

# **Effectiveness of Registered Dietitian Counselling: Interdisciplinary Nutrition Services in Family Health Networks Demonstration Project**

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## Glossary

A1C	GLYCOSYLATED HEMOGLOBIN
BMI	BODY MASS INDEX MEASURED AS WEIGHT IN KG/ HEIGHT IN METERS SQUARED
CDA	CANADIAN DIABETES ASSOCIATION
CHD	CORONARY HEART DISEASE
CVD	CARDIOVASCULAR DISEASE
DBP	DIASTOLIC BLOOD PRESSURE
DM	DIABETES MELLITUS
EHR	ELECTRONIC HEALTH RECORD
FBG	FASTING BLOOD GLUCOSE (MMOL/L)
HDL-C	HIGH DENSITY LIPOPROTEIN CHOLESTEROL (MMOL/L)
HRQL	HEALTH RELATED QUALITY OF LIFE AS MEASURED BY SF36 QUESTIONNAIRE
HT	HYPERTENSION
INSULIN	DEFINED AS THE USE OF INSULIN IN DIABETES MANAGEMENT
LDL-C	LOW DENSITY LIPOPROTEIN CHOLESTEROL (MMOL/L)
N	SAMPLE SIZE
PHC	PRIMARY HEALTH CARE
SBP	SYSTOLIC BLOOD PRESSURE
TC	TOTAL CHOLESTEROL (MMOL/L)
TC/HDL-C	TOTAL CHOLESTEROL TO HIGH DENSITY LIPOPROTEIN CHOLESTEROL RATIO
TG	TRIGLYCERIDES (MMOL/L)
WC	WAIST CIRCUMFERENCE (CM)
Y	YEARS

## Executive Summary

Nutrition issues arise frequently in primary care practice, with family physicians (FP) reporting that about 20% of patients have a nutrition issue related to the reason that prompted the physician visit. As part of a Primary Health Care Transition Fund Demonstration project, three Registered Dietitians (RD) were placed in three diverse Ontario Family Health Networks and their practices were evaluated for changes in key clinical outcomes and health related quality of life (HRQL), as determined by SF-36, v2 (QualityMetric, RI). The study was observational in nature and no attempt was made to alter practice among the 41 FPs serving 60,000 patients. Results were analyzed by paired t-test, using intention to treat methods.

Of the 1043 patients referred for diet counselling, 557 (53%) agreed to participate in the pre-post evaluation. Ninety percent of clients were seen for individual counselling over a mean (SD) of 16 (13) weeks, for a median of three visits. Among the 370 with some combination of excess body weight, dyslipidemia and/or glucose intolerance, (68%) completed an episode of care. Participants who completed diet counselling were, on average, 7 years older, half as likely to report current smoking, and 10 kg lighter than those who did not complete an episode of care. Completers also scored significantly higher on five of eight scales of the SF36.

In subgroup analysis, participants (n=97) with dyslipidemia as the main reason for referral achieved treatment results very similar to literature expectations, with mean reductions in total cholesterol (TC) of 0.6 mmol/L or 8% from baseline, and reductions in low density lipoprotein cholesterol (LDL-C) of 0.5 mmol/L or 10% from baseline, on an intention to treat basis.

The subgroup (n=73) with impaired glucose tolerance or Type 2 diabetes mellitus achieved results comparable to those reported in reviews of diabetes self-management. Decline in glycosylated hemoglobin (A1C) was -0.4 % under an intention to treat model, and -0.5 % among the 70% who completed an episode of care. As expected, multiple other clinical outcomes also improved in these participants.

The subgroup (n=256) of adults referred for weight control counselling was the most challenging among the three subgroups of participants assessed; as weight loss was modest and only 50% of clients completed an episode of care. Results were similar to the Counterweight Programme in the UK, an experimental programme designed to improve management of obesity in primary care (1). In the present study, only 14% of participants lost  $\geq 5\%$  of body weight, 28% lost  $\geq 3\%$  of body weight, and 19% actually gained weight over the course of diet counselling. Both this study and the Counterweight results suggest that new interventions are needed to address the weight control issue in middle aged overweight and obese clients with multiple health conditions and decreased HRQL.

In summary, this descriptive analysis of the effectiveness of RD diet counselling in three FHNs provided needed baseline data previously unavailable on the effectiveness of diet counselling services when RDs are added to primary care practices. While diet counselling services achieved expected declines in clinical outcomes associated with treatment of dyslipidemia, glucose intolerance and type 2 diabetes, weight loss results were modest in this sample of mainly middle aged individuals with multiple health conditions. Development and evaluation of new approaches are needed to improve on current results in these individuals.

## **Introduction**

### **The Demonstration Project**

Nutrition issues arise frequently in primary care practice, with family physicians (FP) reporting that about 20% of patients have a nutrition issue related to the reason that prompted the physician visit. While many nutrition issues can be addressed by FPs and other providers, Registered Dietitians (RD) provide in-depth dietary treatment and counselling for specific issues, such as obesity, dyslipidemia, Type 2 diabetes and hypertension, which require specific knowledge and skills to achieve clinically relevant changes in eating behaviours, and consequent changes in clinical parameters which guide overall medical treatment. In addition, many clients of primary care have multiple chronic conditions, which may or may not have a clinically relevant nutrition component. For all these reasons, many groups have recognized the need for the specialized services of RD in primary care settings and various groups have been developing new approaches to improved nutrition services affiliated with primary care practices. One approach is to move specialized dietetic counselling services by RDs directly into family medicine practices.

Possible benefits of such a strategy could be improved access by patients, improved communication and coordination among providers, better nutrition services by all providers, and better long term support for patient behaviour change. In addition, a greater range of healthy lifestyle promotion and treatment services could be offered. Interventions could range from diabetes prevention, treatment of low birthweight or failure to thrive among children or the elderly, counselling on vitamin/mineral supplements to complex interventions for management of chronic conditions, especially various combinations of dyslipidemia, glucose intolerance, and hypertension.

As part of the development of nutrition services in primary care, it is important to gain insight into effectiveness of newly developed services. While there is substantial literature on the efficacy of RD counselling in clinical trials of specific diseases, the literature on effectiveness of RD services for the range of patients who might be typically referred to family medicine practices is much more limited. This analysis, therefore, was undertaken to both describe the diet counselling clients seen and RD effectiveness as part of an Ontario Primary Health Care Transition Fund demonstration project.

FHNs are an Ontario model of primary care with three or more FPs working with other selected health care professionals to provide PHC services to enrolled patients. They are funded in a blended funding model that includes capitation payments (population-based funding of health care services) with incentives for additional specific preventive health care activities. These FPs often work in separate offices. They have received support from government to implement electronic health records (EHRs). FHNs have not had RDs in the past.

Three RDs were deployed in three FHNs from Sept 2004 to March 2006 and completed pre-post evaluation of clinical outcomes and health related quality of life among patients who volunteered to participate. All patients had been referred by their family physician (FP) in the FHN for counselling.

The RDs implemented a practice model that was broadly based on previous role documents for the profession (2,3), with a main focus on nutrition counselling and a secondary mandate to develop health promotion and disease prevention programming. While individual counselling was the primary intervention, group counselling was implemented where numbers warranted. Key features of dietetic counselling process include use of behavioural counselling

and adult education methods to develop mutual goals or diet prescription, develop skills and evaluate outcomes. The typical focus is long-term sustainable health behaviour change. Other elements of enhanced practice (4,5) included computerized diet record analysis, explicit use of the PRECEDE-PROCEED model (6), and assessment of blood pressure, waist circumference, and health-related quality of life (SF-36)(7-10).

The effectiveness of diet counselling is dependent on the inherent efficacy of intervention, as well as the degree to which providers and patients will undertake the intervention. Inherent efficacy varies depending on the specific issues being addressed in counselling. For example, overweight dyslipidemic patients may achieve clinically relevant declines in low density lipoprotein cholesterol (LDL-C) levels, without weight loss, by changing only the percentage of saturated fat in their diets. Conversely it is possible to achieve weight loss without much change in lipoprotein levels, by restricting energy intake. More typically, however, such patients will achieve modest declines in both body weight and lipoprotein levels, which may or may not be clinically important enough to alter overall medical management. As many patients in primary care have multiple health issues, it is important to analyze the data by counselling focus and to assess subsequent outcomes in this context.

### **Study Design and Analysis Plan**

A major purpose of the RD evaluation was to obtain baseline data on the FHN diet counselling clientele, under typical conditions in Ontario FHNs. This study was therefore observational, and clinical outcomes were assessed in the context of routine practice. An episode of care for diet counselling in the Canadian health system varies substantially across programs and settings, as was found in a previous study of dyslipidemia counselling practice (11). In many settings, both interventions and extent of follow-up are controlled by health organization administrations that employ RDs. In the absence of such control, an episode of care will still vary substantially, based on numerous factors, including RD practice style, client lifestyle, needs and commitment, as well as the mutual goals of the counselling. In this study, the RDs used their clinical judgment in consultation with their patients to establish individual follow-up plans.

A minimum of two client visits was established, however, a baseline assessment and three month follow-up, in order to promote documentation of relevant outcomes at a typical follow-up point. Three months was chosen as there is substantial evidence from clinical trials that changes in lipoprotein levels in treatment of dyslipidemia and glycosylated hemoglobin (A1C) in treatment of diabetes are detectable after three months of diet treatment. Longer periods of intervention are generally required to achieve maximal weight loss, with continuing declines in committed individuals often continuing for periods of up to six months or more. Thus, three month follow-up would allow for detection of most relevant clinical outcomes and was feasible.

It is important to recognize that no efforts were made to change FP practice over the course of the demonstration project, beyond making the RD available to their patients by referral. Lead physicians and RD undertook some activities to advertise and develop the service, but no additional resources were provided for this purpose. After nine months of evolving practice, the three RDs and lead physicians were involved in a formal consensus process to develop an interdisciplinary model for nutrition services, as another aspect of the demonstration project. In this way they had already experienced many of the issues arising with the introduction of a new service, and had developed a number of ideas for improving practice. The methods and results of the consensus process are described elsewhere, but in brief, 23 representatives from relevant organizations and groups in the province were brought together, using the Delphi method, to

determine the preferred options for organizing interdisciplinary nutrition services in FHNs and similar primary health care organizations. The consensus process took several months to complete, and the RDs and lead physicians were kept abreast of the emerging model, while they continued their activities.

Key clinical outcomes for the RD evaluation were gathered by RDs from their own observation, from the medical charts and local medical laboratory reports. As a consequence, data were incomplete for many patients for numerous clinical indicators. In this context, an “intention to treat” analysis is most appropriate, so that all available data can be used to estimate effectiveness, while avoiding over-stating clinical outcomes, when data is available for only a subset of all participants. In this study, a “last value carried forward” approach has been used, whereby it is assumed that clinical indicators remain at the last recorded value, when data is incomplete.

### **Clinical Outcomes to be Considered**

The criteria for selection and format of the clinical outcomes considered in this report were: 1) importance as a key interim measure guiding medical management for the majority of clients with the condition as defined by clinical practice guidelines, 2) outcome is collected in the majority of patients with the condition, 3) the outcome is known to be affected by diet treatment. In addition, perceived health and health related quality of life (HRQL) are of increasing interest, but still are not routinely assessed in diet treatment. Most obese patients, a key target group, consider quality of life impairment to be the most serious consequence of their condition (12,13), and it is one of their primary reasons for seeking treatment (13,14). The construct of HRQL is multidimensional, encompassing emotional, physical, social, and subjective feelings of well-being that are influenced by a person’s experiences, beliefs, expectations, and health perceptions (12,15-17). Assessment of HRQL may offer new insights that can inform development of weight loss and other diet treatment programs.

The key clinical outcomes for obesity, dyslipidemia, Type 2 diabetes and hypertension are reviewed, as it was known from previous work that these would be the common conditions among participants in this effectiveness study. Outcomes will be described a variety of ways, as multiple approaches have been documented, both in terms of mean changes, as well as percentage change.

### **Obesity**

Canadian clinical practices guidelines for management of obesity primary care are currently under development in Canada (Rena Mendelson, Ryerson University, personal communication) and the most recent published national guideline from the Canadian Task Force on preventive Health Care dates from 1999 (18). As noted in this report there was limited evidence supporting treatment, because of limited long term effectiveness of weight reduction. To quote: “(a) *For obese adults without obesity-related diseases, there is insufficient evidence to recommend in favour of or against weight-reduction therapy because of a lack of evidence supporting the long-term effectiveness of weight-reduction methods (grade C recommendation); (b) for obese adults with obesity-related diseases (e.g., diabetes mellitus, hypertension), weight reduction is recommended because it can alleviate symptoms and reduce drug therapy requirements, at least in the short term (grade B recommendation).*”

In the US, National Institutes of Health guidelines from 1998 also acknowledged that diet interventions could achieve weight loss in the range of 5% was achievable and sustainable over the longer term in volunteers (19). In a review of reviews conducted as part of the demonstration project, McTigue et al. (2003) found that behavioural interventions, such as



counselling, can promote modest weight loss, (generally 3 to 5 kg) weight loss over at least 6 or 12 months, respectively (20). Weight loss had beneficial effects on blood pressure, lipid levels, glucose metabolism, and diabetes incidence.

### Dyslipidemia

The current Canadian dyslipidemia guidelines recommend differing target levels depend on cardiovascular disease risk, as determined from a revised algorithm based on the Framingham cohort study and the guidelines from the third report of the National Cholesterol Education program (21-23). The targets are shown in Table 1 (22). Low-density lipoprotein cholesterol (LDL-C) remains a key focus of the guidelines, as well as the ratio of total cholesterol (TC) to high density lipoprotein cholesterol (HDL-C). A discrete target for total triglycerides (TG) level is no longer recommended; an optimal TG concentration is < 1.7 mmol/L. Lifestyle changes to promote reduction of lipoprotein levels are also recommended, in conjunction with pharmacological therapy.

