	Inclusion	Results
Author: Poustie VJ, 2000(86) Purpose: To assess the effects of low¬ phyenylalanine diet commenced early in life for people with phenylketonuria (PKU); to assess the effects of relaxation or termination of the diet Quality Assessment: Strong Major Topic Area: PKU	Inclusion Criteria: 1.RCT Dates of Articles Reviewed: to 2004 Total number of studies: 4 Interventions: diet Health Condition(s): phenylketonuria Meta-analysis Performed? Yes	Results: Few significant differences between treatment and comparison groups for the outcomes of interest. Blood phenylalanine levels were significantly lower in participants with phenylketonuria following a low-phenylalanine diet compared to those on a less restricted diet, weighted mean difference (WMD) at three months ¬ 698.67 (95% CI -869.44 to -527.89). Intelligence quotient was significantly higher in participants who continued the diet than in those who stopped the diet, WMD after 12 months 5.00 (95% CI 0.40 to 9.60). However, these results came from a single study. Coclusions: The results of non-randomized studies have concluded that a low-phenylalanine diet is effective in reducing blood phenylalanine levels and improving intelligence quotient and neuropsychological outcomes. Authors were unable to find any randomized controlled studies that have assessed the effect of a low-phenylalanine diet versus no diet from diagnosis. In view of evidence from non-randomized studies, such a study would be unethical and it is recommended that low-phenylalanine diet should be commenced at the time of diagnosis. There is uncertainty about the precise level of phenylalanine restriction and when, if ever, the diet should be relaxed.

Evidence Table 11.
Systematic reviews of dietary interventions to manage other conditions - Eplilepsy

Review	Inclusion	Results
Author: Lefevre F, 2000(87) Purpose: To systematically review and synthesize the available evidence on the efficacy of the ketogenic diet in reducing seizure frequency for children with refractory epilepsy Quality Assessment: Moderate Major Topic Area: Epilepsy	Inclusion Criteria: 1.reported relevant health outcomes 2.treatment with the ketogenic diet 3.in children with refractory epilepsy (refractory was defined as suboptimal control of seizures despite multiple medication trials or intolerance to any effective medications); 4. treatment given was either the classic ketogenic diet or a modification of this diet (eg, medium chain triglyceride diet). Dates of Articles Reviewed: 1970 to 2000 Total number of studies: 11 Interventions: ketogenic diet Health Condition(s): childhood and refractory epilepsy Meta-analysis Performed? No	Results: The evidence consists entirely of uncontrolled studies. The results of these studies are consistent in showing that some children benefit from the ketogenic diet, demonstrated by a significant reduction in seizure frequency. Conclusions: Although controlled trials are lacking, the evidence is sufficient to determine that the ketogenic diet is efficacious in reducing seizure frequency in children with refractory epilepsy.

Evidence Table 12.
Systematic reviews of dietary interventions to manage other conditions - Irritable bowel syndrome

Review	Inclusion	Results
Author: Spanier JA, 2003(88) Purpose: To assess the effectiveness of alternative or complementary treatments of IBD. Quality Assessment: Strong Major Topic Area: IBD	Inclusion Criteria: 1.clinical trials 2.adults with IBD 3.published Dates of Articles Reviewed: 1966 to 2001 Total number of studies: Not reported Interventions: herbals, diet supplements, psychological therapies Health Condition(s): Irritable Bowel Disorder Meta-analysis Performed? No	Results: No difference exists between ginger and placebo in preventing postoperative nausea and vomiting. Efficacy remains unclear in use of peppermint oil to treat IBS and dyspepsia. Results descriptive rather than comparative for; alteration of intestinal microflora, dietary modifications, food allergies and intolerances, digestive supplements, and psychological therapies Conclusions: Guarded optimism exists for traditional Chinese medicine and psychological therapies, but further well-designed trials are needed.

Evidence Table 13.

Systematic reviews of dietary interventions to manage other conditions - Inflammatory bowel disease and diabetes

Review	Inclusion	Results
Author: MacLean CH, 2004(78) Purpose: The effects of omega-3 fatty acids on immunomediated diseases, bone metabolism, and gastrointestinal diseases Quality Assessment: Strong Main Topic Area: Gastrointestinal/Renal Disease See also under Renal disease	Inclusion Criteria: 1.RCT or clinical controlled trial, observational studies accepted only for bone mineral status. 2.any articles on the effects of omega-3 fatty acids on diabetes mellitus, inflammatory bowel disease (ulcerative colitis and Crohn's disease), rheumatoid arthritis, SLE, renal disease, osteoporosis or bone mineral status Dates of Article Review: 1961 to 2003 Total Number of Studies: 84 studies: -34 diabetes/metabolic syndrome -13 inflammatory bowel disease -21 rheumatoid arthritis -9 Renal disease -3 systemic lupus erythematosis - 4 bone density & fractures Interventions: Herbal medications, diet Health Condition(s): Diabetes, Rheumatoid Arthritis, Osteoporosis, Renal Disease, Lupus, Cholesterol Meta-Analysis Performed? Yes	Results: The quantity and strength of evidence for effects of omega-3 fatty acids on outcomes in the conditions assessed varies greatly. Conclusions: No effect on inflammatory bowel syndrome Diabetes Type II: strong evidence that omega-3fatty acids reduce serum triglycerides but have no effect on total, HDL, & LDL cholesterol. Insufficient data on insulin resistance. Rheumatoid Arthritis: omega-3 fatty acids reduce tender joint counts and may reduce requirements for corticosteroids

Evidence Table 14.
Systematic reviews of dietary interventions to manage other conditions - Renal disease

Review	Inclusion	Results
Author: Fouque D, 2000(89) Purpose: To determine the efficacy of low protein diets in preventing the natural progression of chronic renal failure, therefore delaying the need for start of maintenance dialysis Quality Assessment: Strong Major Topic Area: Renal Disease	Inclusion Criteria: 1.RCT 2.usual protein intake or limited intake for at least 12 months Dates of Articles Reviewed: 1966 to June 1999 Total number of studies: 7 Interventions: diet Health Condition(s): renal disease (CRF) Meta-analysis Performed? No	Results: Low protein diet favoured over high protein diet OR 0.61; 95%CI 0.46 to 0.83 Conclusions: Reducing protein intake in patients with CRF reduces the occurrence of renal death by about 40% as compared to larger or unrestricted protein intake.

Review	Inclusion	Results
Author: MacLean CH, 2004(78) Purpose: The effects of omega-3 fatty acids on immunomediated diseases, bone metabolism, and gastrointestinal diseases Quality Assessment: Strong Main Topic Area: Gastrointestinal/Renal Disease	Inclusion Criteria: 1.RCT or clinical controlled trial, observational studies accepted only for bone mineral status. 2.any articles on the effects of omega-3 fatty acids on diabetes mellitus, inflammatory bowel disease (ulcerative colitis and Crohn's disease), rheumatoid arthritis, SLE, renal disease, osteoporosis or bone mineral status Dates of Article Review: 1961 to 2003 Total Number of Studies: 84 studies: 9 on renal disease Interventions: Herbal medications, diet Health Condition(s): Diabetes, Rheumatoid Arthritis, Osteoporosis, Renal Disease, Lupus, Cholesterol Meta-Analysis Performed? Yes	Results: The quantity and strength of evidence for effects of omega-3 fatty acids on outcomes in the conditions assessed varies greatly. Conclusions: No effect on renal disease Diabetes Type II: strong evidence that omega-3fatty acids reduce serum triglycerides but have no effect on total, HDL, & LDL cholesterol. Insufficient data on insulin resistance. Rheumatoid Arthritis: omega-3 fatty acids reduce tender joint counts and may reduce requirements for corticosteroids

Review	Inclusion	Results
Author: Waugh ,2004(91) Review Purpose: To determine whether protein restriction shows or prevents progression of diabetic nephropathy towards renal failure. Quality Assessment: Moderate Major Topic Area: Diabetic renal disease	Inclusion Criteria: 1.Not limited to RCTs, all trials involving people with insulin dependent diabetes 2. following a lower protein diet for at least four months (straight line nature of progression as reflected by glomerular filtration rate means that patients can act as their own controls in a before and after comparison) 3. studies were excluded if results for diabetic patients not reported separately, length of follow-up too short e.g.< 4 months were used, insufficient detail of diet or results given, design or analysis flawed Dates article reviewed: 1974 to 1996 Total number of studies: 5 Interventions: Diet – usual and low protein Health Condition(s): Renal disease Meta-analysis Performed? No	Results: Overall a protein-restricted diet (0.3-0.8 g/kg) does appear to slow the progression of diabetic nephropathy towards renal failure. Conclusions: The results show that reducing protein intake appears to slow progression to renal failure. All trials were carried out in patients with insulin-dependent diabetes.