**Table 1. Framingham Risk Categories and Target Lipid Levels**

Risk Category	Target Level	
	LDL-C (mmol/L)	TC:HDL-C
High (10 year risk > 20%, <i>or</i> history of DM** <i>or</i> any atherosclerotic disease)	< 2.5 <i>and</i>	< 4.0
Moderate * (10 year risk 11% - 19%)	< 3.5 <i>and</i>	< 5.0
Low ** (10 year risk - ≤ 10%)	< 4.5 <i>and</i>	< 6.0

\* Includes patients with chronic kidney disease and those undergoing long-term dialysis

\*\* In the “very low” risk stratum, treatment may be deferred if the 10 year estimate of CVD is < 5% and LDL-C level is < 5.0 mmol/L

Effects of diet interventions have been assessed in several reviews. Among recent reviews, Yu-Poth et al. evaluated the effects of the National Cholesterol Education Program’s Step I and Step II dietary interventions in free-living subjects (24). The Step I diet specifies intake of less than 30% of total energy from fat, less than 10% of energy from saturated fat, and less than 300 mg of dietary cholesterol per day. The Step II diet recommends less than 6% saturated fat and less than 200 mg of dietary cholesterol per day. Both these diets are similar to dyslipidemia diets currently recommended by RDs in the Canadian health care system (11,25). Study participants had to be free-living (i.e., not on a metabolic ward), and counseled on implementing low-fat diets. The intervention duration had to be at least 3 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-C (0.49 mmol/L, 12%), TG (0.17 mmol/L, 8%), and TC/HDL-C ratio (0.50 mmol/L, 10%). The Step II diet achieved statistically significant decreases in plasma total cholesterol (0.81 mmol/L, 13%), LDL-C (0.65 mmol/L, 16%), TG (0.19 mmol/L, 8%), and TC/HDL-C levels (0.34 mmol/L, 7%). Changes in dietary fat also had a significant impact on body fat: for every 1% reduction in percent energy from fat, body weight decreased by 0.28 kg.

Tang also considered the effect of dietary advice to lower total cholesterol (26). In a review of 19 trials, serum cholesterol reductions of 8.5% at three months, 5.3% at six months, and 8.5% 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 (115).

In a third review, Thompson et al (27) compared results achieved by RDs to those achieved by physicians. The pre-post changes for serum cholesterol within treatment groups varied considerably, but tests for study heterogeneity were null. In the dietitian–physician comparisons, mean pre-post change in serum TC 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.

### Diabetes

The 2003 Canadian Diabetes Association clinical practice guidelines for medical management are summarized in Table 2 (28). As stated in the guidelines, nutritional therapy can reduce A1C up to 1 to 2 %, for example from an A1C of 8% to 7% (29).

Table 2. Target Levels for Glucose Control in Adults with Diabetes

	<b>Ideal</b>	<b>Target for Most</b>
A1C	≤6	≤7
Fasting/pre-meal glucose (mmol/L)	4-6	4-7
Glucose 2 h after eating (mmol/L)	5-8	5.0-10

While a large number of studies support diet management as an integral feature of overall diabetes management, and this was confirmed in the 15 high and moderate quality reviews found in the systematic review conducted as part of the demonstration project (5), specific estimates of the reductions to be expected for diet counselling alone were not found. Reductions in A1C in these reviews of multi-faceted interventions were more modest, and in the range of 0.3 to 0.5 % reduction. For example, Ellis (30) explored the effect of diabetic education on glycemic control. 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 A1C levels more than the control groups.

### Hypertension

The Canadian Hypertension Education Program promotes the following medical management treatment goals for systolic (SBP) and diastolic (DBP) blood pressure (31-34).

Table 3. Canadian Hypertension Treatment Goals

<b>Condition</b>	<b>Target (SBP/DBP mm Hg)</b>
Diastolic ± systolic hypertension	<140/90
Isolated systolic hypertension	<140
Home BP (no diabetes, renal disease or proteinuria)	<135/85
Diabetes	<130/80
Non-diabetic renal disease	<130/80
Proteinuria > 1g/day	<125/75

Numerous lifestyle interventions have shown that blood pressure can be modestly reduced (35), and this was confirmed in the review of reviews conducted as part of the demonstration project (5). Estimated possible changes are summarized below (36). The DASH diet was developed as part of a large US study. It promotes moderate fat intake, with increased fruit, vegetable and dairy product intake (37). RDs frequently counsel clients regarding eating and physical activity patterns that would be consistent with most of the following changes.

**Table 4. Impact of Lifestyle Therapies on Blood Pressure in Hypertensive Adults (36)**

Intervention	Estimated mean reduction	
	SBP	DBP
Weight loss in overweight Weight loss per 1 kg	1.1	0.9
Alcohol reduction from 3-6 to 1-2 drinks/day	3.9	2.4
Moderate physical activity (120-150 minutes per week)	4.9	3.7
Sodium restriction to maximum of 78 mmol/day	5.0	2.7
Dietary patterns - DASH diet	11.4	5.5

**Conclusions on Clinical Outcomes**

In summary, estimates from the published studies to date provide a baseline for considering the effectiveness of RD counselling. These and most other reviews have been based on results from randomized clinical trials, a biased subset of all patients who are treated in primary health care settings. In addition, a variety of diet and exercise interventions were employed, many of which are more intensive than is feasible in the health care system. Client centred care, the foundation of diet counselling, is also based on the concept that diet changes must be acceptable to clients, and RDs employ a variety of possible diets and strategies, based on stated and observed client preferences and needs. For example, most patients can be encouraged to decrease fat intake somewhat, in line with a Step 1 diet for dyslipidemia, but may be unable or unwilling to make the more dramatic changes associated with a Step 2 diet. These reviews provide reasonable benchmarks for comparison, but changes in clinical outcomes achieved in an effectiveness study will be more limited than suggested by the studies reviewed.

To reiterate, mean weight losses of 3 to 5 kg or about 5% of body weight have been observed in previous community-based studies among overweight and obese individuals, with modest reductions in other clinical outcomes. In dyslipidemia, reductions in TC of 0.6 mmol/L or 10%, LDL-C of 0.5 mmol/L or 12%, TG of 0.17 mmol/L or 8%, and in the TC/HDL-C ratio of 0.50 mmol/L or 10%, may be possible. In Type 2 diabetes, reductions in A1C of 0.5 to 1.0 % or approximately 10 % reduction from baseline may be possible. In hypertension, blood pressure reductions in the range of 6-11 mm Hg systolic and 2-7 mm Hg diastolic or about 5% reduction may be possible. Finally, no benchmarks for changes in HRQL with diet counselling have been established, as this is still an emerging area of research.

**Methods****The Family Health Networks**

The demonstration project steering committee reasoned that better estimates of effectiveness would be developed if geographically diverse FHNs were represented. In April 2004, a request for proposals was sent to all FHNs and primary care models in Ontario that met specific criteria, including five or more physicians, diverse locations in urban, rural and northern settings, development of EHRs already under way, and no previous RD services. The three FHNs (Parry Sound, Kingston and Stratford) were chosen in May 2004 from eight submissions. The three FHNs were gradually expanding over the course of the project, from 52636 enrolled patients in Fall 2004, 40 FP and 71 other staff, to 59426 enrolled patients, 41 FP and 71 other staff in Fall 2005.

Direct information on the health behaviours and body weight of the enrolled population was not available, but recent analysis of the Local Health Integration Networks (the Ontario

regions for health planning), showed that health and lifestyle issues are common in all three regions compared to Ontario as a whole (38).

About 1.3 per cent of rostered patients were sent to the FHN RD over the course of the demonstration project (ref). Another 1.1% patients were referred to other community services, such as diabetes education centres and their results were not available (39).

The RDs' paid hours ranged from 0.57 to 0.71 of a full time equivalent (FTE) in each FHN, with an average of 1,306 hours per year or 0.67 FTE. Therefore, there were  $0.67 \times 3 = 2.0$  FTE RDs working with 41 physicians. The ratio of RDs to physicians was 1:20.5 over the three FHNs.

### **RD Practice in Each Family Health Network**

Each FHN organized its RD services differently. In one FHN with three separate offices, the RD was located in one office and had to arrange her own appointments, and hired a student to call patients for initial appointments. This RD booked all her own follow-up appointments. In the second FHN with 13 offices, the RD had an office in one location, and a receptionist or nurse booked the appointments. In the third FHN of three offices, the RD provided nutrition counselling at each site on given days of the week, and initially a receptionist booked the nutrition appointments at two of the sites. (Halfway through the project, the RD was required to take over booking all initial and follow-up appointments.) This RD also did not have an office, and carried all her resources with her, including her computer and nutrition patient charts, to each site. All FHNs were in the process of implementing EHRs over the course of the project, but only one FHN had a fully functioning EHR system by project completion.

Every effort was made to incorporate RD services in the FHN practices, with the least disruption possible to usual clinical practice. Physicians were informed by their administration of the availability of RD services and invited to refer patients according to their clinical judgment. Changes to practice with respect to follow-up, laboratory measures, etc were not pre-specified. Physicians referred patients for diet counselling according to local procedures, and indicated one main reason for their referral. A referral form was developed by the three RDs, in consultation with their local FHNs at the beginning of the study (Appendix).

All patients capable of completing informed consent themselves or having their guardian complete informed consent were approached to participate in the study at the first appointment with the RD (Appendix). Each client was to complete the form, if interested, and return it to the office receptionist or mail it directly to the University of Guelph. The RDs were to be blinded to patient participation and study participants received the same care as non-study patients. Once the RD and patient had completed an episode of care, the patient identification number (ID) was submitted to the research team at the University of Guelph who then sent back a list of consenting study participants to the RDs, for forwarding of the diet counselling data to the study central data management centre for data entry. The diet counselling forms were identified only by subject ID to maintain participant confidentiality. All data from all three FHNs were analyzed together.

### **Instrument Development and Pilot Testing**

#### **Demographic Information**

Limited demographic information was collected directly from each patient, using questions and categories taken from recent national surveys (Canadian Community Health Survey) with the exception of occupation, where only broad categories were listed. Income was not requested.

### **Clinical Outcomes Forms**

Key process and outcome data were entered on paper based forms, which were adapted from others already used in numerous other agencies, with the addition of ICD10-CD codes to further describe client health issues and more detailed information on the interventions given (Appendix). The data collection forms were pilot tested by the three RDs for ease of completion and completeness. Presence of medical conditions was determined from medical records and patient medical history. Similarly patients reported on medication use.

### **Health Related Quality of Life**

Among the generic instruments, the SF-36, with scales for physical function, pain, emotional and social function, vitality and mental and general health has been most widely used and extensively validated in many health conditions, allowing for comparisons to population norms and results from other clinical groups (copy in Appendix). The English and French paper versions of SF36 v2 were obtained (QualityMetric, Lincoln, RI) and used as provided (40). Participants usually completed these questionnaires in the course of their counselling appointment, with a few being completed by mail.

### **Clinical Outcomes**

Clinical measures were recorded by the RDs, using the equipment and measures used in each FP practice. Participants were categorized as having metabolic syndrome if they met three of five criteria as described by the National Cholesterol Education Program (23). Criteria are outlined in the Appendix. Similarly, where possible, cardiovascular disease risk was calculated according to the criteria of the Canadian and US dyslipidemia guidelines(22,23). The revised algorithm is also reproduced in the Appendix.

### **Anthropometric Measures**

Body weight and height were measured using standard equipment in each FP office by each RD. Waist circumference was measured by each RD, using a rigid tape measure as the narrowest point at the level of the umbilicus by each RD as outlined in published guidelines (41). RDs were trained to complete measurement accurately.

### **Laboratory data**

Laboratory measures were taken from laboratory data as reported by laboratories used by the FP, using standard methods. Blood pressure was measured as in the FP office; or by the RDs using Omron automated blood pressure instruments, and appropriate cuff size as recommended by the manufacturer. Three blood pressure measures were taken, and the mean of the final two measures was recorded.

## **Analyses**

Data were double entered into Epi-Info v. 3.2.2 (CDC, Atlanta), and discrepancies corrected. Descriptive statistics were calculated for each question using SPSS v.12 (Chicago, IL). For the purposes of this report simple descriptive and two–group comparisons analyses were completed, based on both “intention to treat” and actual changes in clinical outcomes and HRQL over time. Levene’s test was first used to check for equality of variances. Paired t-tests of pre-post changes were determined. The scores for SF36 v2 were calculated as recommended, and norm based to the US population, such that each scale had mean of 50 and a SD of 10 (40).

## **Ethics**

The study protocol was approved by the Research Ethic Board, University of Guelph.

## **Results**

### **Study Participants**

As shown in figure 1, 1043 patients were referred for diet counselling to the FHN RDs over the 19 month study. Of these 138 (13%) did not attend an initial appointment. Of the 905 who attended the first appointment, 91 (10%) were not offered study participation, for a variety of reasons, primarily because of inability to obtain informed consent, either directly or from a parent or guardian.

Of the 814 approached to participate 557 (68%) agreed to participate, and 257 declined (32%). Therefore, results for 53% (n=557) of the total referred patients were analysed. In terms of follow-up, 69% of study participants either completed an episode of care or were referred to other programs. For diet counselling patients who had not agreed to participate, limited information was available on follow-up, but 78% completed at least one follow-up appointment, were referred to other programs or did not require follow-up.