Evidence Table 15.
Systematic reviews of dietary interventions to manage other conditions - Fatty liver disease

Review	Inclusion	Results
Author: Wang RT, 2003(92) Purpose: To assess the evidence supporting the efficacy of weight reduction for patients with nonalcoholic fatty liver Quality Assessment: Moderate Major Topic Area: Liver Disease	Inclusion Criteria: 1.Studies were included if they reported histology, serum aminotransferase levels, or radiological imaging of the liver. 2. weight reduction methods included caloric restriction alone or with increase in activity, other behavioural modifications, or antiobesity medications Dates of Articles Reviewed: 1966 to 2002 Total number of studies: 15 -12 studies used dietary and behavioural interventions Interventions: Diet, exercise, pharmaceuticals, behaviour therapy Health Condition(s): weight change, liver outcome measurements Meta-analysis Performed? No	Results: Poor quality studies: 1 RCT, 2 non-randomized trials, 9 case series, 1 retropsecitve review, 2 case studies All studies reported overall improvements in the liver outcome measurements (serum aminotransferase levels, radiological imaging, histology). Studies were inadequate to permit meta-analysis, evidence was limited and sometimes of lower quality. Conclusions: There is little evidence to support the widely held belief that weight reduction is an effective therapy for nonalcoholic fatty liver

Evidence Table 16.
Systematic reviews of dietary interventions to manage other conditions - Malnutrition in the eldery

Review	Inclusion	Results
Author: Baldwin C, 2004(93) Purpose: To examine the evidence that dietary advice to improve nutritional intake in adults with illness-related malnutrition can improve survival, weight and anthropometry and to estimate the size of any additional effect of whole protein nutritional supplements when given in combination with dietary advice. Quality Assessment: Strong Major Topic Area: Weight Loss	Inclusion Criteria: 1.RCT 2.dietary advice compared with: no advice; oral nutritional supplements; and dietary advice plus oral nutritional supplements 3. in people with illness-related malnutrition. Dates of Article Review: 1966 to April 2003 Total Number of Studies: 24 Interventions: Diet Health Condition(s): Weight change due to illness related malnutrition Meta-Analysis Performed? Yes	Results: No significant difference in mortality for each comparison, or in weight change for either dietary advice compared with no advice (one study) weighted mean difference (WMD) -0.03 kg (95% CI -0.69 to 0.63); advice compared with advice plus supplements (four studies), WMD -0.09 kg (95% CI -0.63 to 0.46); or for advice plus supplements if required compared with no advice (one study) WMD 1.10 (95% CI -0.96 to 3.16). Compared with groups receiving only dietary advice, groups receiving supplements gained significantly more (or lost significantly less) weight (four studies), WMD 1.09 kg (95%CI 0.29 to 1.90). Few data were available for other outcomes. Conclusions: This review highlights the lack of evidence for the provision of dietary advice in the management of illness-related malnutrition. Results suggest oral nutritional supplements may be more effective than dietary advice, or provide an additional benefit in enhancing short-term weight gain, but whether this can be sustained, or whether survival and morbidity are also improved remains uncertain.

Evidence Table 17.
Systematic reviews of dietary interventions to manage other conditions - Mental Health

Review	Inclusion	Results
Author: Austin SB, 2000(97) Purpose: This paper reports on accumulated data on effectiveness of programs for prevention of eating disorders. Quality Assessment: Moderate Major Topic Area: Eating Disorders	Inclusion Criteria: 1. must report empirical results from a study intended to prevent eating disorders or their typical behavioural or psychological precursors; 2. published in peer-review literature 3. English Dates of Articles Reviewed: 1966 to 2000 Total number of studies: 20 Interventions: behaviour modification Health Condition(s): eating disorders Meta-analysis Performed? No	Results: Though there has been a compelling interest in social, political and economic factors influencing the incidence of disordered eating, little of this interest has been carried over into the prevention end of eating disorders research. Most studies reported thus far have been designed to target and measure change principally on the individual level, to the exclusion of considering leverage points for intervention in the larger social environment. Conclusions: This paper concludes with a recommendation for new attention to a model of proactive primary prevention targeted at environmental change and cross-disciplinary collaboration to achieve a reduction in the incidence of eating disorders.
Author: Bianchi-Demicheli F, 2002(95) Purpose: To review literature on therapeutic options of premenstrual dysphoric disorder (PMDD) and identify the treatments of proven efficacy. Quality Assessment Rating: Moderate Main Topic Area: Premenstrual dysphoric disorder	Inclusion Criteria: 1.RCTs, 2. examining therapeutic options for PMDD Dates of Articles Reviewed: 1983 to 2001 Total number of studies: 42 Interventions: Exercise, supplements, diet Health Condition(s): PMDD Meta-analysis Performed? No	Results: Physical activity, dietary change (increased carbohydrate intake, calcium and magnesium supplements, vitamins E and B6), mineral salt supplementation and ovulation inhibitors are effective at reducing symptoms of PMDD Conclusions: Therapy should begin with non-medicated approaches and pharmacological treatment should only be used if symptoms persist

Review	Inclusion	Results
Author: Faulkner G, 2003(94) Purpose: To review the literature on the effectiveness of interventions designed to control weight gain in schizophrenia Quality Assessment: Strong Main Topic Area: Schizophrenia & weight management.	Inclusion Criteria: 1.Published in English, 2. majority of participants diagnosed and classified for schizophrenia, 3. outcome of weight loss Dates of Article Review: 1961 to 2002 Total Number of Studies: 8 Interventions: Diet and exercise Health Condition(s): weight change Meta-Analysis Performed? No	Results: Interventions incorporating multiple components of diet, exercise and /or behavioural counselling were all successful in limiting weight gain. The drop-out rates were similar to other community groups participating in Weight Watchers programs. Conclusions: Weight loss in this population may be difficult but this systematic review suggests that small effects are possible
Author: Pratt BM, (96) Purpose: Interventions for preventing eating disorders in children and adolescents Quality Assessment: Strong Major Topic Area: Eating Disorders	Inclusion Criteria: 1.RCT's 2.major focus on eating disorder prevention programs 3. for children and adolescents where there is no DSM-IV diagnosis Dates of Articles Reviewed: 1986 to 2001 Total number of studies: 8 studies, 2631 participants Interventions: eating attitudes, behaviour, psychoeduction Health Condition(s): weight change, mental health Meta-analysis Performed? Yes	Results: The findings from the current meta-analysis of outcomes from eating disorder prevention programs for children and adolescents indicate that the risk factors and content of interventions investigated to date have not yielded particularly promising results in the short-term. Conclusions: No firm conclusions can be made about the impact of prevention programs for eating disorders in children and adolescents.

Review	Inclusion	Results
Author: Sharpe JK, 2003(32) Purpose: To review findings from weight management intervention studies to consider clozapine and/or olanzapine induced weight gain. A parallel aim is to summarize the challenges facing future research and provide an overview of best practice in the management of weight in mental health patients Quality Assessment: Moderate Major Topic Area: Weight loss	Inclusion Criteria: 1. studies reported weight control practices 2. patients taking atypical antipsychotic medications Dates of Article Review: Not reported Total Number of Studies: 5 Interventions: diet Health Condition(s): weight change Meta-Analysis Performed? No	Results: The studies reviewed provide some important descriptive clinical insights; however, common shortcomings include small subject numbers and methodological drawbacks such as lack of a control group. Conclusions: There is some evidence that weight gain associated with atypical antipsychotic medication can be ameliorated by lifestyle changes such as improved nutritional practices and increased physical activity. Lifestyle interventions for individuals with psychotic disorders may need to be adapted to be most effective; for example, using strategies to counter increased appetite and to enhance physical activity. Clinicians need to be vigilant and persistent in monitoring and intervening if weight gain occurs. A standardized screening tool and clinical pathway would help clinicians to target appropriate interventions for each person prescribed atypical antipsychotic medication.
Author: Werneke U, 2003(33) Purpose: To summarize the evidence on effectiveness of behavioural interventions for weight gain in the general population and in¬patients treated with atypical psychotics Quality Assessment: Moderate Major Topic Area: weight loss	Inclusion Criteria: 1.studies evaluating the effectiveness of behavioural interventions for the prevention and treatment of overweight patients treated with antipsychotic medication and individuals in the general population Dates of Article Review: 1966 to 2003 Total Number of Studies: 13 Interventions: Diet, Exercise, Pharmaceuticals, Behavioural management Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: In general, behavioural approaches including, diet, exercise and drug treatments may be effective. There were only 13 studies of behavioural interventions for patients taking antipsychotic medication. No study met the criteria for a RCT. Calorie restriction in a controlled ward environment, structured counselling combined with cognitive behavioural therapy and counselling on life style and provision of rewards may potentially lead to weight loss. Conclusions: Currently only limited, methodologically flawed, evidence is available that behavioural interventions in overweight patients treated with antipsychotics, although intuitively appealing, actually work.

Evidence Table 18.

Systematic reviews of dietary interventions to manage other conditions - Pregnancy and newborn care

Review	Inclusion	Results
Author: Duley L, 2000(101) Purpose: To assess the effects of dietary advice to alter salt intake compared to continuing a normal diet, on the risk of pre-eclampsia and its consequences. Quality Assessment Moderate Major Topic Area: Hypertension, pregnancy	Inclusion Criteria: 1.RCT 2. advice to either reduce or increase dietary salt during pregnancy. Dates article reviewed: up to 1998 Total number of studies: 2 RCTs. Interventions: diet Health Condition(s): pregnant women with pre¬eclampsia Meta-analysis Performed? Yes	Results: Relative Risk for reducing salt intake in preventing pre-eclampsia is 1.11, 95% CI (0.44-2.78) Conclusion: Results not sufficient to provide reliable information about the effects of advice to restrict salt intake during normal pregnancy. This review provides no information about the effects of advice to restrict salt intake for treatment of pre-eclampsia.

Review	Inclusion	Results
Author: Korenbrot CC, 2002(100) Purpose: To determine effectiveness of care at improving the course of pregnancy or its outcomes Quality Assessment: Moderate Major Topic Area: Prenatal and Infant Care	Inclusion Criteria: 1.RCT, case matched controlled trial, unmatched controlled trial with at least two nonrandomized, unmatched groups, internally controlled trial with each woman's previous pregnancy used as a control; or observational trials with comparison groups 2.comparison of a preconception intervention to an intervention either occurring prenatally or not at all Dates of Articles Reviewed: January 1990 to July 1991 Total number of studies: 21 Interventions: vitamin supplements, education, screening Health Condition(s): congenital abnormalities Meta-analysis Performed? No	Results: Only four problem areas and 19 research trials met the review criteria. Evidence of effectiveness was found for: 1.screening women who are seeking family planning for risk conditions; 2.having sexually active women of reproductive age take dietary folate supplements 3.providing women affected by certain metabolic conditions (diabetes and hyperphenylalanemia) with nutrition services Conclusions: Health care professionals need to promote the concept of readiness for pregnancy and help see that women are as healthy and appropriately nourished as possible before they become pregnant.

Review	Inclusion	Results
Author: Kramer MS, 2003(98) Purpose: To assess the effects of advice to increase or reduce energy or protein intake, or of actual energy or protein supplementation or restriction on energy and protein intakes, gestational weight gain, and the outcome of pregnancy Quality Assessment: Strong Main Topic Area: Pregnancy	Inclusion Criteria: 1. controlled trials of dietary advice to increase or reduce energy or protein intake during pregnancy Dates of Article Review: Cochrane Trials registry 2002 Total Number of Studies: 23 Interventions: nutritional advice on energy and protein Health Condition(s): Pregnancy Meta-Analysis Performed? No	Results: Nutritional advice to increase energy and protein intakes was successful in achieving those goals, but no consistent benefit was observed on pregnancy outcomes. Conclusions: Dietary advice appears effective in increasing pregnant women's energy and protein intakes but is unlikely to confer major benefits on infant or maternal health. Balanced energy/protein supplementation improves fetal growth and may reduce the risk of fetal and neonatal death. High-protein or balanced protein supplementation alone is not beneficial and may be harmful to the infant. Protein/energy restriction of pregnant women who are overweight or exhibit high weight gain is unlikely to be beneficial and may be harmful to the infant.
Author: Lu MC, 2003(99) Purpose: To review the evidence of effectiveness of prenatal care for preventing low birth weight LBW) Quality Assessment: Strong Main Topic Area: Prenatal and infant care	Inclusion Criteria: Not clear Dates of Article Review: Not reported Total Number of Studies: Not reported Interventions: Dietary improvement and/or supplements Health Condition(s): prevention of low birth weight Meta-Analysis Performed? No	Results: There is insufficient evidence to conclude a benefit for nutrition interventions in the prevention of preterm birth and intrauterine growth restriction. Conclusions: Preventing LBW will require reconceptualization of prenatal care as part of a longitudinally and contextually integrated strategy to promote optimal development of women's reproductive health not only during pregnancy but over the life course.

Evidence Table 19.
Systematic reviews of intervention components

Review	Inclusion	Results
Author: Ammerman, AS, 2002(4) Purpose: To evaluate the overall effectiveness of behavioral dietary interventions in promoting dietary change related to chronic disease risk reduction. A secondary goal was to explore the relative effectiveness of specific intervention features and among different population subgroups. Quality Assessment: Moderate Major Topic Area: Behavioral Interventions to modify diet	Inclusion Criteria: 1.humans (including children, adolescents, and adults) 2.published in English since 1975 3.conducted in North America, Europe, or Australia 4. had sample sizes of at least 40 subjects at follow-up; 5. were not based on controlled diets; and that otherwise met inclusion criteria Dates of Articles Reviewed: 1975-1999 Total number of studies: 104 Interventions: Diet Health Condition(s): Chronic Disease Meta-analysis Performed? Yes	Results: The studies were similarly successful in reducing intake of total and saturated fat, and increasing fruit and vegetable intake. More than three-quarters of the studies (17 of the 22 reporting results for fruit and vegetable intake) reported significant increases in fruit and vegetable intake, with an average increase of 0.6 servings per day. Similar consistent decreases were seen in intake of saturated fat and total fat (7.3% reduction in the percentage of calories from fat). Interventions appeared to be more successful at positively changing dietary behavior among populations at risk of (or diagnosed with) disease than among general, healthy populations. Two intervention components seemed to be particularly promising in modifying dietary behavior—goal setting and small groups. Conclusions: The majority of the interventions reviewed resulted in meaningful improvements in dietary factors behaviors associated with the prevention of chronic disease, particularly among individuals at elevated disease risk. The lack of similarity across studies in outcome measures, study design, analysis strategy, and intervention technique hampered our ability to draw broad conclusions about the most effective behavioral dietary interventions.

Review	Inclusion	Results
Author: Ashenden R, 1997(109) Purpose: To examine how effective lifestyle advice provided by GPs is in changing patient behaviour Quality Assessment: Strong Major Topic Area: General health	Inclusion Criteria: 1.RCT 2.English 3.lifetyle advice 4.general practice setting Dates of Article Review: 1966 to May 1995 Total Number of Studies: 23 -10 related to dietary advice Interventions: Dietary change, smoking cessation, alcohol cessation, exercise Health Condition(s): weight loss, COPD, cholesterol, diabetes Meta-Analysis Performed? Yes (only for smoking trials, not dietary)	Results: Results of dietary trials were mixed; populations and outcome measures were diverse Conclusions: Many of the general practice lifestyle interventions show promise in effective small changes in behaviour, none appears to produce substantial changes
Author: Bankhead CR, 2003(104) Purpose: To examine the effects of cholesterol screening on actual or intended health-promoting behaviours and health-related beliefs Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: all study types that were about cholesterol screening Dates of Articles Reviewed: 1980-2000 Total number of studies: 56 Interventions: Diet, exercise, screening Health Condition(s): Weight change, Cholesterol Meta-analysis Performed? No	Results: Dietary Change: (30 studies) 28 of the studies reported positive changes in diet following cholesterol screening; 2 reported no change Exercise Change: (15 studies) 11 studies reported an increase in exercise; 3 studies reported no change; 1 study reported a decrease in exercise (fear of heart attack) Weight Change: (11 studies) 8 studies reported weight loss; 3 studies reported no change Blood Cholesterol Change: (21 studies) 19 studies reported a cholesterol reduction; 2 studies reported no change. Reduction in blood cholesterol levels was reported in all but two of the studies that assessed this outcome, suggesting that successful lifestyle changes were made. Conclusions: The studies reviewed suggest that cholesterol screening had a positive effect on health behaviors with the majority of studies reporting change in a healthy direction for the outcomes diet, exercise and weight.