Demographic characteristics of the study participants are shown in Table 5 and compared to data for Ontario, from analysis of the Canadian Community Health Survey (2004)(38). Statistical comparison was not completed. Participant age ranged from < one year to 94 years, with a mean (SD) of 48 (17) years. A higher proportion of our study participants were aged 65 and older compared to the Ontario population (16% vs. 12.8%). Sixty-seven percent of participants were female. Sixty-six percent were married or living in a common-law relationship, in households with a median of 2 persons. The majority were English speaking and described themselves as Canadian or European or a combination. A substantially higher proportion of the study participants had English as their mother tongue compared to Ontario (96% vs. 71.9%). Labour force participation was slightly lower in the study participants. Participants described their work background in various ways, with 22% being retired or on disability. A lower percentage of study participants had less than Grade 9 education compared with Ontario data (4.7% vs. 8.7%). About one quarter had not completed high school, while 44% had at least some post-secondary education. Only 14% were current smokers.

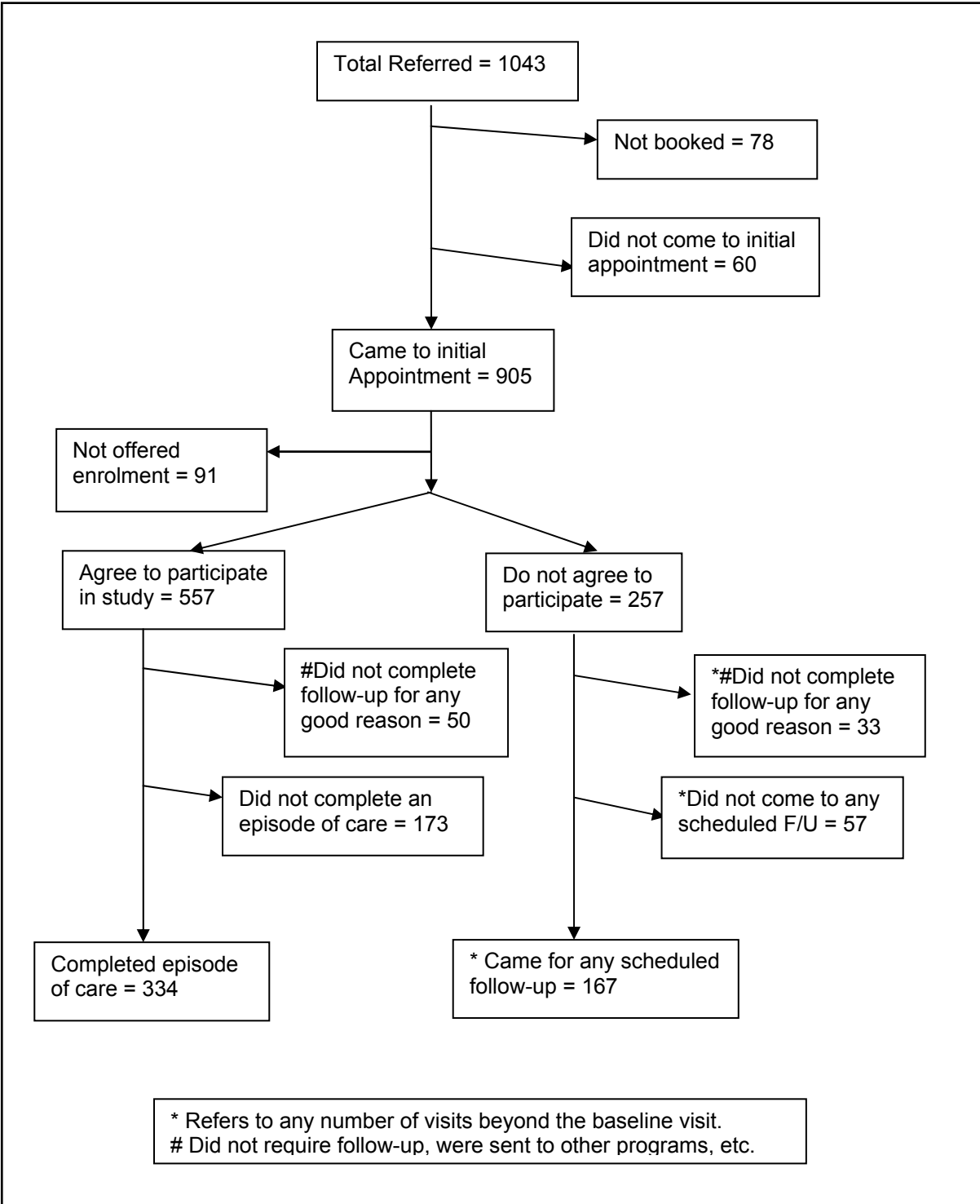


Figure 1. Study participation.

**Table 5. Demographic Characteristics Compared to Ontario Population Health Profile (38)**

Characteristic	n=557	Description	Number	Percent	Ontario Percent
Gender		F	372	67	
		M	185	33	
Age		Years mean $\pm$ SD	48 $\pm$ 17		
		Senior population (age $\geq$ 65 years)	87	16	12.8
Number of people in household	539	Median mean $\pm$ SD	2 2.6 $\pm$ 1.3		
Marital status	532	married		66	
		single		21	
		divorced		7	
		widowed		4	
		separated		2	
Ethnicity	539	Canadian only listed	468	87	1.7
		European, not Canadian	48	9	
		Aboriginal	9	2	
		All others	14	3	
		Population with English as mother tongue	513	96	71.9
Language spoken at home	537	English only	513	96	71.9
		French only	2	0.3	
		Another language	9	2	
		English and another language	13	2	
Labour participation	507	Labour force participation rate (age $\geq$ 15)	318	63	67.3
Professional category	530	Homemaker	57	11	
		Clerical worker (e.g. secretary, receptionist, data entry, cashier)	53	10	
		Service worker (e.g. janitor, cook, waiter, nurse's aide, security guard, road crew worker, bus driver)	73	14	
		Professional or technical (e.g. lawyer, teacher, social worker, scientist, nurse, doctor, police officer, computer programmer)	144	27	
		Craftsman or tradesman (e.g. carpenter, electrician, mechanic)	32	6	
		Retired	95	18	
		Child or Student	41	8	
		Disability	19	4	
Other	16	3			
Education	450	Population (age 20+) with less than Grade 9 education	18	4.7	8.7
		Population (age 20+) without high school graduation	96	21	25.7
		Population (age 20+) with some post-secondary education	198	44	
Current smoker	489	No	423	86	16.8
		Yes	66	14	



## Counselling Issues

The most common main reason for referral to diet counselling was weight control in adults ( $\geq 18$  years), followed by dyslipidemia, Type 2 diabetes mellitus and impaired glucose tolerance.

**Table 6. Physician Main Reason for RD referral (n=557)**

Condition	Number	Percent
Overweight and Obesity ( $\geq 18$ years)	256	46
Pediatric Weight Control ( $<18$ years)	18	3
Dyslipidemia	97	17
Type 2 diabetes	49	10
Impaired glucose tolerance	24	4
Adult eating habits	14	2
Underweight – adult	12	2
Diverticulitis	8	1
Irritable bowel syndrome	8	1
GI reflux	6	1
Vegetarian diet	6	1
All others ( $\leq 5$ cases each reason)	59	11

Individual counselling was the main service offered. Some group classes were developed and offered by the RDs over the course of the demonstration project, where numbers and interest warranted their development. Groups classes addressing overweight and cholesterol reduction were offered in two of the three FHNs. The RDs tracked completion of episodes of care in participants who completed a baseline interview. About 70 % overall, completed an episode of care or were referred to other programs. As noted in Figure 2, 13% or 72 subjects completed only one visit or were involved in group classes. The mean length of RD care, including those who did not complete an episode of care was 114 days or 16 weeks, with a wide range, as illustrated by the number of visits in Figure 2, which ranged up to 33 visits for one participant.

**Table 7. Overview of Counselling Interventions (n=557)**

Intervention	N	Percent
Assessment only	13	2
Group classes only	16	3
Group and individual	28	5
Individual counselling	500	90
Patient Disposition		
Patient did not complete or unknown	173	31
Ongoing monitoring by RD	34	6
Care returned to FP	300	54
Community or other program	50	9
Length of completed care – all subjects – days (Mean $\pm$ SD)	114 $\pm$ 92	
Number of visits (median)	3.0	

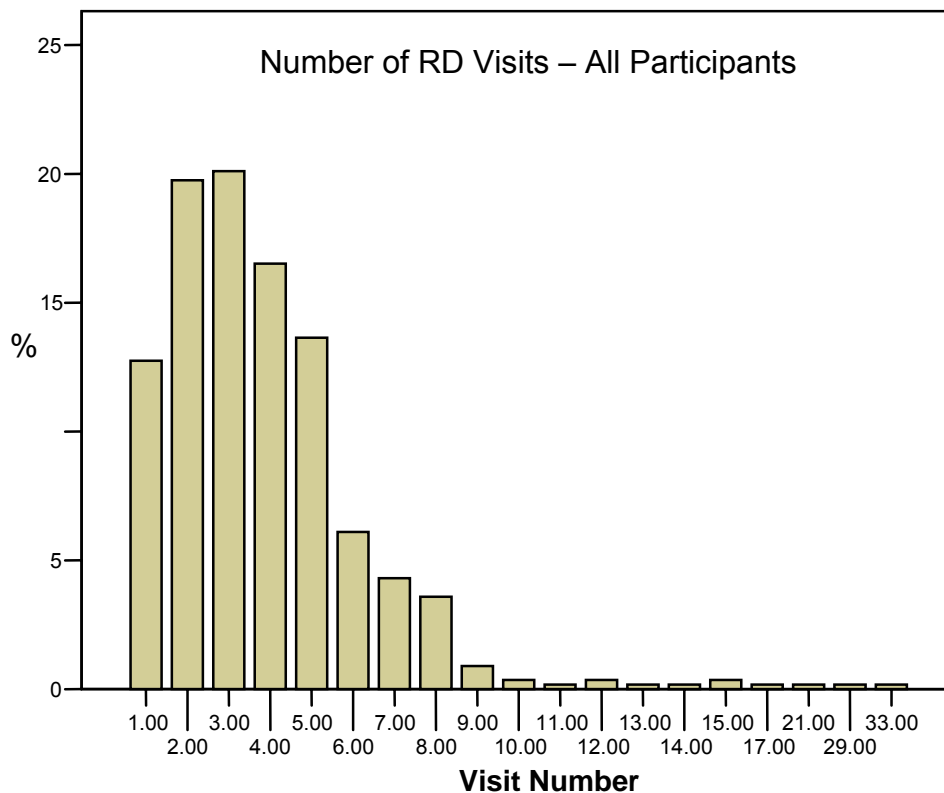


Figure 2. Number of RD visits with study participants.

### Differences Between Participants Completing and Not Completing An Episode of Care

Most diet intervention studies suffer substantial loss to follow-up, with many studies reporting up to 40% of study subjects dropping out before intervention completion (42-47). To better understand differences among participants in this study, baseline characteristics of those who completed an episode of care were compared to those who did not by t-test. The results are shown in Table 8. The focus of this analysis was individual counselling participants, who were not referred to other programs. Only the results for the three major three counselling groups (obesity, diabetes and IGT and dyslipidemia) are shown but similar trends were seen in subgroup analysis.

In all, there were 251 (68%) completers and 119 (32%) participants who did not complete an episode of care. People who completed diet counselling were, on average, 7 years older, half as likely to report current smoking, 10 kg lighter, three BMI units smaller, with a waist circumference 10 cm less. Gender was not an important factor.

In terms of medical history, those with any medical history of dyslipidemia were more likely to complete counselling, but history of other conditions was not associated with completion. There were some differences in clinical characteristics. Completers had higher

HDL-C and lower TC levels, with a lower total cholesterol/HDL ratio. Interestingly, differences in the proportion with metabolic syndrome that completed counselling did not differ, despite the differences in clinical characteristics.

Most striking were the differences in HRQL scales between completers and non-completers, with significant differences in five of eight scales, all favouring completers. Their general health, social function and vitality was better than non-completers at  $p < 0.001$ , with body pain, role physical and role emotional also achieving higher scores.

Differences in the number of visits and follow-up time varied by completion of an episode of care. As expected, those who completed an episode of care saw the RD more times over a longer time period. The participants who completed an episode of care saw the RD a mean (SD) of 4.7 (2.1) times over 21 (11) weeks, compared to the participants who definitely did not complete an episode of care with 2.6 (1.8) visits over 10 (14) weeks, and the difference was highly significant by t-test ( $p < 0.001$ ).