Review	Inclusion	Results
Author: Burke LE, 1997(110) Purpose: Addresses compliance across four regimens of cardiovascular risk reduction: pharmacological therapy, exercise, nutrition, and smoking cessation Quality Assessment: Strong Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2.focus on cardiovascular disease reduction 3.report quantitative measure of compliance Dates of Articles Reviewed: 1987-1997 Total number of studies: 46 Interventions: Diet Health Condition(s): heart disease Meta-analysis Performed? No	Results: Interventions utilized diverse cognitive, behavioural, and educational strategies. Children and the elderly were studied the least. Signed agreements, behavioural skill straining, self-monitoring, telephone/ mail contact, spouse support, contingency contracting, self-efficacy enhancement, external cognitive aids (appointment reminders, reminder charts), persuasive communication all were shown to be effective in some studies. Conclusions: The strategies demonstrated to be successful for improving compliance included behavioural skill training, self-monitoring, telephone/ mail contact, self-efficacy enhancement, and external cognitive aids.
Author: Cooper H, 2001(111) Purpose: To explore the effects of patient education and the need to qualitatively explore the processes by which these effects have transpired. Quality Assessment: Moderate Major Topic Area: Chronic disease, patient education	Inclusion Criteria: 1.meta-analyses 2. people with chronic disease 3.behaviour modification is a part of the treatment regime. Dates article reviewed: 1980 to 1998 Total number of studies: 12. Interventions: education, weight loss strategies, self-monitoring Health Condition(s): Blood pressure, diabetes, heart disease Meta-analysis Performed? No	Results: Most investigators sought to influence physical outcomes. Analyses reported moderate but variable weighted mean effects for physical outcomes. There is evidence to show that patients do benefit from educational interventions but the effects varied. Effects were largest for knowledge and smallest for self-care activities and psychological outcomes. Effects by educational approach could not be differentiated. Some evidence to suggest didactic and psychosocial strategies produced smaller outcome effects than intervention using enhanced education methods or a combination of behavioural, cognitive or affective therapies There was no consistent pattern of effect across outcomes on contact frequency and total contact time Conclusion: Results highlight the need for theoretically based teaching strategies which include behaviour change tactics that affect feelings and attitudes.

Review	Inclusion	Results
Review Author: Hardeman W, 2000(113) Purpose: (1) to describe interventions aimed at the prevention of weight gain; and (2) to characterize the target behaviours, the psychological models underlying the interventions, behaviour change methods and modes of delivery, the methodological quality of the evaluation, the characteristics of the participants, and the outcomes of the study Quality Assessment: Moderate Main Topic Area: Weight Loss	Inclusion Inclusion Criteria: 1.Studies of any design 2.primary aim of preventing weight gain 3.published reports 4.any duration 5.participants could be any weight or age 6.excluded: interventions targeting a specific subgroup, multifactorial interventions, interventions aimed at weight loss and those with an ambiguous aim Dates of Articles Reviewed: 1966-2000 Total number of studies: 27 Interventions: Diet, exercise, behaviour change Health Condition(s): Weight Change Meta-analysis Performed? No	Results: Diet and physical activity resulted in positive effects, but all were measured by self-report. Effects on weight were mixed but follow-up was generally short. Smaller effects of weight gain were found among low-income participants, students and smokers. Many participants in community-based studies were overweight or obese. Study drop-out was higher among thinner and lower-income subjects. Conclusions: Interventions to prevent weight gain exhibited various degrees of effectiveness Definite statements about elements of the interventions that were associated with increased effect size cannot be made as only 1/5 RCTs reported a significant effect on weight.

Review	Inclusion	Results
Author: McClure JB, 2002(107) Purpose: To examine the evidence on the effectiveness of informing individuals of their biomarker status as a means of increasing motivation to change or promote behaviour modification Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2.published 3.adults 4.compared persons receiving biomarker feedback to those not receiving this type of intervention, 4.studies that compared treatments in which the only difference was the frequency or intensity of the biomarker feedback 5. studies of behaviour change directly assessed, as opposed to measured through biomarker proxies of behaviour change (e.g. cholesterol level or infant birth weight) Dates of Article Review: 1966 to 2001 Total Number of Studies: 8 Interventions: Biomarkers-cholesterol level Health Condition(s): Cholesterol Meta-Analysis Performed? No	Results: Participants aware of test result reported greater intent to change their diet ($p=0.02$). Subjects reassessed on biomarker status (usually cholesterol) were significantly more likely to report 'a lot' of dietary change during 6 month follow-up (24% versus 10.3%, $p<0.05$. They also reported eating less red meat, cheese, butter, and fast food ($p<0.05$), no statistically significant difference for other outcomes Conclusions: Preliminary findings suggest that combining biomarkers with appropriate behavioral treatment may enhance health behavior change, but more research in this area is warranted.

Review	Inclusion	Results
Author: McTigue KM, 2003(31) Purpose: To examine evidence for screening and treating obesity in adult treatment of obesity Quality Assessment: Moderate Major Topic Area: Weight Loss	Inclusion Criteria: Not reported Dates of Article Review: January 1994 to February 2003 Total Number of Studies: Not reported Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: Pharmacotherapy and counselling interventions produced modest weight loss over at least 6 or 12 months. Counselling was most effective when intensive and combined with behavioural therapy. Maintenance strategies helped retain weight loss. Selected surgical patients lost substantial weight. Weight reduction improved blood pressure, lipid levels, and glucose metabolism and decreased diabetes incidence. Conclusions: Counselling and pharmacotherapy can promote modest sustained weight loss, improving clinical outcomes.
Author: Newell SA, 2000(108) Purpose: To examine the effectiveness of interventions aimed at improving cardiovascular patient compliance with nonpharmacologic treatments. Quality Assessment: Strong Main Topic Area: Heart Disease	Inclusion Criteria: 1.RCT 2.involved people with diagnosed cardiovascular disease, hypertension, or hypercholesterolemia; 3. implemented an intervention aimed at increasing their compliance with a non-pharmacologic treatment; 4.reported results on patient compliance Dates of Article Review: 1985 to 1996 Total Number of Studies: 24 -18 rated as good and fair quality Interventions: Diet, exercise, interventions targeting; smoking cessation, blood pressure screening, general lifestyle Health Condition(s): Heart disease Meta-Analysis Performed? No	Results: Several strategies related to nutrition were associated with favourable outcomes: compliance monitoring (eg, urine, diet diaries) and giving feedback about compliance, involvement of the spouse, educational and behavioural counselling Conclusions: Partner-focused and structural strategies showed the most consistent benefits, physician-focused strategies were unanimously unsuccessful, and patient-focused strategies were of mixed benefit.

Review	Inclusion	Results
Author: Norton DE, 2003(105) Purpose: To review the literature on parental influence on children's health beliefs and behaviours, particular eating and exercise behaviours as indicators of cardiovascular health, school-based cardiovascular disease risk reduction programs, and racial/ethnic, gender, and socioeconomic considerations for models of primary prevention of cardiovascular disease in children. Quality Assessment: Moderate Major Topic Area: Heart Disease	Inclusion Criteria: A1.parents served as either a source of information, change agent or participant 2.cardiovascular disease risk reduction intervention.. Dates of Article Review: 1980 - 2002 Total Number of Studies: 17 Interventions: Diet Health Condition(s): Weight Change Meta-Analysis Performed? No	Results: Parents influence the health behaviour of their children. Parents have accurate perceptions about the eating and exercise behaviours of their children. Models of primary prevention of CVD that were successful included parental modeling of healthy behaviour and parental participation on many levels: directed family activities, newsletters, media presentations, parent focus groups and advisory boards. Conclusions: Children's lifestyle health beliefs and behaviors are significantly influenced by positive parental modeling and involvement in exercise and healthy eating; parental influence on children's behavior lasts beyond adolescence; parents are effective teachers of health habits at home when prompted by health educators; and parental influences vary by ethnicity/race, socioeconomics and gender.
Author: Pavlovich WD, 2004(106) Purpose: Cost-effectiveness of Nutrition Services Quality Assessment: Strong Major Topic Area: General health conditions	Inclusion Criteria: any study that reported on costs and effectiveness of outpatient nutrition services for any indicated condition Dates of Article Review: 1966 to 2001 Total Number of Studies: 13 Interventions: Nutrition service related to dietary modification Health Condition(s): Weight change, cholesterol, diabetes, BP Meta-Analysis Performed? No	Results: Nutrition services can be a cost-effective intervention for the reduction of low-density lipoprotein levels and dietary cholesterol. Limited evidence exists to support the cost-effectiveness of outpatient nutrition services in the reduction of cholesterol levels, weight, and blood glucose for target populations with diabetes mellitus and hypercholesterolemia. Conclusions: Given the lack of conclusive findings from the available randomized controlled trials, it is difficult to reach solid conclusions about the overall cost-effectiveness of nutrition services.