**Table 8. Baseline Characteristics and Interventions of Participants Undergoing Diet Counselling for Weight Control, Impaired Glucose Tolerance, Type 2 Diabetes or Dyslipidemia Completed or Did Not Complete an Episode of Care**

	Completers			Non completers			t-test
	n	Mean	SD	n	Mean	SD	
<b>Demographic</b>							
Age (years)	251	54	13	119	47	13	<0.001
Gender (% male)	251	35		119	40		
Current Smoker (%)	247	10		119	22		<0.01
<b>Clinical</b>							
Weight (Kg)	250	92.3	18.7	117	102.6	25.2	<0.001
BMI	250	33.2	6.7	116	36.2	8.1	<0.001
Waist Circumference (cm)	206	106.0	14.0	84	115.8	16.7	<0.001
Fasting Blood glucose	144	6.3	1.9	60	6.4	2.3	
A1cSi	69	6.89	1.38	23	7.43	1.70	
Total Cholesterol	172	5.8	1.3	62	5.8	1.4	
LDL-C	159	3.5	1.1	48	3.4	1.2	
HDL-C	166	1.3	0.3	60	1.2	0.3	<0.01
Triglycerides	170	2.2	1.6	60	3.1	2.3	<0.01
TC/HDL-C Ratio	166	4.6	1.3	60	5.4	2.6	<0.05
Systolic Blood	180	135	17	74	131	18	
Diastolic Blood	180	81	11	74	81	12	
<b>Medical history</b>							
Has Type 2 DM (%)	251	22		119	15		
Has dyslipidemia (%)	251	65		119	50		<0.01
Has hypertension (%)	251	40		119	39		
Has arthritis (%)	251	10		119	8		
Has heart disease (%)	251	10		119	11		
Has metabolic syndrome (%)	244	41		112	37		
CHD risk (% low, med, high)	147	38,11,51		50	36, 0, 54		
<b>Interventions</b>							
Intervention duration (days)	251	146	77	119	68	96	<0.001
Number of sessions	251	4.7	2.1	119	2.6	1.8	
<b>Health Related Quality of Life</b>							
General Health	221	48	9	105	42	10	<0.001
physical functioning	217	46	11	107	44	12	
Bodily pain	218	47	10	106	44	11	<0.05
Role physical	216	48	11	107	45	12	<0.05
Mental Health	220	50	9	105	48	11	
Social functioning	218	49	9	106	43	12	<0.001
Vitality scale	220	48	10	105	44	11	<0.001
Role emotional	219	48	10	106	45	13	<0.05

### **Subgroup Analyses**

Clinical and HRQL results for three selected subgroups, defined by main reason for referral, and based on typical diet counselling focus, were analysed in more detail, and compared to literature expectations. These were: weight control in adults ( $\geq 18$  years), dyslipidemia, and impaired glucose tolerance and Type 2 diabetes combined. Each of the groups was heterogeneous with respect to other medical conditions, with significant overlap among groups. Each group is first described with respect to baseline characteristics, followed by pre-post analysis of outcomes, using intention to treat methods, followed by consideration of results in those who completed an episode of care.

### **Weight Control**

Among participants referred for diet counselling for treatment of excess body weight, 15% were overweight (BMI  $\leq 29.9$ ), 28% had Grade 1 obesity (BMI 30-34.9), 26% had Grade II obesity (BMI 35-39.9) and 31 % had Grade III obesity (BMI  $\geq 40$ ). As shown in Table 9, these participants were middle aged and had a variety of medical conditions. In addition, their HRQL was lower than population norms.

**Table 9. Characteristics of Adult Participants with Weight Control as the Primary Reason for Referral (n=256)**

<b>Characteristic</b>	<b>n</b>	<b>Value</b>
Age (years $\pm$ SD)	256	48 $\pm$ 14
Gender	256	185 F, 71M
Marital status (% married)	237	68
Grade completed (% $\leq$ high school)	245	54
Current smoker (% yes)	253	12
Number of all listed medical conditions (number $\pm$ SD )	256	3.5 $\pm$ 1.9
Dyslipidemia as listed medical condition (% yes)	256	33
Hypertension as listed medical condition (% yes)	256	39
Any arthritis as listed medical condition (% yes)	256	10
Any heart disease as listed medical condition (% yes)	256	9
Any diabetes as listed medical condition (% yes)	256	10
Sum all meds (number $\pm$ SD )	256	3.9 $\pm$ 3.0
Oral DM meds (% yes)	256	7
Insulin (% yes)	256	2
HT meds (% one or more)	256	38
Dyslipidemia meds (% one or more)	256	22
<b>Clinical Characteristics</b>		
Weight (kg – mean $\pm$ SD )	255	103.5 $\pm$ 21.5
BMI (mean $\pm$ SD )	254	37.3 $\pm$ 7.2
WC (cm – mean $\pm$ SD) men	57	120 $\pm$ 11
women	149	112 $\pm$ 16
Blood glucose (mmol/L – mean $\pm$ SD)	103	5.9 $\pm$ 1.7
A1C ( % - mean $\pm$ SD)	46	6.5 $\pm$ 1.4
Total cholesterol (mmol/L – mean $\pm$ SD)	109	5.3 $\pm$ 1.1
LDL cholesterol (mmol/L – mean $\pm$ SD)	99	3.1 $\pm$ 1.0
HDL cholesterol (mmol/L – mean $\pm$ SD)	106	1.26 $\pm$ 0.27
Total cholesterol/HDL ratio	106	4.3 $\pm$ 1.3
Triglycerides (mmol/L – mean $\pm$ SD)	106	2.2 $\pm$ 1.2
Systolic blood pressure (mm Hg – mean $\pm$ SD)	159	134 $\pm$ 18
Diastolic Blood pressure (mm Hg – mean $\pm$ SD)	159	82 $\pm$ 11
Has metabolic syndrome (% yes)	240	31
Framingham risk (% low, medium, high)	87	40, 9, 51
<b>Health Related Quality of Life</b>		
General health (score – mean $\pm$ SD)	226	44 $\pm$ 10
Physical functioning (score – mean $\pm$ SD)	225	44 $\pm$ 12
Body pain (score – mean $\pm$ SD)	226	44 $\pm$ 10
Role physical (score – mean $\pm$ SD)	225	45 $\pm$ 12
Mental health (score – mean $\pm$ SD)	226	47 $\pm$ 11
Social functioning (score – mean $\pm$ SD)	226	45 $\pm$ 12
Vitality (score – mean $\pm$ SD)	226	45 $\pm$ 11
Role emotional (score – mean $\pm$ SD)	226	44 $\pm$ 13

As expected, results of the Intention to treat analysis in Table 10 show modest reductions in weight of 1.8 kg with a wide range of weight change. Expressed as a percentage of initial

weight, 255 participants lost an average of  $1.7 \pm 3.3\%$  of initial body weight. Among the 128 participants who completed an episode of care (Table 11) weight loss was greater, but still modest and was an average of  $2.4 \pm 3.7\%$  of initial body weight.

Fourteen percent of all participants lost  $\geq 5\%$  of body weight, 28% lost  $\geq 3\%$  of body weight, 22 % lost no weight or did not complete intervention, and 19% actually gained weight over the course of diet counselling. As has been observed in other weight loss studies modest reductions in several clinical outcomes were also evident. Modest improvements in several scales of HRQL were also noted. Among the 128 completers or 50% of the original group, more positive changes in clinical outcomes and HRQL were seen.

**Table 10. Diet Counselling Results in All Patients Referred for Weight Control**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical Outcomes</b>								
Weight (Kg)	255	103.6	21.5	101.8	21.6	-1.78	3.40	<0.001
Body Mass Index	254	37.3	7.2	36.6	7.2	-0.7	1.2	<0.001
Waist Circumference (cm)	206	114.2	15.1	112.5	15.2	-1.7	3.7	<0.001
Fasting Blood Glucose (mmol/L)	103	5.9	1.7	5.7	1.2	-0.20	0.97	<0.05
A1c (%)	46	6.5	1.4	6.4	1.1	-0.16	0.64	
Total Cholesterol (mmol/L)	109	5.3	1.1	5.1	1.1	-0.11	.58	<0.05
LDL- C (mmol/L)	99	3.1	1.0	3.0	1.0	-0.10	.54	
HDL-C (mmol/L)	106	1.26	0.27	1.25	0.27	-0.007	0.10	
Triglycerides (mmol/L)	106	2.2	1.2	2.1	1.2	-0.083	0.50	
TC/HDL Ratio	106	4.3	1.3	4.3	1.3	-0.066	0.46	
SBP (mm Hg)	159	134	18	130	16	-4	11	<0.001
DBP (mm Hg)	159	82	11	80	10	-2.4	7.3	<0.001
<b>Health Related Quality of Life</b>								
General Health	226	44	10	46	10	2	6.3	<0.001
Physical Function	225	44	12	45	11	1	6.4	<0.001
Role Physical	225	45	12	46	11	1	6.8	<0.01
Body Pain	226	44	10	45	11	1	6.5	
Mental Health	226	47	11	48	10	1	7.3	
Social Function	226	45	12	46	12	1	7.9	
Vitality	226	45	11	47	11	2	7.2	<0.001
Role Emotional	226	44	13	45	13	1	9.8	

**Table 11. Results Among Participants Who Completed Counselling for Weight Control**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical</b>								
Weight (Kg)	128	99.6	18.2	97.2	18.3	-2.4	3.7	<0.001
Body Mass Index	128	35.9	6.3	35.0	6.3	-0.9	1.3	<0.001
Waist Circumference (cm)	97	112	13	109	13	-3.0	4.5	<0.001
Fasting Blood Glucose (mmol/L)	35	6.4	1.9	5.9	1.0	-0.5	1.3	<0.05
A1C (%)	22	6.6	1.6	6.2	1.0	-0.40	0.7	<0.05
Total Cholesterol (mmol/L)	35	5.5	1.4	5.1	1.4	-0.4	0.9	<0.01
LDL- C (mmol/L)	31	3.3	1.1	2.9	1.2	-0.3	0.9	<0.05
HDL-C (mmol/L)	34	1.27	0.29	1.25	0.28	-0.018	0.16	
Triglycerides (mmol/L)	35	2.2	1.0	1.8	0.9	-0.34	0.71	<0.01
TC/HDL Ratio	34	4.5	1.2	4.2	1.2	-0.2	0.66	<0.05
SBP (mm Hg)	79	134	18	128	15	-6	14	<0.001
DBP (mm Hg)	79	82	12	78	9	-4	9	<0.01
<b>Health Related Quality of Life</b>								
General Health	103	47	10	50	8	3	8	<0.001
Physical Function	102	44	12	47	10	3	8	<0.001
Role Physical	102	46	11	48	10	2	8	<0.01
Body Pain	103	45	10	47	10	2	8	
Mental Health	103	49	10	50	8	1	9	
Social Function	102	48	10	49	9	1	10	
Vitality	104	46	11	50	10	4	9	<0.001
Role Emotional	103	47	11	47	11	0	12	

**Dyslipidemia**

The 97 subjects with dyslipidemia as the reason for referral were also a heterogeneous group. As shown in Table 12, they were older than the obesity subgroup and had lower BMI. While 29% were taking dyslipidemia medications, 50% were at low risk for coronary heart disease according to their risk profile and only 6% already had any documented heart disease. Their HRQL was the same as US population norms, in contrast to the obesity subgroup. There were few statistically significant differences between those already on medications and those not on medications (not shown). The pre-post results of diet counselling are shown in Table 13.



**Table 12. Baseline Characteristics of Participants with Dyslipidemia as the Primary Reason for Referral**

Characteristic	N	Baseline
Age (years $\pm$ SD)	97	56 $\pm$ 10
Gender	97	59F, 41M
Marital status (% married)	97	82
Grade completed (% $\leq$ high school)	97	62
Current smoker (% yes)	96	18
Number of all listed medical conditions (number $\pm$ SD )	97	3.0 $\pm$ 1.6
Hypertension as listed medical condition (% yes)	97	29
Any arthritis as listed medical condition (% yes)	97	9
Any heart disease as listed medical condition (% yes)	97	6
Any diabetes as listed medical condition (% yes)	97	7
Sum all meds (number $\pm$ SD )	97	3.3 $\pm$ 2.6
Oral DM meds (% yes)	97	3
Insulin (% yes)	97	0
HT meds (% one or more)	97	38
Dyslipidemia meds (% one or more)	97	29
BMI (weight kg/height in m squared – mean $\pm$ SD )	95	29.5 $\pm$ 4.7
WC (cm – mean $\pm$ SD) men	30	102 $\pm$ 10
women	46	95 $\pm$ 13
Blood glucose (mmol/L – mean $\pm$ SD)	72	5.4 $\pm$ 1.0
A1C ( % - mean $\pm$ SD)	8	6.6 $\pm$ 1.1
Total cholesterol (mmol/L – mean $\pm$ SD)	95	6.7 $\pm$ 1.1
LDL cholesterol (mmol/L – mean $\pm$ SD)	82	4.3 $\pm$ 1.0
HDL cholesterol (mmol/L – mean $\pm$ SD)	93	1.30 $\pm$ 0.37
Total cholesterol/HDL ratio	93	5.6 $\pm$ 2.2
Triglycerides (mmol/L – mean $\pm$ SD)	94	2.7 $\pm$ 2.4
Systolic blood pressure (mm Hg – mean $\pm$ SD)	75	133 $\pm$ 15
Diastolic blood pressure (mm Hg – mean $\pm$ SD)	75	80 $\pm$ 10
Has metabolic syndrome (% yes)	97	36
Framingham risk (% low, medium, high)	66	50, 21, 29
<b>Health Related Quality of Life</b>		
General health (score – mean $\pm$ SD)	91	49 $\pm$ 8
Physical functioning (score – mean $\pm$ SD)	91	49 $\pm$ 9
Body pain (score – mean $\pm$ SD)	91	49 $\pm$ 9
Role physical (score – mean $\pm$ SD)	92	50 $\pm$ 9
Mental health (score – mean $\pm$ SD)	91	50 $\pm$ 9
Social functioning (score – mean $\pm$ SD)	91	50 $\pm$ 9
Vitality (score – mean $\pm$ SD)	91	50 $\pm$ 10
Role emotional (score – mean $\pm$ SD)	92	50 $\pm$ 10

Surprisingly, these participants achieved similar weight loss to the obesity subgroup, on an intention to treat basis (Table 13). TC reduction was 0.6 mmol/L or 8% from baseline, while LDL-C reduction was 0.5 mmol/L or 10% from baseline. TG reduction was -0.3 mmol/L or 2% from baseline and the TC/HDL-C ratio declined by -0.4 or 5% from baseline. With respect to HRQL, the dyslipidemic subjects did not experience substantial gains.

**Table 13. Diet Counselling Results in All Patients Referred for Dyslipidemia**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical Outcomes</b>								
Weight (Kg)	95	81.8	16.0	79.8	14.9	-2.01	4.16	<0.001
Body Mass Index	95	29.5	4.7	28.7	4.2	-0.74	1.45	<0.001
Waist Circumference (cm)	76	97	12	96	11	-1.8	3.3	<0.001
Fasting Blood Glucose (mmol/L)	72	5.4	1.0	5.3	0.7	-0.06	0.61	
Total Cholesterol (mmol/L)	95	6.7	1.1	6.1	1.1	-0.57	0.79	<0.001
LDL- C (mmol/L)	82	4.3	1.0	3.8	0.8	-0.5	0.73	<0.001
HDL-C (mmol/L)	93	1.29	0.37	1.27	0.37	-0.027	0.16	
Triglycerides (mmol/L)	94	2.7	2.4	2.5	2.1	-0.3	1.6	
TC/HDL Ratio	93	5.6	2.2	5.2	2.2	-0.4	0.9	<0.001
SBP (mm Hg)	75	133	15	129	15	-4.6	10.4	<0.001
DBP (mm Hg)	75	80	10	78	9	-2.1	7.1	<0.05
<b>Health Related Quality of Life</b>								
General Health	91	49	8	50	10	1	8	
Physical Function	91	49	9	50	9	1	6	
Role Physical	92	50	9	50	10	0	7	
Body Pain	91	49	9	50	10	1	7	
Mental Health	91	50	9	52	9	2	6	<0.05
Social Function	91	50	9	51	9	1	7	
Vitality	91	50	10	52	11	2	9	<0.05
Role Emotional	92	50	10	50	10	0	7	

A1C – too few numbers (n=8)

As a check on these results, the percentage decline in clinical outcomes for those already on dyslipidemia medications were compared to results among participants not on medications, using an intention to treat approach. The results, in Table 14, showed that relevant declines were achieved in both groups. Only TG and DBP differed by medication status.

**Table 14. Percentage Declines in Clinical Outcomes by Dyslipidemia Medication Status**

	On Dyslipidemia Medications		Not Taking Medications		t-test
	Mean N=28	SD	Mean N=69	SD	
Percent weight loss	-1.7	3.2	-2.5	4.5	
Percent BMI change	-1.7	3.2	-2.5	4.5	
Percent Waist Circumference	-1.9	4.0	-1.7	3.0	
Percent TC	-10.3	12.8	-7.0	9.8	
Percent LDL-C	-12.6	19	-8.5	11.6	
Percent HDL-C	-0.10	15.9	-1.84	8.7	
Percent TC/HDL-C	-8.0	20.0	-4.5	12.9	
Percent TG	-15.3	26	3.2	39	<0.05
Percent SBP	-1.7	8.9	-3.9	6.9	
Percent DBP	1.3	7.4	-3.7	9.1	<0.05

Fasting blood glucose and A1C – too few numbers

Seventy percent of subjects, compared to only 50% of the obesity subgroup, completed an episode of care. As expected the results in the 69 subjects who completed an episode of care were somewhat more positive. Reductions of TC was 0.57 mmol/L or 9% from baseline, while LDL-C reduction was 0.5 mmol/L or 11% from baseline. TG reduction was -0.3 mmol/L or 0% from baseline and the TC/HDL-C ratio declined by -0.4 or 6% from baseline.

**Table 15. Diet Counselling Outcomes Among Participants Treated for Dyslipidemia who Completed an Episode of Care**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical Outcomes</b>								
Weight (Kg)	65	79.9	13.2	77.6	12.6	-2.3	3.4	<0.001
Body Mass Index	65	29.0	4.0	28.2	3.6	-0.9	1.3	<0.001
Waist Circumference (cm)	50	96	11.6	94	10.3	-2.5	3.7	<0.001
Fasting Blood Glucose (mmol/L)	25	5.6	1.6	5.4	0.9	-0.2	1.0	
Total Cholesterol (mmol/L)	61	6.6	1.1	5.9	1.0	-0.7	0.8	<0.001
LDL- C (mmol/L)	52	4.4	1.0	3.7	0.9	-0.64	0.81	<0.001
HDL-C (mmol/L)	58	1.34	0.34	1.31	0.35	-0.03	0.17	
Triglycerides (mmol/L)	61	2.5	2.2	2.2	2.0	-0.3	1.8	
TC/HDL Ratio	58	5.2	1.3	4.7	1.1	-0.5	1.0	<0.001
SBP (mm Hg)	46	135	14	129	15	-6	12	<0.01
DBP (mm Hg)	46	81	9	79	9	-2	8	<0.05
<b>Health Related Quality of Life</b>								
General Health	58	51	7	52	10	1	9	
Physical Function	56	50	9	51	8	1	7	
Role Physical	57	51	9	51	8	1	8	
Body Pain	57	49	9	52	10	3	9	<0.05
Mental Health	56	51	7	54	7	3	8	<0.05
Social Function	57	52	7	53	8	1	9	
Vitality	56	51	9	54	9	3	10	<0.05
Role Emotional	58	51	8	51	9	0	9	

Among the 40 participants with complete baseline and follow-up data to assess compliance with target values, it was possible to assess the percentage who were meeting target lipoprotein levels. Twenty-three low risk participants met the criteria and 17 moderate and high participants. Among the 23 low risk participants, 39% met goal at baseline, and 83% met goal at completion of an episode of care. Among the 17 moderate and high risk clients, of whom 7 were already on dyslipidemia medication, 4 met target goals at baseline and 6 at completion of an episode of care. Numbers are too small to draw firm conclusions, but these limited results are suggestive of possible positive effects from a medical management point of view.

### **Type 2 Diabetes and Impaired Glucose Tolerance**

Participants with either impaired glucose tolerance or Type 2 diabetes mellitus had multiple health conditions (Table 16) and half were on either oral hypoglycemic agents and/or dyslipidemia medications. Sixty-four percent were also taking hypertension medications. HRQL was intermediate between the obesity subgroup and the dyslipidemic participants.

**Table 16. Characteristics of Participants with Impaired Glucose Tolerance or Type 2 Diabetes as the Primary Reason for Referral**

<b>Characteristic</b>	<b>n</b>	<b>Baseline</b>
Age (years $\pm$ SD)	73	58 $\pm$ 11
Gender	73	41 F, 32 M
Marital status (% married)	71	73
Grade completed (% $\leq$ high school)	65	58
Current smoker (% yes)	73	19
Number of all listed medical conditions (number $\pm$ SD )	73	4.4 $\pm$ 1.8
Dyslipidemia as listed medical condition (% yes)	73	86
Hypertension as listed medical condition (% yes)	73	55
Any arthritis as listed medical condition (% yes)	73	7
Any heart disease as listed medical condition (% yes)	73	18
Sum all meds (number $\pm$ SD)	73	6 $\pm$ 4
Oral DM meds (% yes)	73	42
Insulin (% yes)	73	4
HT meds (% one or more)	73	64
Dyslipidemia meds (% one or more)	73	49
<b>Clinical Characteristics</b>		
BMI (mean $\pm$ SD )	73	33.0 $\pm$ 7.5
WC (cm – mean $\pm$ SD) men	25	106 $\pm$ 10
women	25	111 $\pm$ 16
Blood glucose (mmol/L – mean $\pm$ SD)	60	8.3 $\pm$ 2.4
A1C ( % - mean $\pm$ SD)	50	7.5 $\pm$ 1.4
Total cholesterol (mmol/L – mean $\pm$ SD)	60	5.1 $\pm$ 0.9
LDL cholesterol (mmol/L – mean $\pm$ SD)	55	2.9 $\pm$ 0.8
HDL cholesterol (mmol/L – mean $\pm$ SD)	57	1.21 $\pm$ 0.3
Total cholesterol/HDL ratio	57	4.4 $\pm$ 1.1
Triglycerides (mmol/L – mean $\pm$ SD)	59	2.3 $\pm$ 1.2
Systolic blood pressure (mm Hg – mean $\pm$ SD)	50	138 $\pm$ 18
Diastolic Blood pressure (mm Hg – mean $\pm$ SD)	50	80 $\pm$ 11
Has metabolic syndrome (% yes)	73	70
Framingham risk (% low, medium, high)	62	13, 2, 85
<b>Health Related Quality of Life</b>		
General health (score – mean $\pm$ SD)	59	45 $\pm$ 10
Physical functioning (score – mean $\pm$ SD)	58	46 $\pm$ 10
Body pain (score – mean $\pm$ SD)	57	46 $\pm$ 10
Role physical (score – mean $\pm$ SD)	56	49 $\pm$ 10
Mental health (score – mean $\pm$ SD)	58	49 $\pm$ 10
Social functioning (score – mean $\pm$ SD)	57	49 $\pm$ 9
Vitality (score – mean $\pm$ SD)	58	47 $\pm$ 11
Role emotional (score – mean $\pm$ SD)	57	47 $\pm$ 11

When diet counselling results were analyzed, weight loss was again similar to that achieved by the weight control subgroup (Table 17). Improvements in A1C were -0.4 %, with moderate changes in multiple clinical outcomes, but few changes in HRQL. Mean percentage (SD) declines in body weight, fasting blood glucose and A1C were -2.7% (3.1), -8.9% (14.7) and -4.0% (10.5), respectively. At baseline, 42% of the 50 participants with a recorded value already had A1C levels <7.0, and at follow-up 52% met this criterion.

**Table 17. Diet Counselling Results in All Patients Referred for Impaired Glucose Tolerance or Type 2 Diabetes**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical Outcomes</b>								
Weight (Kg)	73	92.4	18.9	89.9	18.6	-2.5	3.15	<0.001
Body Mass Index	73	33.0	7.5	32.2	7.6	-0.9	1.1	<0.001
Waist Circumference (cm)	50	109	13.7	106	13.1	-3.1	4.3	<0.001
Fasting Blood Glucose (mmol/L)	60	8.3	2.4	7.5	2.4	-0.8	1.54	<0.001
A1C (%)	50	7.5	1.4	7.1	1.1	-0.38	0.96	<0.01
Total Cholesterol (mmol/L)	60	5.1	0.9	4.9	1.0	-0.3	0.6	<0.01
LDL- C (mmol/L)	55	2.9	0.8	2.7	0.8	-0.2	0.5	<0.01
HDL-C (mmol/L)	57	1.2	0.3	1.2	0.3	0.028	0.12	
Triglycerides (mmol/L)	59	2.3	1.2	2.1	1.2	-0.3	0.58	<0.001
TC/HDL Ratio	57	4.4	1.1	4.1	1.3	-0.29	0.53	<0.001
SBP (mm Hg)	50	138	18	134	17	-3.6	16.7	
DBP (mm Hg)	50	80	11	78	10	-1.8	9.3	
<b>Health Related Quality of Life</b>								
General Health	59	45	10	45	11	0	8	
Physical Function	58	46	10	46	11	0	5	
Role Physical	56	49	10	48	10	-1	6	
Body Pain	57	46	10	46	11	0	7	
Mental Health	58	49	10	50	11	1	8	
Social Function	57	49	9	49	11	0	8	
Vitality	58	47	11	49	11	2	7	<0.05
Role Emotional	57	47	11	49	10	2	6	<0.01

As a check on the effects of diet counselling a comparison of percentage declines in participants on oral hypoglycemic medications with results for those not taking medications was conducted using intention to treat methods (Table 18). Analysis was exploratory, as power to detect differences was limited due to small sample size. Few differences were statistically significant.

**Table 18. Percentage Declines in Clinical Outcomes by Diabetes Medication Status**

	On Oral Hypoglycemic Medications		Not Taking Medications		t-test
	Mean N=31	SD	Mean N=42	SD	
Percent weight loss	-1.9	3.0	-3.2	3.0	
Percent BMI change	-1.9	3.0	-3.2	3.0	
Percent Waist Circumference	-1.2	2.2	-3.7	4.2	<0.05
Percent fasting blood glucose	-10.7	19.4	-7.8	11.0	
Percent A1C	-5.4	12.5	-2.4	7.8	
Percent TC	-6.8	14.1	-3.8	9.2	
Percent LDL-C	-11.0	17.6	-2.2	14.6	=0.05
Percent HDL-C	-0.7	5.5	4.2	10.8	<0.05
Percent TC/HDL-C	-6.1	14	-7.0	11	
Percent TG	-4.3	22	-15.4	23	
Percent SBP	-1.7	9.3	-2.0	15.1	
Percent DBP	-0.6	9.3	-2.0	14.6	

Sixty-seven percent of participants in this subgroup completed an episode of care, comparable to the dyslipidemic participants and higher than the obesity subgroup. Clinical outcomes in participants who completed an episode care were positive for all outcomes except blood pressure (Table 19). Changes in HRQL were modest.