Review	Inclusion	Results
Author: Pignone M, 2003(112) Purpose: To examine the effectiveness of counselling to promote a healthy diet in primary care settings. Quality Assessment: Moderate Major Topic Area: Chronic disease, patient education	Inclusion Criteria: 1.RCT 2. at least 3 months duration 3.dietary interventions and outcome measures, 4.patients similar to or found in primary care settings 5.drop-out rates < 50%, Dates article reviewed: 1966 to 2001 Total number of studies: 21. Interventions: education, behavioural counselling, included mailed, telephone or computer-based communication, strategies, self-monitoring Health Condition(s): not or at risk for heart disease or breast cancer Meta-analysis Performed? No	Results Results: Dietary therapy for primary prevention led to long term reductions in cholesterol (3% to 5%), but no reduction in coronary heart disease events overall. Counselling produced modest changes in self-reported saturated fat, fruit and vegetable intake. More intensive interventions were more likely to produce important changes than brief interventions. Conclusion: Moderate or high-intensity counselling interventions, including interactive health communication, can reduce consumption of saturated fats and increase intake of fruits and vegetables. Brief counselling of unselected patients produces small change in dietary behavior; effect on health outcomes not clear.

Evidence Table 20.

Systematic review of comparison of interventions done by dietitians versus other health care providers, or self-help.

Review	Inclusion	Results
Author: Thompson RL, 2003(115) Purpose: To assess the effects of dietary advice given by dietitians compared with advice from other health professionals, or self-help resources, in reducing blood cholesterol in adults. with strict dietary control (6). Quality Assessment: Strong Major Topic Area: HDL	Inclusion Criteria: 1 RCT 2.Iterventions included dietary advice given by dietitians or nutritionists compared with advice from other health professionals (e.g., doctors, nurses) or self-help resources. Dates of Article Review: 1966 to January 1999 Total Number of Studies: 12 Interventions: Dietary advice from dietitians compared with doctors (4 studies), with self-help (7) and with nurses or other counsellors (1 each) Health Condition(s): Cholesterol Meta-Analysis Performed? Yes	Results: Dietitians versus doctors: participants advised by nutritionists experienced greater reduction in blood total cholesterol than those receiving advice from doctors (-0.25 mmol/L, 95% CI -0.37,- 0.12 mmol/L). Dietitians and self-help resources: no statistically significant difference in change in blood cholesterol between (-0.10 mmol/L, 95% CI -0.22 to 0.03 mmol/L). Dietitians versus nurses: (1 study only), no difference in total cholesterol; dietitian groups showed greater reduction in HDL (-0.06 mmol/L, 95% CI –0.11 to –0.01). No other differences in secondary outcomes. Conclusions: Interventions by dietitians lowered blood cholesterol more than interventions by doctors, in the short to medium term, though the difference was small (about 4%). There was no evidence that dietitians were better than self-help resources or nurses, in lowering total cholesterol.

Evidence Table 21.

Primary studies comparing interventions done by dietitians versus other health care providers, or self-help.

Study	Study Design Participants	Intervention	Results
Ashley JM, 2001 (122) United States Purpose: (1) Can a primary care physician implement a successful long-term lifestyle change using meal replacements in the general practice office; (2) Can a lifestyle-modification program administered by a registered dietitian using a meal-replacement strategy be as effective as the same program using a standard food plan exchange strategy? (3) To evaluate the potential health benefits of sustained weight loss for specific chronic disease risk factors associated with the moderately overweight and obese.	Study Design: RCT Target Group: Adults Study Participants: Gender: Female 100% Age: mean 40 years Ethnicity: not reported (NR) Education/SES: NR	Intervention: All participants attended 26 session over 1 year; all received LEARN program manual, fact sheets and posters; given a pedometer and encouraged to increase walking to 10,000 steps per day. (1) N=23; one-hour classes by dietitian, geared to self-select food, 1200 Kcal/day. (2) N=26; one-hour classes by dietitian, self-selected diet, 1200kcal/day; 2 of 3 meals /day replaced by meal-replacement shakes or bars (e.g. Slim-Fast foods) (3) N=25; 1200kcal/day; individual meetings with primary care MD or practice nurse; session 15-20 minutes; used same meal replacement as in Intervention #2 Intervention Setting: Clinic Duration (weeks): 52 Frequency: 26 sessions Length of post-intervention follow-up period: immediate post-intervention (52 weeks) Outcomes Reported: Weight loss	Results: Outcome #1: Weight Loss (mean weight change, kg) Mean SD P-value Group 1: -3.4 5.4 Group 2: -7.7 7.8 <0.05* Group 3: -3.5 5.5 * compared to groups 1 and 3 Similar significant differences for Group 2, compared to other groups, for % weight change, and change in BMI. Those who lost over 5% was associated with significant reduction in insulin level, total cholesterol, and LDL cholesterol. Conclusion: A traditional lifestyle intervention using meal replacements can be effective for weight control and reduction in risk of chronic disease in the physician's office setting as well as in the dietitian-led group setting.

Study	Study Design Participants	Intervention	Results
Bemelmans WJE, 2000(119) Netherlands Purpose: To investigate the impact of intensive group education on the Mediterranean diet on dietary intake and serum total cholesterol compared to a posted leaflet with the Dutch nutritional guidelines, on primary prevention of cardiovascular disease	Controlled Trial Target Group: Adults Study Participants: Gender: mixed Age: mean 55 years Ethnicity: NR Education /SES: NR	Intervention: N= 103 group education , provided by dietitian (3 meetings of 2 hours each, over 16 weeks) re Mediterranean diet: 5-7 servings of bread; 2 servings of fruit/day' 2 servings of fish/week; less red meat, eggs, cheese Control: N=163 Mailed distribution of printed educational materials (e.g., Fact sheet, posters), based on Dutch nutritional guidelines Intervention Setting: Clinic Length of post-intervention follow-up period: 52 weeks Outcomes reported: Fat intake, food intake, cholesterol, BMI	Results: Fat intake: the intervention group decreased %energy from fat and saturated fat intake more than the control group (mean difference 1.8%; 95%CI 0.2 to 3.4; and 1.2% (95%CI 0.4 to1.9), respectively). Food intake: the intake of fish, fruit, poultry and bread increased in the intervention group, more than in the control group. Within the intervention group, intake of fish, poultry and bread was significantly increased after 1 year. (P <0.05). Cholesterol: The intensive programme on dietary education did not significantly lower serum cholesterol level (-3%) compared to posted leaflets (-2%). Body Mass Index: BMI decreased more in the intervention group, but no difference after 1 year Conclusions: Despite beneficial changes in dietary habits in the intervention group compared with the control group, after 1 year BMI increased and total fat and saturated fat intake were still too high in the intervention group.

Study	Study Design Participants	Intervention	Results
Brannon SD, 1997 (116) Tershakovec, 1998 (120) United States Purpose: To compare the cost-effectiveness from the family's perspective, of a parent-child auto-tutorial nutrition education program with that of counselling by a dietitian after identification of hypercholesterolemic children in pediatric offices	RCT Target Group: Grade school children and their parents Study Participants: Gender: mixed Age: mean 6 years (range: 4 to 10) Ethnicity: 88% white Education/SES: grade school, upper middle income	Intervention: Group #1: (n=66) parent-child auto-tutorial; complied with National Nutrition Education Program recommendations. Included 10 talking-book lessons (audio-taped stories and picture books); paper and pencil activities for children and parents manual. Group #2: Children and parents attending one¬time counselling session with dietitian (45-60 minutes); one to one counselling Group #3: At risk control – no intervention Length of post-intervention follow-up period: 52 weeks Outcomes Reported: LDL Cholesterol, dietary intake of fat	Results: 1. LDL Cholesterol: no difference between groups 2.Dietary fat intake: two intervention groups had a signficiant decrease compared to control; no difference between intervention groups 3. Knowledge was higher in the auto-tutorial group, than other 2 groups. Conclusions: Modest reductions in fat in the diet and in plasma lipid levels were achieved in both intervention groups; no difference between each intervention; all at costs that also appear modest in comparison with treatment of elevated cholesterol in adulthood Follow-up interventions may be needed to sustain effects.