**Table 19. Diet Counselling Outcomes Among Participants Treated for Impaired Glucose Tolerance or Type 2 Diabetes Who Completed an Episode of Care**

	n	Baseline		Final		Change		t-test
		Mean	SD	Mean	SD	Mean	SD	
<b>Clinical Outcomes</b>								
Weight (Kg)	49	89.6	18.2	86.6	17.5	-3.0	3.4	<0.001
Body Mass Index	49	32.0	7.5	31.0	7.6	-1.0	1.1	<0.001
Waist Circumference (cm)	32	106	12	102	11	-3.7	4.0	<0.001
Fasting Blood Glucose (mmol/L)	33	7.7	2.2	6.4	1.2	-1.3	1.5	<0.001
A1C (%)	31	7.3	1.3	6.8	0.8	-0.5	0.87	<0.01
Total Cholesterol (mmol/L)	32	5.2	0.9	4.7	0.9	-0.5	0.8	<0.01
LDL- C (mmol/L)	29	3.0	0.8	2.7	0.8	-0.4	0.6	<0.01
HDL-C (mmol/L)	30	1.28	0.26	1.32	0.31	0.05	0.14	
Triglycerides (mmol/L)	32	2.1	0.8	1.7	0.9	-0.3	0.6	<0.01
TC/HDL Ratio	30	4.2	0.8	3.7	0.9	-0.5	0.6	<0.001
SBP (mm Hg)	32	140	18	134	18	-6	19	
DBP (mm Hg)	32	80	11	77	11	-3	10	
<b>Health Related Quality of Life</b>								
General Health	36	46	9	46	10	0	8	
Physical Function	35	48	10	47	11	-1	5	
Role Physical	34	50	9	49	10	-1	8	
Body Pain	35	48	10	49	10	1	8	
Mental Health	35	50	8	50	11	0	9	
Social Function	35	50	9	50	11	0	8	
Vitality	35	49	10	52	10	3	7	<0.05
Role Emotional	34	47	11	50	9	3	7	<0.01

### Weight Loss in Combined Group

Weight loss emerged as a key issue in all the subgroup analyses, for some but not all clients. An additional analysis was therefore conducted to assess the percent decline in body weight achieved by those adults with any of dyslipidemia, glucose intolerance or weight issues who were substantially overweight (BMI  $\geq 30$ ) at baseline. Weight control would have been one component of the diet counselling in the majority of such clients. Of the 295 clients assessed only 16% lost 5% or more of body weight, on an intention to treat basis, while 32% lost  $\geq 3\%$  body weight and 16% actually gained weight. These results were substantially the same as the analysis of the obesity subgroup.

### Discussion

A high percentage of referred patients (53%) agreed to participate in this study. No previous study, to our knowledge, has achieved similar high participation rates, and the majority of community based studies report on a subset of all clients from an unknown source group. Thus the results provide a more complete picture of RD effectiveness than previously reported. The data on must be interpreted cautiously, however, and may not be generalizable to all



Ontario primary care settings, as study subjects differed from the Ontario population with respect to ethnic diversity, had an older age distribution and a lower percentage who had less than Grade 9 education. Ninety-six percent of study subjects only spoke English, and claimed Canadian and/or European heritage compared to 72 % of all Ontarians. The percentage of Aboriginal study participants was similar to the Ontario average.

The distribution of clinical issues addressed in this study can be compared to another review completed in Hamilton, Ontario (48). In the present study, 81% of all referrals were for various combinations of paediatric and adult obesity (50%), followed by dyslipidemia (17% of referrals), type 2 diabetes mellitus (10%) and impaired glucose tolerance (4%), while the Hamilton study reported 82% presented with any of dyslipidemia (44%), followed by Type 2 diabetes (21%) and weight control (17%). Similar proportions of other diet counselling issues were evident in their data and were similar in the present study, such as impaired glucose tolerance (4%) and the other clinical issues. Data on the characteristics of the Hamilton review were not available, but some of the differences in specific reasons for referral could reflect differences in the patterns of documentation rather than substantial differences in client base. It is also possible that some differences among subgroups arose because some subjects in the present study would have been referred to Diabetes Education Centres, separate entities in each community, rather than to the FHN RD. The numbers of such referrals was not assessed, if they occurred as a direct result of FP or other provider referral. Possible reasons for the higher percentage of dyslipidemia referrals in Hamilton compared to the present study is uncertain, but may reflect differences in focus among participating FPs. Certainly from a population perspective, the overall percentages of referrals for some combination of overweight, dyslipidemia and glucose in tolerance are remarkably similar between the two analyses and consistent with estimates of obesity and diabetes in Ontario (48.5% and 4.6%, Canadian Community Health Survey, 2004)(38), and with estimated prevalence of dyslipidemia (TC>6.2 mmol/L: 16-18%, according to the Heart Health Surveys of 1986-90) (49).

As with the Hamilton program, individual counselling was the main service offered (48). Our RDs spent about 4% of time in group counselling, according to workload measurement analysis, reported elsewhere (39), very similar to the Hamilton program (3%). While group education is well received by patients, there may be limitations to the numbers of patients available for such approaches at any one time. Only 8% of study participants were involved in group classes throughout the project.

Data on the number of visits and follow-up times has been infrequently tracked in the literature. In the present study, RDs set the follow-up schedule individually to meet the needs of patients. The wide range of follow-up times suggests widely varying needs and preferences of participants. In general, as found in previous reviews, participants who completed an episode of care saw the RD more often over a longer period of follow-up.

Analysis of the baseline and intervention characteristics of completers vs. non-completers revealed some insights in the potentially key characteristics distinguishing these groups. The present analysis is preliminary and additional multivariate analysis will be completed. In the meantime, some characteristics have been previously observed and others not. Some previous studies have shown that older individuals are more likely to complete counselling, while others have not observed this (46,50). Those who do not smoke are more likely to undertake successful diet behaviour change. The fact that non-completers were substantially heavier and had more adverse lipoprotein profiles is reasonable, but has not been well documented in the literature. Some studies have found heavier people more likely to complete counselling (42,47). The data

showing that clients who do not complete counselling also have poorer HRQL compared to completers has been previously demonstrated in some studies of specific groups (51), and would appear to contradict previous finding that individuals at risk for disease are more likely to achieve relevant diet behaviour change (52,53). These data suggest that further distinctions within the at-risk group need to be explored, to determine what the differences are, and to determine if any aspects can be specifically addressed to improve diet counselling or lifestyle effectiveness in this younger, heavier and more adversely affected group.

Obesity treatment was the most challenging among the three subgroups of participants assessed; as weight loss was modest and only 50% of clients completed an episode of care. This completion rate was similar to the results of the Counterweight programme in the UK, a large primary care study of obesity management (1). A 5% weight loss, which is considered realistic for the majority of individuals in current treatment guidelines was considered to be a realistic target and is associated with improved clinical outcomes and HRQL. Only 14% of all participants lost  $\geq 5\%$  of body weight, 28% lost  $\geq 3\%$  of body weight, and 19% actually gained weight over the course of diet counselling. This was almost identical to the Counterweight results, on an intention to treat basis, as 16.2% achieved  $\geq 5\%$  weight loss over 12 months (1). Three percent weight loss in a 100 kg individual is 3 kg or 6.6 pounds, a loss which could be potentially achieved with current recommended sensible weight loss programs that aim to 0.25 to 0.5 kg weight loss per week in about 12 weeks. In a trial of FP nutritional counselling mean BMI change was 0.4 units, compared to 0.7 units in our study. Ninety-three percent of their 3179 subjects completed the one year intervention (54). Thus, our results are entirely consistent with the PHC literature, but few patients are achieving the desired body weight reductions.

Additional multi-disciplinary research targeted to this primary care group of already affected middle aged overweight and obese clients with multiple health conditions and decreased HRQL. The present study confirmed that more will be required than addition of a RD to primary care practices, as these clients have substantial difficulty achieving even modest weight loss, and a high percentage continue to gain weight even under treatment. While the results of this evaluation are consistent with the majority of the PHC literature (55,56), there is potential to improve effectiveness through targeted multi-disciplinary efforts (57-59). Promising approaches are being developed by groups treating chronic diseases that merit consideration and adaptation to diet counselling.

Dyslipidemia treatment results were much more positive and similar to literature expectations than the weight control results. To review, TC reduction in the present study was 0.6 mmol/L or 8% from baseline compared to Yu-Poth et al's results of 0.63 mmol/L or 10% reduction(24) and Tang et als finding of 8% TC reduction at three months (26). The LDL-C results were similar, with reduction of 0.5 mmol/L or 10% from baseline in the present compared to reductions in LDL-C of 0.49 mmol/L, 12% in the Yu-Poth et al review. Reductions in TG and TC/HDL-C in the present study were more modest than that reported by Yu-Poth et al. In the present study TG reduction was -0.3 mmol/L or 2% from baseline while Yu-Poth reported TG reductions of 0.17 mmol/L or 8% from baseline. In the present study the TC/HDL-C ratio declined by -0.4 or 5% from baseline, while Yu-Poth reported reductions of 0.50, or 10% from baseline. The results in the 69 who completed an episode of care were similar.

The results for the subgroup with impaired glucose tolerance or Type 2 diabetes were comparable to results achieved in reviews of diabetes self-management, but not as substantial as suggested by the CDA clinical practice guidelines (-1.0%) with respect to A1C. Declines in A1C were -0.4 % under an intention to treat model, and -0.5 % among those who completed an

episode of care. The sample in the present study consisted of a wide range of severity in glucose intolerance, and consisted mainly of people who, in the opinion of FP or other providers in the FHN were more likely to benefit from seeing the FHN RD than attending the Diabetes Education Centre, which includes inter-disciplinary teams teaching diabetes self management. At baseline, 42% of the 50 participants with a recorded value already had A1C levels <7.0, and this is lower than found in a cross-sectional survey of Canadian primary care physicians, where 49% of patients reviewed had A1C <7.0 (60). The fact that reductions in A1C the same range as documented in the literature was a very positive result of the analysis. As expected, multiple other clinical outcomes also improved in these participants.

Few participants were referred for hypertension counselling, but many participants were either on hypertension medications or had increased blood pressure. Diet advice for weight loss, dyslipidemia and glucose intolerance would tend to improve blood pressure values as well. As noted in the three subgroup analyses, blood pressure declined on average -4 mm Hg SBP/-2 mm Hg DBP, on an intention to treat basis, and -6 mm Hg SBP/-3 mm Hg DBP among those who completed an episode of care. This latter reduction is comparable to the change achieved with loss of 5 kg according to the latest review by the Canadian Hypertension Education Program (36).

Generally modest improvements in HRQL were achieved in diet counselling, especially among completers in the weight control subgroup analyses, where statistically significant improvements in general health, physical function, body pain and vitality were recorded. These changes are consistent with previous small studies of community weight loss programs (46,50,61). Are the changes achieved both statistically and clinically important? While the statistical approaches are well accepted, the methods and standards defining clinically relevant changes in HRQL studies are still under active development (62,63), and will require additional analysis, beyond the scope of this report.

## **Conclusions**

This descriptive analysis of the effectiveness of RD diet counselling in three FHNs provides baseline data from one demonstration project of the mix of clinical issues and patient characteristics from three diverse FHNs with a combined roster of about 60,000 patients and 41 FPs. Descriptive analysis of the baseline characteristics of the most common types of patients, those with obesity, dyslipidemia and disorders of glucose metabolism, indicate that most patients are middle aged with multiple chronic conditions. While diet counselling by RDs was shown to be effective in modifying some clinical outcomes, especially LDL-C and A1C, results of obesity treatment under the practice model employed in the study was modest at best, and few patients were able to achieve levels of weight loss of 5% that would be consistent with multiple improved clinical outcomes. Thus, additional work is needed, including additional randomized controlled trials in similarly health care and community settings, specifically directed to these complex patients. The present work has also identified possible differences in HRQL among clients who do not complete diet counselling compared to those that do. Such clients merit specific attention to identify and test possible new approaches to promote modest weight loss; as such weight loss may be particularly beneficial in these individuals.

# Appendix

LOGO HERE?

Dietitian Referral Form

RD contact information

To book appointment:

Phone: xxx-xxxx or

Fax referral to: xxx-xxxx

Patient:

\_\_\_\_\_

Home Phone: \_\_\_\_\_ Work

Phone: \_\_\_\_\_

DOB |\_|\_| |\_|\_| |\_|\_|\_|\_|

**Record Relevant Lab Data** or fax relevant lab data to the above fax number (e.g. HgA1c, FBS, Lipid Profile, Albumin, Hgb, Creatinine etc.)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The main medical condition or reason for referral:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Is this referral urgent? (to be seen within 2 weeks of referral)  Yes  No

Has this referral been discussed with patient?  Yes  No

Is patient aware of diagnosis?  Yes  No

Referral Initiated by: Family Physician Nurse Pharmacist Dietitian Other: \_\_\_\_\_

**Please Circle**

Name of Referring Professional

\_\_\_\_\_

Signature \_\_\_\_\_ Referral Date |\_|\_| |\_|\_| |\_|\_|\_|\_|  
D D M M Y Y Y Y



## **Diet Counselling Effectiveness Study consent**

Dear Patient of the xxxxxx Family Health Network:

Your Family Health Network is participating in a research project with Dietitians of Canada and the University of Guelph to develop interdisciplinary nutrition services for clients. Your dietitian's services are being evaluated as part of the project. All patients referred to the dietitian are being asked to agree to have their diet records reviewed by a researcher at the University of Guelph on treatment completion.

The advice and treatment you receive from the dietitian will be the same whether you agree or not agree to take part in this study. It will not take extra time or effort to take part in the study. The dietitian will not know if you have agreed to sign this consent form. A copy of your diet treatment record will stay with your doctor at the Family Health Network.

If you agree to sign this form, then your diet records will be sent to the University of Guelph when your meetings with the dietitian are finished. These diet records will have a private identification number only. The results of diet counselling will be presented as group results only.

Your participation is completely voluntary. You are free to withdraw at any time, even after your records have been sent to the University, by contacting the Project Coordinator, Bridget Davidson.

The research project has been approved by the University of Guelph Research Ethics Board. If you would like additional information about your rights as a participant in a research study, please contact Sandra Auld, Research Ethics Officer, at the University of Guelph: (519) 824-4120 x.56606 or [sauld@uoguelph.ca](mailto:sauld@uoguelph.ca)

For other questions and concerns about the study, or to withdraw, please contact Bridget Davidson, the Project Coordinator, at (519) 824-4120 x. 54831 (leave message) or [nutrphc@uoguelph.ca](mailto:nutrphc@uoguelph.ca).

Thanks for your help in completing this project.

Sincerely

Paula M Brauer, PhD, RD  
Principal Investigator  
Department of Family Relations and Applied Nutrition  
P 519-824-4120 x54831 or [pbrauer@uoguelph.ca](mailto:pbrauer@uoguelph.ca)

**Sign the attached form, place it in the envelope provided and seal it.**

**Please keep this page for your records.**



## Diet Counselling Effectiveness Study

Please sign this page, place it in the envelope provided and seal it. The Family Health Network will send it to Guelph for you.

I have read this consent form and agree to take part in the Diet Counselling Effectiveness Study. I understand that this is part of the Interdisciplinary Nutrition Services in Family Health Networks Demonstration Project

Name (please print) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

ID# | \_ | \_ | \_ | \_ | \_ |

Any questions, contact:  
Bridget Davidson, MHSc, RD  
Project Coordinator  
Interdisciplinary Nutrition Services Study  
Department of Family Relations and Applied Nutrition  
University of Guelph  
50 Stone Road West  
Guelph, ON N1G 2W1

# Diabetes / Dyslipidemia / Obesity / Hypertension Treatment Worksheet

Practice \_\_\_\_\_

ID# |\_|\_|\_|\_|\_|\_|\_|\_|

DOB |\_|\_|\_|\_|\_|\_|\_|\_|  
           D D M M Y Y Y Y

Gender  M  F

Referral to Nutrition Counselling

Individual  Group  Other \_\_\_\_\_

**Circle the box for the reason for diet counseling. Check off all the boxes that apply for diagnosis(es):**

	Diabetes	Gastrointestinal	Musculo-Skeletal
	<b>E10</b> Type I Diabetes	<b>K59.1</b> Diarrhea	<b>M10</b> Gout
	<b>E11</b> Type II Diabetes	<b>E73</b> Lactose	<b>M80-M81</b> Osteoporosis (and Prevention)
	<b>O24</b> Gestational Diabetes	<b>K57</b> Diverticular Disease	<b>M00 – M19</b> Arthritis
	<b>R73</b> Impaired Glucose	<b>I69</b> Dysphagia – post	<b>Disease Prevention / Health</b>
	<b>E15-E16</b> Hypoglycemia	<b>K58</b> Irritable Bowel	<b>E40-E46 or R62-R69</b> Underweight -
	<b>E28.2</b> Polycystic ovaries	<b>K86</b> Pancreatitis	<b>E40-E46 or R50-R69</b> Underweight –
	<b>NCEP</b> Metabolic Syndrome	<b>Hepatic / Renal</b>	<b>E65-E68</b> Overweight / Obesity – Adult
	<b>I20-I25</b> Ischemic Heart Disease	<b>K70-K77</b> Liver	<b>E65-E68</b> Overweight / Obesity –
	<b>I10-I15</b> Hypertension	<b>N00-N19</b> Renal	<b>P90-P96</b> Peri-natal Nutrition
	<b>I26- I79</b> Other Cardiovascular	<b>Systemic</b>	<b>Z69-Z76 or R50-69</b> Pediatric ( 1–18)
	<b>E78</b> Dyslipidemia	<b>F50</b> Eating Disorders	<b>Z69-Z76 or R50-69</b> Adult eating habits
	<b>Gastrointestinal</b>	<b>C00-C75</b> Cancer	<b>None</b> Vegetarianism
	<b>K90</b> Celiac Disease	<b>D50</b> Anemia – Iron	<b>None</b> Sports Nutrition
	<b>K50</b> Crohn's Disease	<b>D51-D53</b> Anemia – B12/Folate Deficiency	<b>Z55-Z65 or Z69-Z76</b> Behavioural /
	<b>K51</b> Ulcerative Colitis		<b>Z59</b> Food Affordability / Availability
	<b>K 25-K28</b> Ulcer	<b>Z91</b> Food Allergies	
	<b>K21</b> Reflux	<b>E50-E64</b> Electrolytes	
	<b>K91.1</b> Dumping Syndrome	<b>D80-D89 or M30-M36</b> Auto-Immune Disease	
	<b>K30</b> Gas/Bloating		
	<b>K 59</b> Constipation	<b>E00-E07</b> Thyroid function	

ICD-10 Codes:

Primary |\_|\_|\_|\_|\_|\_|\_|\_| Secondary |\_|\_|\_|\_|\_|\_|\_|\_| |\_|\_|\_|\_|\_|\_|\_|\_|

Date of conclusions for episode of care |\_|\_|\_|\_|\_|\_|\_|\_|  
   D D M M Y Y Y Y



Did this Patient Receive....

- Assessment Only       Individual       Group       Group & Individual

Medication/Supplement Profile

Drug(s) Names , e.g....	Current medications Dosage and time of day	Medications started for the referred problem during this episode of care Dosage and time of day
Insulin		
Oral Hypoglycemic Agent		
Anti-Hypertensive		
Lipid Lowering Meds		
Other(s)		

Problem		Baseline dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy
Current smoker	Y/N				
Time spent with patient individually (min)					
Time spent with patient in groups (min)					
Time spent on telephone, email or other					
Weight	kg				
Height	cm / m				
BMI	kg/m <sup>2</sup>				
Waist Circumference	cm				
Urinary Microalbumin	mg/L				
Fasting Blood Glucose	mmol/L				
A1C	SI				
Total Cholesterol	mmol/L				
LDL Cholesterol	mmol/L				
HDL Cholesterol	mmol/L				
Triglycerides	mmol/L				
Cholesterol / HDL Ratio					
Creatinine					
Other:					
Blood Pressure	mmHg				
SF36 Completed					
Exercise					

Date Completed

|\_ |  
D D

|\_ |  
M M

|\_ |\_ |  
Y Y Y Y

1. How many persons live in your household, including yourself, other adults, and any children?

\_\_\_\_\_ person(s)

2. Please check which of the following describes your ethnic origin? (fill all that apply)

- a.  European [1]
- b.  Arab [2]
- c.  West Asian [3]
- d.  South Asian [4]
- e.  East and Southeast Asian [5]
- f.  African [6]
- g.  Pacific Islands [7]
- h.  Latin, Central / South American [8]
- i.  Caribbean [9]
- j.  Aboriginal / Native [10]
- k.  Canadian [11]
- l.  Other: [12]
- m. \_\_\_\_\_(write in other)

3. At home, what language do you speak most: \_\_\_\_\_  
(write in language)

4. What is your current marital status? (fill in one box)

- Married (including common law) [1]
- Separated [2]
- Divorced [3]
- Widowed [4]
- Never married (single) [5]

5. Which best describes your profession:

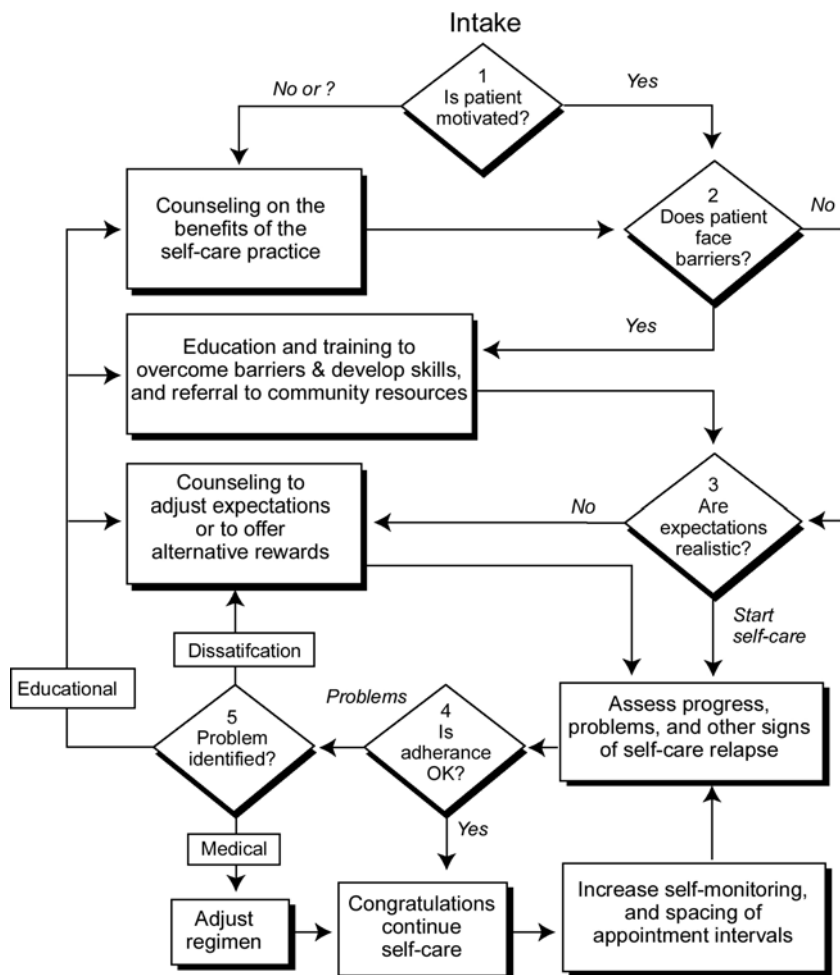
- [1]  Homemaker \_\_\_\_\_
- [2]  Elected or appointed official (for example: legislator, agency head, commissioner)
- [3]  Clerical worker (for example: secretary, receptionist, data entry, cashier)
- [4]  Service worker (for example: janitor, cook, waitress / waiter, nurse's aide, security guard, road crew worker, bus driver)
- [5]  Professional or technical (for example: lawyer, teacher, social worker, scientist, nurse, doctor, police officer, computer programmer)
- [6]  Craftsman or tradesman (for example: carpenter, electrician, mechanic)
- [7]  Other (please describe) \_\_\_\_\_

6. What is the highest grade you completed in school (circle grade number)

1 2 3 4 5 6 7 8 9 10 11 12 13 13 14 15 16 17 17+  
Grade School Junior High High School College/University Post Grad

### Interventions Approaches Used

CHECK (✓) all that apply (The same intervention may have multiple effects)	Baseline dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy
1. Interventions assisting client to form or reinforce a positive intention (or commitment) to perform the behaviour.				
2. Interventions to decrease or remove environmental constraints so behaviour can occur.				
3. Interventions so the person has the skills necessary to perform the behaviour.				



Resources, Handouts, Interventions Used

Overall rating of this patient's adherence to treatment:	<input type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor	<input type="checkbox"/> Difficult to Assess
Disposition:	<input type="checkbox"/> Care returned to family physician for routine monitoring			
	<input type="checkbox"/> Care returned to family physician for continued treatment of this problem			
	<input type="checkbox"/> Community Program	<input type="checkbox"/> Group	<input type="checkbox"/> Other	
	<input type="checkbox"/> Patient did not follow through (never seen)		<input type="checkbox"/> Patient dropped out	

# Other Nutrition Treatments Worksheet

Practice \_\_\_\_\_

ID# |\_\_|\_\_|\_\_|\_\_|\_\_|

DOB |\_\_|\_\_| |\_\_|\_\_| |\_\_|\_\_|\_\_|\_\_|  
           D  D      M  M      Y  Y  Y  Y

Gender  M  F

### Referral to Nutrition Counselling

Individual  Group  Other \_\_\_\_\_

**Circle the box for the reason for diet counseling. Check off all the boxes that apply for diagnosis(es):**

	Diabetes	Gastrointestinal	Musculo-Skeletal
	<b>E10</b> Type I Diabetes	<b>K59.1</b> Diarrhea	<b>M10</b> Gout
	<b>E11</b> Type II Diabetes	<b>E73</b> Lactose	<b>M80-M81</b> Osteoporosis (and Prevention)
	<b>O24</b> Gestational Diabetes	<b>K57</b> Diverticular Disease	<b>M00 – M19</b> Arthritis
	<b>R73</b> Impaired Glucose	<b>I69</b> Dysphagia – post	<b>Disease Prevention / Health</b>
	<b>E15-E16</b> Hypoglycemia	<b>K58</b> Irritable Bowel	<b>E40-E46 or R62-R69</b> Underweight -
	<b>E28.2</b> Polycystic ovaries	<b>K86</b> Pancreatitis	<b>E40-E46 or R50-R69</b> Underweight –
	<b>NCEP</b> Metabolic Syndrome	<b>Hepatic / Renal</b>	<b>E65-E68</b> Overweight / Obesity – Adult
	<b>I20-I25</b> Ischemic Heart Disease	<b>K70-K77</b> Liver	<b>E65-E68</b> Overweight / Obesity –
	<b>I10-I15</b> Hypertension	<b>N00-N19</b> Renal	<b>P90-P96</b> Peri-natal Nutrition
	<b>I26- I79</b> Other Cardiovascular	<b>Systemic</b>	<b>Z69-Z76 or R50-69</b> Pediatric ( 1–18)
	<b>E78</b> Dyslipidemia	<b>F50</b> Eating Disorders	<b>Z69-Z76 or R50-69</b> Adult eating habits
	<b>Gastrointestinal</b>	<b>C00-C75</b> Cancer	<b>None</b> Vegetarianism
	<b>K90</b> Celiac Disease	<b>D50</b> Anemia – Iron	<b>None</b> Sports Nutrition
	<b>K50</b> Crohn’s Disease	<b>D51-D53</b> Anemia – B12/Folate Deficiency	<b>Z55-Z65 or Z69-Z76</b> Behavioural /
	<b>K51</b> Ulcerative Colitis		<b>Z59</b> Food Affordability / Availability
	<b>K 25-K28</b> Ulcer	<b>Z91</b> Food Allergies	
	<b>K21</b> Reflux	<b>E50-E64</b> Electrolytes	
	<b>K91.1</b> Dumping Syndrome	<b>D80-D89 or M30-M36</b> Auto-Immune Disease	
	<b>K30</b> Gas/Bloating		
	<b>K 59</b> Constipation	<b>E00-E07</b> Thyroid function	

### ICD-10 Codes:

Primary |\_\_|\_\_|\_\_|\_\_|\_\_| Secondary |\_\_|\_\_|\_\_|\_\_|\_\_| |\_\_|\_\_|\_\_|\_\_|\_\_|