Study	Study Design Participants	Intervention	Results
Goertz CH, 2002(123) United States Purpose: To compare the effect dietary advice from a dietitian versus dietary advice plus spinal manipulation, on blood pressure.	RCT Target Group: Adults Study Participants: Gender: Mixed Age: mean 47.6 years Ethnicity: Can't tell Education/SES: Can't tell	Intervention 1: N=69 low fat diet, individual counselling with dietitian, three session (15-20 minutes) per week for 4 weeks, Written diet sheets, recipes for low fat, low salt Intervention 2: N= 71 Same written diet information as in group 1, but individual session with chiropractor, three session (15-20 minutes) per week for 4 weeks Intervention Setting: Clinic Length of post-intervention follow-up period: 4 weeks Outcomes Reported: Diastolic BP, Systolic BP	Results: Between group changes were not statistically significant. Average decreases in systolic/ diastolic blood pressure were 4.9/5.6 mmHg for diet group and 3.5/4.0 mmHg for the chiropractic group. Conclusions: For patients with high normal blood pressure or stage I hypertension, chiropractic spinal manipulation in conjunction with a dietary modification program offered no advantage in lowering either diastolic or systolic blood pressure compared to diet alone.

Study	Study Design Participants	Intervention	Results
Henkin Y, 2000(124) Israel Purpose: Evaluated the incremental value of detailed nutritional counselling by dietitians when added to general nutritional advice provided by physicians	RCT Target Group: Adults Study Participants: Gender: Mixed Age: mean 50 range: 35 to 65 Ethnicity: NR Education/SES: NR	Intervention : N=66 Individual counselling, 2 to 4 session over 12 weeks, by dietitian, in addition to usual care by MD. -involved analysis of eating habits and nutrients (through diet dairies), emphasis on Step I diet, with progression to Step II if necessary. Distribution of printed educational materials Control: N= 70 usual care by MD, focus on Step I diet. Intervention Setting: Clinic Duration (weeks): 12 Length of post-intervention follow-up period: 52 weeks Outcomes Reported: Total cholesterol, LDL, HDL, HDL/total cholesterol ratio, triglyceride	Results: Short-term (3 months) improvement in total cholesterol and LDL cholesterol, only. 1 year: no differences in total cholesterol, LDL, HDL, HDL/total cholesterol ratio, triglyceride Conclusions: The short-term reduction in LDL cholesterol level achieved after counselling by dietitians was superior to that achieved by physicians. Long-term compliance was inadequate. For patients at high risk, consideration should be given to a more aggressive dietary approach and possibly earlier introduction of lipid-lowering medications.

Study	Study Design Participants	Intervention	Results
Heshka S, 2000(125) United States Purpose: To compare the effects of a self-help program and a commercial program on weight loss and other measures of obesity in overweight and obese adults	RCT Target Group: Adults BMI: 27 to 40 Study Participants: Gender: NR Age: NR Ethnicity: NR Education/ SES: NR	Intervention 1: Dietitian group N= 212 Two, 20 minute individual sessions with dietitian, given printed materials and other self-help resources 2.Commercial weight loss program (Weight Watchers) N=211 Food plan, activity plan; vouchers for program - participants chose whether/ when and where to attend; diet designed to induce weight loss of 0.9 Kg per week. Weekly group meetings of 1 hour, led by program graduates Framework: Cognitive restructuring Intervention Setting: Community Duration (weeks): 26 Length of post-intervention follow-up period: 26 weeks Outcomes Reported: weight, BMI, waist circumference, fat mass	Results: Participants in commercial program had greater decreases than the brief intervention with self-help, in: body weight (mean difference -3.4, 95% CI -2.4 to -4.4) significant differences at 26 weeks: Mean change(SD) Group: Dietitian Weight Watchers weight -1.4 (4.7) -4.8 (5.6) BMI -0.5 (1.6) -1.7 (1.9) Waist circumference -0.7 (12.7) -4.3 (10.5) fat mass -1.5 (7.6) -3.8 (7.0) Conclusions: A structured weight loss program is more likely to be effective for managing moderately overweight people than brief counselling with self-help.

Study	Study Design Participants	Intervention	Results
Jen KL, 2004(126) United States Purpose: To compare the efficacy of different weight loss regimens on body weight loss and metabolic improvement in breast cancer survivors.	RCT Target Group: Adult women; breast cancer survivors Study Participants: Gender: 100% Female Age: NR Ethnicity: NR Education/SES: NR	Intervention 1: N= 8 Weight Watchers group -given free coupons to attend weekly meetings; groups led by Weight Watchers graduate. Intervention 2: N= 9 Individualized dietary counselling with a dietitian; weekly for first 3 months, biweekly next 3 months and monthly for last 6 months. Intervention 3: N=10 Comprehensive group interventions of groups 1 and 2 Control: N= 12 given the National Cancer Institute "Action Guide to Healthy Eating" and the Food Guide Pyramid" . No other exercise or dietary instruction. Intervention Setting: Community Duration (weeks): 52 Length of post-intervention follow-up period: 52 weeks Outcomes Reported: Weight, % body fat, serum cholesterol	Results: Only the individualized and comprehensive groups lost significant weight and % body fat : Mean Change (SD): -weight -8.0 (1.9) Individualized - 9.5 (2.7) Comprehensive % of body fat - 3.17 (0.8) Individualized - 3.65 (1.1) Comprehensive Only the Comprehensive group showed improvements in LDL cholesterol level, compared to the other 3 groups. Note-very small sample size Conclusions: Breast cancer survivors should be offered different weight loss strategies to assist them in losing weight.

Study	Study Design Participants	Intervention	Results
Loprinzi CL, 1996(118) United States Purpose: To test whether dietitian counselling could prevent weight gain in women receiving adjuvant chemotherapy for breast cancer	RCT Target Group: Adult women receiving adjuvant chemotherapy for breast cancer Study Participants: Gender: female Age: 25-57, median=43 Ethnicity: NR Education/SES: NR	Intervention1: N=54 Monthly, one to one, dietitian counselling by a dietitian, every 4-6 weeks for 1 year. Control: N=53 Standard care - patients physicians and nurses told them about possible weight gain, but provided no formalized counselling. Intervention Setting: Clinic Duration (weeks): 6 months Length of post-intervention follow-up period: 26 Outcomes Reported: Weight change, calorie consumption,	Results: No statistically significant findings: median weight change were gains of 2 kg in the dietitian group and 3.5 kg in the control group. Conclusions: Routine dietitian counselling did not produce statistically significant reductions in weight gain or calorie consumption in women receiving chemotherapy for breast cancer. More weight was gained by those at a higher weight, and participants who had been on a diet in the preceding 6 months.

Study	Study Design Participants	Intervention	Results
McCarron DA, 1997(127) United States Purpose: To assess the clinical effects of prepackaged meal provision (incorporates all National Academy of Sciences National Research Council recommended dietary allowances for vitamins, minerals, and macronutrients) compared with a patient-selected American Heart Association Step I and Step II diet plan	RCT Target Group: Adults With essential hypertension, dyslipidemia, non-insulin dependent diabetes mellitus, or any combination of these diseases. Study Participants: Gender: Mixed Age: 26-70, mean 54 Ethnicity: NR Education/SES: NR	Intervention 1: N= 283 Campbell's Centre for Nutrition and Wellness plan - prepackaged breakfast, lunch and dinner meals provided to participants. Plus one serving of each: fruit, vegetable and dairy, plus one "bonus" each day Intervention 2: N= 277 Nutritionist guided, self-selection of foods based on Step I or II diet, plus one "bonus" each day. $40 weekly food allowance. Duration (weeks): 10 Length of post-intervention follow-up period: 10 weeks Outcomes Reported: Weight, blood pressure, triglyceride, cholesterol, HbA1c	Results: All statistically significant results favor meal replacement interventions Mean change between diets — pvalue Weight: Men -1.0 kg <0.05 Women -2.0 kg <0.05 Blood pressure: Systolic - 2.0 <0.05 Diastolic NS Triglyceride: NS Cholesterol: NS HbA1c Conclusions: The prepackaged meal plan provided greater clinical benefits (weight and systolic blood pressure reductionand compliance than self-selected diets with advice from a nutritionist.

Study	Study Design Participants	Intervention	Results
Peiss B, 1995(121) United States Purpose: (1) to compare the impact of a brief physician or nurse education session with the impact of education provided by dietitians on patient knowledge regarding coronary risk factors, dietary recommendations, and compliance, and (2) to determine the value of additional formal dietary counselling on knowledge, dietary fat, and serum lipids.	Non-randomized control trial Consecutive admissions Target Group: Adults with hyperlipidemia, stable coronary artery disease, cardiac rehabilitation post myocardial infarction, and post coronary artery bypass graft. Study Participants: Gender: Mixed Age: mean 59 years Ethnicity: mixed Education/SES: NR	Intervention 1: N=27 MDs (cardiologists) and nurses, one-to-one, diet instruction to patients. No common protocol Intervention 2. Dietitian N=23 Counselling (one to one), in hospital clinic Duration (weeks): at least 1 visit in each group Frequency: Can't tell Length of post-intervention follow-up period: 8 weeks Outcomes Reported: Dietary fat, dietary cholesterol, knowledge scores	Results: Both groups improved; no differences in dietary fat or cholesterol intake. The dietitian group had higher knowledge scores. Note- small sample size Conclusions: Primary care physicians and their office nurses, using less time than dietitians, can be effective educators for coronary risk reduction and dietary fat intake.

Study	Study Design Participants	Intervention	Results
Reid R, 2002(128) Canada Purpose: To compare 1) the effectiveness of physician advice versus dietitian advice for a fat-reduced diet (AHA Step II); 2) the effectiveness of dietitian advice for a fat-reduced diet (AHA Step II); 3) dietitian advice for a soluble fibre-enhanced diet (>10g/day).	RCT Target Group: Adults with moderate dyslipidemia Study Participants: Gender: mixed Age: mean 54 years Ethnicity: NR Education/SES: NR	Intervention 1: N=38 MD advice - reduce fat in diet; follow AHA Step II diet Individual basis, 3 office visits, 15-30 minutes each, at weeks 1, 8, and 16. Participants given "Step By Step Guide to Healthy Eating" Intervention 2: N=35 Dietitian advice to reduce fat in diet, follow AHA Step II diet 3 one-hour group sessions at weeks 1, 2 and 6; plus 15 minute phone consultations at weeks 10, 18 and 23. Participants given "Step By Step Guide to Healthy Eating" Intervention 3: N=38 Dietitian advice to increase soluble fibre intake 3 one-hour group sessions at weeks 1, 2 and 6; plus 15 minute phone consultations at weeks 10, 18 and 23 Participants asked to consume one serving/day of Kellogg's All-Bran Buds Intervention Setting: Clinic Duration (weeks): 16 Length of post-intervention follow-up period: 26 weeks Outcomes Reported: cholesterol, LDL, weight	Results: No significant differences between groups %change (95% CI) / Dietitian (fat-reduced) / MD Dietitian ↑fibre *Weight* -2.7 (-3.8 to –1.6) / -1.9 (-2.9 to-0.8) / -1.1 (-2.3 to –0.1) TC/HDL -5.5 (-9.2 to –1.8) / -4.3 (-8.0 to –0.5) / -3.9 (-3.9 to –0.2) LDL -5.9 (-9.9 to –1.9) / -4.3 (-8.3 to –0.3) / -5.7 (-9.7 to –1.7) Conclusions: Both dietitians and physicians can help moderately dyslipidemic patients make clinically meaningful changes in blood lipid levels. Soluble fibre enhancement lead to similar reductions in LDL and TC/HDL rain compared with fat reduction interventions.

Study	Study Design Participants	Intervention	Results
Rhodes KS, 1996(117) United States Purpose: To compare the effect of the addition of medical nutrition therapy administered by a registered dietitian with the usual physician counselling on nutrition knowledge, attitudes regarding dietary change, body mass index, dietary intake and lipid and lipoprotein concentrations during initial management of persons at risk for cardiovascular disease.	RCT Target Group: Adults with hypercholesterolemia or 2 other known risks for CHD. Study Participants: Gender: mixed Age: mean 47.5 years Ethnicity: 94% white Education/SES: More than half had at least college education; two thirds earned more than $50,000/year	Intervention 1: N=50 10 minute diet instruction from cardiologist or nurse based on Step I diet from NCEP Intervention 2 N= 47 Received above, copy of Grocery Shopping Guide with 10 minute video-tape to go with guide; PLUS up to 3 one-hour comprehensive consultation with dietitian; individualized recommendations for diet low in fat & Cholesterol and high in CHO. All participants asked to not change exercise routine Intervention Setting: Clinic Duration (weeks): 12 Length of post-intervention follow-up period: 12 weeks Outcomes Reported: BMI, serum lipid levels, % fat dietary intake, dietary cholesterol	Results: Dietitian group differed significantly ($p<0.05$) from the MD/nurse group on mean difference Dietitian vs MD/nurse % fat intake -9.0 (8.6) -6.0 (7.9) % carbohydrates 7.8 (9.3) 4.2 (7.8) dietary cholesterol -74 (98) -51 (93) BMI -1.1 (0.9) -0.6 (0.8) Conclusions: Additional nutrition therapy increased knowledge, and reduced % fat and cholesterol intake, and reduced BMI more than the MD/nurse intervention.

Study	Study Design Participants	Intervention	Results
Timlin MT, 2002(129) United States Purpose: To evaluate the effectiveness of nutrition education within an outpatient cardiac rehabilitation program	Non-randomized, controlled trial Target Group: Adults With myocardial infarction followed by surgery. Study Participants: Gender: both Age: 35-85, mean=62 Ethnicity: NR Education/SES: <$15000 9% 15000-24999 28% 25000-49999 20% 50000-74999 16% 75000-99999 15% > 100,000 12%	Intervention 1. N= 54 dietitian led; 2 group classes and one individual session re reducing fat in diet; AHA Step II diet; all in addition to 6 week cardiac rehab program Intervention 2: N=50 Usual care, cardiac rehabilitation Framework: Trans-theoretical Social cognitive theory Intervention Setting: Clinic Duration (weeks): 6 Frequency: 3 times over 6 weeks Length of post-intervention follow-up period: 12 weeks	Results: Both groups improved in cholesterol-saturated fat index, in % energy from carbohydrates. No differences in results across groups, except in knowledge and self-efficacy score improvement in dietitian intervention. Conclusions: Nutrition education within an outpatient cardiac rehabilitation program can improve dietary choices at restaurants and boost self-confidence in ability to adhere to lipid-lowering diet