Date of conclusions for episode of care |\_\_|\_\_| |\_\_|\_\_| |\_\_|\_\_|\_\_|\_\_|  
   D  D      M  M      Y  Y  Y  Y

Did this Patient Receive    assessment only    individual treatment  
 group treatment    both group & individual

Medication/Supplement Profile

Drug(s) Names, e.g....	Current medications Dosage and time of day	Medications started for the referred problem during this episode of care Dosage and time of day

Problem	Baseline dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy
Time spent with patient individually in minutes				
Time spent with patient in groups				
Time spent on telephone, email or other				
Functional Improvements				
Weight				
Height				
Other:				
Other:				
Behavioural Changes				
Consumption of Sugars				
Intake from Fibre				
Intake from Fat				
Fluids				
Improve nutritional adequacy				
Caffeine				
Sodium				
Alcohol				
Exercise				
General Knowledge	L M H	L M H	L M H	L M H
SF36 completed				



Date Completed

|\_ | |  
D D

|\_ | |  
M M

|\_ | | |  
Y Y Y Y

7. How many persons live in your household, including yourself, other adults, and any children?

\_\_\_\_\_ person(s)

8. Please check which of the following describes your ethnic origin? (fill all that apply)

- n.  European [1]
- o.  Arab [2]
- p.  West Asian [3]
- q.  South Asian [4]
- r.  East and Southeast Asian [5]
- s.  African [6]
- t.  Pacific Islands [7]
- u.  Latin, Central / South American [8]
- v.  Caribbean [9]
- w.  Aboriginal / Native [10]
- x.  Canadian [11]
- y.  Other: [12]
- z. \_\_\_\_\_(write in other)

9. At home, what language do you speak most: \_\_\_\_\_  
(write in language)

10. What is your current marital status? (fill in one box)

- Married (including common law) [1]
- Separated [2]
- Divorced [3]
- Widowed [4]
- Never married (single) [5]

11. Which best describes your profession:

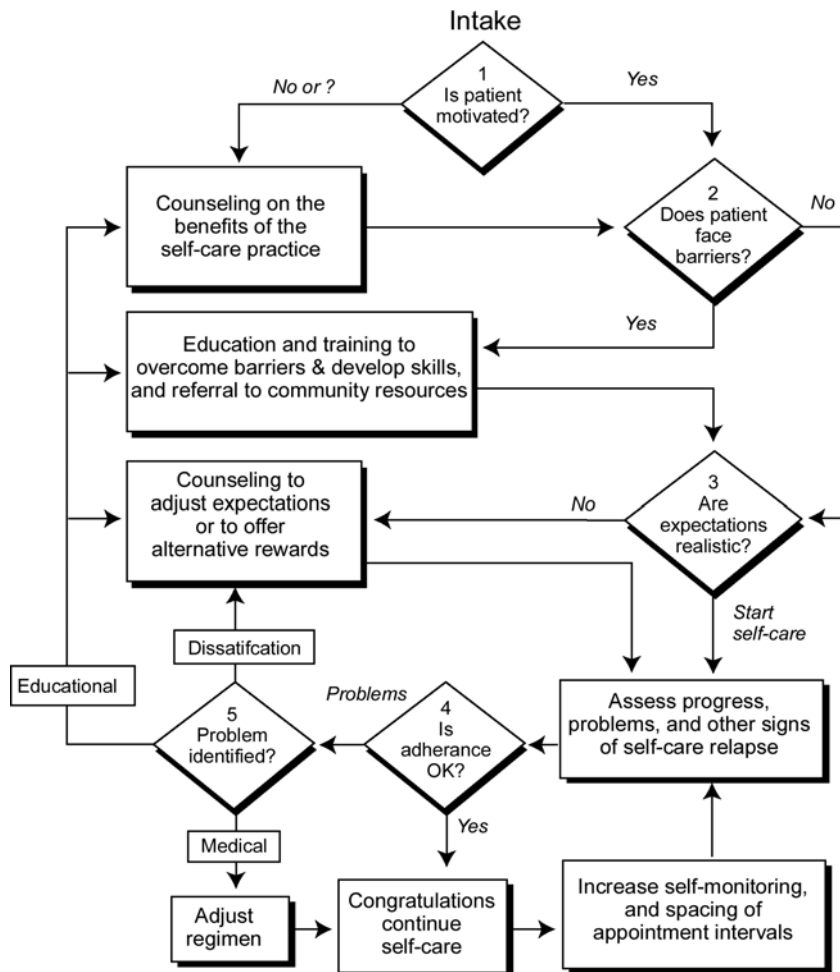
- [1]  Homemaker \_\_\_\_\_
- [2]  Elected or appointed official (for example: legislator, agency head, commissioner)
- [3]  Clerical worker (for example: secretary, receptionist, data entry, cashier)
- [4]  Service worker (for example: janitor, cook, waitress / waiter, nurse's aide, security guard, road crew worker, bus driver)
- [5]  Professional or technical (for example: lawyer, teacher, social worker, scientist, nurse, doctor, police officer, computer programmer)
- [6]  Craftsman or tradesman (for example: carpenter, electrician, mechanic)
- [7]  Other (please describe) \_\_\_\_\_

12. What is the highest grade you completed in school (circle grade number)

- 1 2 3 4 5 6    7 8 9    10 11 12 13    13 14 15 16 17 17+  
Grade School    Junior High    High School    College/University    Post Grad

### Interventions Approaches Used

CHECK (✓) all that apply (The same intervention may have multiple effects)	Baseline dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy	Progress dd/mm/yy
1. Interventions assisting client to form or reinforce a positive intention (or commitment) to perform the behaviour.				
2. Interventions to decrease or remove environmental constraints so behaviour can occur.				
3. Interventions so the person has the skills necessary to perform the behaviour.				



Resources, Handouts, Interventions Used

Overall rating of this patient's adherence to treatment:	<input type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor	<input type="checkbox"/> Difficult to Assess
Disposition:	<input type="checkbox"/> Care returned to family physician for routine monitoring			
	<input type="checkbox"/> Care returned to family physician for continued treatment of this problem			
	<input type="checkbox"/> Community Program	<input type="checkbox"/> Group	<input type="checkbox"/> Other	
	<input type="checkbox"/> Patient did not follow through (never seen)		<input type="checkbox"/> Patient dropped out	

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# Your Health and Well-Being –SF36

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**This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!***

**For each of the following questions, please mark an  in the one box that best describes your answer.**

**1. In general, would you say your health is:**

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

**2. Compared to one year ago, how would you rate your health in general now?**

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

**3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?**

Yes, limited a lot	Yes, limited a little	No, not limited at all
▼	▼	▼

- a Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.....  1 .....  2 .....  3
- b Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.....  1 .....  2 .....  3
- c Lifting or carrying groceries.....  1 .....  2 .....  3
- d Climbing several flights of stairs.....  1 .....  2 .....  3
- e Climbing one flight of stairs.....  1 .....  2 .....  3
- f Bending, kneeling, or stooping.....  1 .....  2 .....  3
- g Walking more than a kilometre.....  1 .....  2 .....  3
- h Walking several hundred metres.....  1 .....  2 .....  3
- i Walking one hundred metres.....  1 .....  2 .....  3
- j Bathing or dressing yourself.....  1 .....  2 .....  3

**4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?**

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities .....  1 .....  2 .....  3 .....  4 .....  5
- b Accomplished less than you would like.....  1 .....  2 .....  3 .....  4 .....  5
- c Were limited in the kind of work or other activities.....  1 .....  2 .....  3 .....  4 .....  5
- d Had difficulty performing the work or other activities (for example, it took extra effort).....  1 .....  2 .....  3 .....  4 .....  5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
	▼	▼	▼	▼	▼

a. Cut down on the amount of time you spent on work or other activities .....  1 .....  2 .....  3 .....  4 .....  5

b. Accomplished less than you would like .....  1 .....  2 .....  3 .....  4 .....  5

c. Did work or other activities less carefully than usual .....  1 .....  2 .....  3 .....  4 .....  5

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

**8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?**

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

**9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...**

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Did you feel full of life? .....  1 .....  2 .....  3 .....  4 .....  5
- b Have you been very nervous? .....  1 .....  2 .....  3 .....  4 .....  5
- c Have you felt so down in the dumps that nothing could cheer you up? .....  1 .....  2 .....  3 .....  4 .....  5
- d Have you felt calm and peaceful? .....  1 .....  2 .....  3 .....  4 .....  5
- e Did you have a lot of energy? .....  1 .....  2 .....  3 .....  4 .....  5
- f Have you felt downhearted and depressed? .....  1 .....  2 .....  3 .....  4 .....  5
- g Did you feel worn out? .....  1 .....  2 .....  3 .....  4 .....  5
- h Have you been happy? .....  1 .....  2 .....  3 .....  4 .....  5
- i Did you feel tired? .....  1 .....  2 .....  3 .....  4 .....  5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
a I seem to get sick a little easier than other people.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
b I am as healthy as anybody I know .....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
c I expect my health to get worse .....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
d My health is excellent .....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

***Thank you for completing these questions!***



## Estimates of 10-year Risk for CHD for Women (21-23)

Age	Points	Age	Points		
20 - 34	-7	55 - 59	8		
35 - 39	-3	60 - 64	10		
40 - 44	0	65 - 69	12		
45 - 49	3	70 - 74	14		
50 - 54	6	75 - 79	16		
<b>Total Cholesterol I (mmol/L)</b>	<b>Points</b>				
	<b>Age 20 - 39</b>	<b>Age 40 - 49</b>	<b>Age 50 - 59</b>	<b>Age 60 - 69</b>	<b>Age 70 - 79</b>
< 4.14	0	0	0	0	0
4.15 - 5.19	4	3	2	1	1
5.20 - 6.19	8	5	4	2	1
6.2 - 7.2	11	8	5	3	2
≥ 7.21	13	10	7	4	2
<b>Smoking</b>	<b>Points</b>				
	<b>Age 20 - 39</b>	<b>Age 40 - 49</b>	<b>Age 50 - 59</b>	<b>Age 60 - 69</b>	<b>Age 70 - 79</b>
Non-smoker	0	0	0	0	0
Smoker	9	7	4	2	1
<b>HDL (mmol/L)</b>	<b>Points</b>		<b>HDL (mmol/L)</b>		<b>Points</b>
≥ 1.55	-1		1.04 - 1.29		1
1.30 - 1.54	0		< 1.04		2
<b>Systolic Blood Pressure (mm Hg)</b>	<b>If Untreated</b>		<b>If Treated</b>		
< 120	0		0		
120 - 129	1		3		
130 - 139	2		4		
140 - 159	3		5		
≥ 160	4		6		
<b>RISK</b>					
<b>Point Total</b>	<b>10 - Yr Risk (%)</b>		<b>Point Total</b>	<b>10 - Yr Risk (%)</b>	
< 9	< 1		17	5	
9	1		18	6	
10	1		19	8	
11	1		20	11	
12	1		21	14	
13	2		22	17	
14	2		23	22	
15	3		24	27	
16	4		≥ 25	≥ 30	

## Estimates of 10-year Risk for CHD for Men (21-23)

Age	Points	Age	Points		
20 - 34	-9	55 - 59	8		
35 - 39	-4	60 - 64	10		
40 - 44	0	65 - 69	11		
45 - 49	3	70 - 74	12		
50 - 54	6	75 - 79	13		
<b>Total Cholesterol I (mmol/L)</b>					
	<b>Age 20 - 39</b>	<b>Age 40 - 49</b>	<b>Age 50 - 59</b>	<b>Age 60 - 69</b>	<b>Age 70 - 79</b>
< 4.14	0	0	0	0	0
4.15 - 5.19	4	3	2	1	0
5.20 - 6.19	7	5	3	1	0
6.20 - 7.20	9	6	4	2	1
≥ 7.21	11	8	5	3	1
<b>Smoking</b>	<b>Points</b>				
	<b>Age 20 - 39</b>	<b>Age 40 - 49</b>	<b>Age 50 - 59</b>	<b>Age 60 - 69</b>	<b>Age 70 - 79</b>
Non - smoker	0	0	0	0	0
Smoker	8	5	3	1	1
<b>HDL (mmol/L)</b>	<b>Points</b>		<b>HDL (mmol/L)</b>		<b>Points</b>
≥ 1.55	-1		1.04 - 1.29		1
1.30 - 1.54	0		< 1.04		2
<b>Systolic Blood Pressure (mm Hg)</b>	<b>If Untreated</b>		<b>If Treated</b>		
< 120	0		0		
120 - 129	0		1		
130 - 139	1		2		
140 - 159	1		2		
≥ 160	2		3		
<b>RISK</b>					
<b>Point Total</b>	<b>10 - Yr Risk (%)</b>		<b>Point Total</b>	<b>10 - Yr Risk (%)</b>	
< 0	Less than 1		9	5	
0	1		10	6	
1	1		11	8	
2	1		12	10	
3	1		13	12	
4	1		14	16	
5	2		15	20	
6	2		16	25	
7	3		≥ 17	≥ 30	
8	4				

## Screening Definition of the Metabolic Syndrome\*(21-23)

Risk Factor	Defining Level
Abdominal obesity	Waist circumference
Men	> 102 cm
Women	> 88 cm
Triglycerides	≥ 150 mg/dL or 1.69 mmol/L
HDL Cholesterol	
Men	< 40 mg/dL or 1.04 mmol/L
Women	< 50 mg/dL or 1.29 mmol/L
Blood pressure	≥ 130 / ≥ 85 mmHg or treated for HT
Fasting glucose	≥ 110 mg/dL or 6.1 mmol/L or treated for DM

\* Criteria: 3 or more of the risk factors

## References

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