Appendix A:
Search Terms

1. Exp obesity
2. Weight loss/
3. Body image/
4. Body weight/
5. (Obes: or Overweight or Weight control or Weight loss or Body image).tw.
6. Exp hyperlipidemia
7. (Dyslipidemia or dyslipidaemia or hypercholesterolemia or hypercholesterolaemia or high cholesterol).tw.
8. exp hypertension
9. (hypertens or high blood pressure or high BP or high systolic blood pressure or high systolic BP or high diastolic blood pressure or high diastolic BP).tw.
10. Exp Diabetes Mellitus
11. diabet:.tw.
12. Exp heart disease
13. exp cerebrovascular accident
14. exp cardiovascular diseases
15. heart disease:.tw.
16. (coronary artery disease or myocardial infarction or angina or heart failure or CHF or CAD or MI or stroke).tw.
17. cardiovascular disease:.tw.
18. cardiovascular event:.tw.
19. exp malnutrition
20. exp nutrition disorders/
21. malnutrit:.tw.
22. malnourish:.tw.
23. wasting syndrome:.tw.
24. nutrition disorder:.tw.
25. Exp Pulmonary Disease, Chronic Obstructive
26. (chronic obstructive pulmonary disease or COPD or chronic bronchitis or pulmonary emphysema).tw.
27. Exp osteoporosis
28. Osteoporosis.tw.
29. Hepatitis/
30. Hepatitis, alcoholic/
31. Exp hepatitis, viral, human
32. Hepatitis, toxic/
33. Hepatitis.tw.
34. Exp hiv infections/
35. Exp HIV/
36. (HIV or acquired immunodeficiency syndrome or acquired immune deficiency syndrome or AIDS).tw.
37. Exp mental disorders
38. mental illness:.tw.
39. mental disorder:.tw.
40. (mental health or depression or anxiety).tw.
41. eating disorder:.tw.
42. (anorexia or bulimia or schizophrenia).tw.
43. mood disorder:.tw.
44. affective disorder:.tw.
45. Exp kidney diseases/
46. (Nephropathy or kidney failure or renal failure or nephritis).tw.
47 kidney disorder:.tw.
48. renal disorder:.tw.
49. kidney disease:.tw.
50. kidney disorder:.tw.
51. (glomerulonephritis or Anuria or Fanconi Syndrome or Hepatorenal Syndrome or Hydronephrosis).tw.
52. Hyperoxaluria, Primary.tw.
53. (Kidney Calculi or Kidney Cortex Necrosis or Cystic kidney or Kidney Papillary Necrosis or Nephrocalcinosis or Nephrosclerosis or Nephrosis or Perinephritis or Pyelitis or Renal Artery Obstruction or Renal Osteodystrophy or renal tuberculosis or Uremia oruraemia or Wegener's Granulomatosis or Zellweger Syndrome).tw.
54. exp gout
55. gout.tw.
56. exp neuromuscular diseases/
57. exp nervous system diseases/
58. motor neuron disease.tw.
59. muscular disease:.tw.
60. atrophic muscular disease:.tw.
61. nervous system disease:.tw.
62. neuromuscular disease:.tw.
63. enteral nutrition/
64. (enteral nutrition or tube feed: or tubefeed:).tw.
65. exp deglutition disorders/
66. dysphagia or deglutition.tw.
67. Anemia, Iron-Deficiency/
68. (iron-deficiency anemia or iron-deficiency anaemia).tw.
69. Exp Diverticulosis, Colonic/
70. Exp inflammatory bowel diseases/

71. Irritable bowel syndrome/
72. (Diverticulosis or diverticulitis or inflammatory bowel disease: or irritable bowel syndrome).tw.
73. prenatal care/
74. exp Infant, Low Birth Weight/
75. (prenatal care or antenatal care or pregnant wom: or birth weight or birthweight).tw.
76. or/1-75
77. Exp diet
78. Exp food/
79. Exp vitamins/
80. Exp fish oils/
81. Calcium, Dietary/
82. Sodium, Dietary/
83. Potassium, Dietary/
84. Iron, Dietary/
85. Exp diet therapy /
86. Nutrition therapy/
87. Nutritional support/
88. Exp antioxidants/
89. (Bread or grains or monounsaturated fat: or saturated fat: or unsaturated fat or fatty acid.tw.
90. (Fibre or fiber or vegetable: or fruit: or meat or fish).tw.
91. (diet: or food plan: or vitamin: or supplement: or ascorbic acid or antioxidant: or folic acid or calcium or sodium or potassium or iron).tw.
92. (restrict: carbohydrate: or low carbohydrate: or restrict: calorie: or low calorie: or restrict: fat: or low fat).tw.
93. diet: adj2 counsel: or diet adj2 (advice or advise:).tw.
94. (garden: or community kitchen.tw.
95. or/77-94
96. Exp nutrition assessment Nutritional status/
97. nutrition: adj2 assess:.tw.nutrition: adj2 screen.tw.
98. exp mass screening/
99. body mass index/
100. blood glucose/
101. Hemoglobin A, Glycosylated/
102. cholesterol/
103. exp hemoglobins/
104. exp ferritin/
105. exp hematologic tests/
106. (Screen: or Assess: or waist circumferenc: or haemoglobin: or hemoglobin: or cholesterol: or lipid: or blood glucose or ferritin).tw.
107. or/96-108
108. meta-analysis.sh,pt. or meta-analy:.tw. or metaanaly:.tw.
109. ((systematic: or quantitative:) adj (review: or overview:)).tw.
110. (cochrane or medline or cinahl or embase or scisearch or psychinfo or psycinfo or psychlit or psyclit or (national and library)).tw.
111. ((handsearch: or search:) and (cochrane or medline or cinahl or embase or scisearch or psychinfo or psycinfo or psychlit or psyclit or (national and library) or (hand: or manual: or electronic: or bibliograph: or database:))).tw.
112. ((review or guideline).pt. or consensus.ti. or guideline:.ti. or literature.ti. or overview.ti. or review.ti.) and (56 and 57)
113. ((synthesis or overview or review or survey) and (systematic or critical or methodologic or quantitative or qualitative or literature or evidence or evidence-based)).ti.
114. or/110-115
115. limit 116 1999-2004
116. 76 AND 95
117. 116 AND 117
118. exp nursing staff/
119. exp physicians/
120. exp nurses/
121. dietitian:.tw.
122. dietician:.tw.
123. nutritionist:.tw.
124. therapist:.tw.
125. clinician:.tw.
126. healthcare provider:.tw.
127. health care provider:.tw.
128. exp allied health personnel/
129. exp professional-patient relations/
130. or/120-131
131. 109 AND 117 AND 132
132. Limit 133 1994-2004

Appendix B
Quality Criteria - Reviews

1. Was the search strategy for primary studies stated?

2. Was the search comprehensive?

3. Were the relevance criteria for the primary studies described?

   Criteria include: participants, interventions, outcome, design

4. Was the quality (strengths and weaknesses) of the primary studies assessed?

5. Did the quality assessment include:
   Minimum requirement: 3/6 of the following criteria) study design, study sample / population, confounders, intervention, outcome measures, follow

6. Does the review integrate the findings beyond describing or listing primary study results?

7. Is the reported data from all studies adequate to support the review's conclusions?

Appendix C
Quality Criteria – Primary Studies

A) SELECTION BIAS
(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?
(Q2) What percentage of selected individuals agreed to participate?

B) ALLOCATION BIAS
Indicate the study design _____

(i) Is the method of random allocation stated? Yes No

(ii) If the method of random allocation is stated is it appropriate? Yes No

(iii) Was the method of random allocation reported as concealed? Yes No

C) CONFOUNDERS
(Q1) Prior to the intervention were there between group differences for important confounders reported in the paper?
(Q2) If there were differences between groups for important confounders, were they adequately managed in the analysis?
(Q3) Were there important confounders not reported in the paper?
Relevant Confounders NOT reported in the study:

D) BLINDING

(Q1) Was (were) the outcome assessor(s) blinded to the intervention or exposure status of \ participants?

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown or are they known to be valid?
(Q2) Were data collection tools shown or are they known to be reliable?

F) WITHDRAWALS AND DROP-OUTS

(Q1) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

G) ANALYSIS

(Q1) Is there a sample size calculation or power calculation?
(Q2) Is there a statistically significant difference between groups?
(Q3) Are the statistical methods appropriate?
(Q4a) Indicate the unit of allocation (circle one)
(Q4b) Indicate the unit of analysis (circle one)
(Q4c) If 4a and 4b are different, was the cluster analysis done?
(Q5) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

H) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?
(Q2) Was the consistency of the intervention measured?

G) ANALYSIS

H) INTERVENTION INTEGRITY

Appendix D
Reviews Excluded: Quality Rated "Weak"

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Appendix E
Glossary and Abbreviations

CRF — chronic renal failure

DSME — diabetes self-management education

Effect size — the difference in outcomes, between the intervention and control groups divided by some measure of variability, typically the standard deviation. Generally, and effect size of 0.2 is considered a small effect size, 0.5 a medium effect size, and 0.8 a large effect size.

GHb — glycated hemoglobin; a serum measure of metabolic control in diabetes mellitus

HbA1c — hemoglobin A1c; a serum measure of metabolic control in diabetes mellitus

NR — not reported

NS — not statistically significant

SMD — standardized mean difference – difference between means on outcome measurement; standardized by the pooled standard deviation of all studies in a meta-analysis.

SS — statistically significant

WMD — weighted mean difference; the arithmetic average of the differences in outcomes across studies on the same outcome; each study is weighted by the precision of its estimate of effect (usually the inverse of the variance).

WSWL — weighted sum of weight loss

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