



# A review of type 2 diabetes and CVD prevention translational research

prepared for CMDHB by



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# 1 Executive Summary

This report provides a broad overview of type 2 diabetes prevention programmes that have been implemented in real world settings as opposed to a clinical trial setting. It considers pre programme processes of recruitment and screening as well as the programmes themselves. It also considers type 2 diabetes prevention programmes for indigenous populations and those living with mental illness.

An outline is provided of recruitment and screening strategies utilised within the international programmes identified. However, in New Zealand, there are evidence based guidelines that were launched in 2003 and revised in 2005 and 2009, that recommend processes for the identification of those at high risk of type 2 diabetes and key populations to target.

The programmes considered as part of this review were delivered in Europe, America and Australia, however they share some common elements. Overwhelmingly, the programmes were group based and participatory in nature. Goal setting, problem solving, self monitoring and skill building were common to all. Programmes for indigenous populations had some other common features. Community health workers played a significant role in programmes for indigenous people, both in reaching the population and in delivering the programme. Secondly, these programmes were very inclusive of the communities in the way they were either developed or adapted for the specific population.

The literature suggested that the following factors were positively linked with programme participants achieving programme goals:

- Conscientious monitoring and recording of dietary intake;
- Marked increase in physical activity;
- Number of programme sessions attended;
- Being of an older age,
- Being male is associated with achieving physical activity target;
- Lower levels of psychological distress and more years of education.

The report considers the components of a well established training programme for facilitators and presents suggested quality indicators for type 2 diabetes prevention programmes.

Programmes for those at high cardiovascular risk are less well developed and researched than those for the prevention of type 2 diabetes, however, a concise overview of a noteworthy programme, EUROACTION, is outlined.

The literature contains several gaps, including: lack of information on how to cater for males, younger participants and those with low levels of literacy; how to sustain change and how to effectively deliver a type 2 diabetes prevention programme to indigenous, migrant or disadvantaged populations.

Overall, lifestyle behaviour change programmes for type 2 diabetes prevention are considered cost effective and have the added bonus of contributing positively to the prevention of other chronic conditions such as heart disease and some cancers.

While this remains an under-developed area of medicine with no authoritative programme outline it is crucial that any programme implemented is suitably developed, undergoes a robust

evaluation and findings are disseminated to national and global type 2 diabetes prevention networks.

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## 4 Background

This report follows on from a report developed for Counties Manukau District Health Board, (CMDHB) in 2009, *Overweight and Obesity Management Strategies and Diabetes Prevention in Primary Care*,<sup>1</sup> by PHOCUS on Health.

A 2010 report for CMDHB concluded that cardiovascular disease (CVD) and diabetes accounted for a substantial proportion of its health care expenditure in 2008 and that investment in prevention programmes could potentially reduce morbidity and mortality rates, as well as saving health care dollars.<sup>2</sup> This report also highlighted that the population served by CMDHB is expected to age as it has over the last 12 years.<sup>2</sup> Aging has a significant association with the increased prevalence of chronic conditions; hence the incentive to actively invest in prevention strategies is significant.

The most effective approach to managing type 2 diabetes (T2D), CVD and their associated complications is to prevent their development in the first place. Trials focusing on the prevention of T2D in the USA, China, Japan and Finland have shown that diabetes can be delayed or prevented in individuals with impaired glucose tolerance (IGT), using lifestyle intervention and/or medication in a structured randomised controlled setting.<sup>3-7</sup> Intervention approaches that utilised lifestyle strategies - diet and exercise - showed the potential to reduce the relative risk of developing type 2 diabetes by 58%<sup>7</sup> and the use of pharmacological treatments - metformin, acarbose and orlistat - while less effective than lifestyle interventions showed a reduction of 25-30%.<sup>8</sup> Key elements of the lifestyle strategies were

- At least 30 minutes / day of moderate intensity physical exercise;
- At least 5% weight reduction;
- No more than 30% of energy consumed from fat;
- No more than 10% of energy from saturated fat;
- At least 15g fibre / 1000kcal;

Moreover, follow up data from the Finnish Diabetes Prevention Study and the Chinese DaQing study demonstrated the sustainability of the achieved beneficial effects.<sup>3 5</sup>

Importantly, intervening to prevent type 2 diabetes is closely linked to preventing cardiovascular disease and, as noted below, will also improve risk factor profiles for cancer.

The current challenge is how to translate the lessons from clinical trials into the "real world" setting of clinical practice in a way that is practical and sustainable. Of particular concern is the effort required to support lifestyle behaviour change and medication adherence, and the sustainability of this in the clinical practice setting. Barriers to the utilisation of the lifestyle recommendations and approaches used in clinical trial settings in "real world" settings include a lack of resources, skills and reimbursement, as well as difficulties in identifying and retaining patients.<sup>9</sup>

### 4.1 Objectives of the review

The aim of this report is to update the 2009 review by evaluating the findings of national and international programmes which have implemented targeted primary prevention programmes for those at high risk of diabetes and cardiovascular disease. Counties Manukau District Health

Board has already implemented a population based primary prevention strategy to increase awareness amongst their general population and specifically Maaori, Pacific and South Asian peoples around T2D. As a result, the main focus of this report is individual/group level interventions for those identified as high risk as opposed to those that are population based.

In addition, the DHB's prevention efforts have evolved to an integrated approach to encompass the non-communicable disease 'risk factor and disease package' identified by the World Health Organization - smokefree and safe use of alcohol alongside improved nutrition and physical activity, with the aim of preventing cardiovascular disease (CVD), diabetes, chronic obstructive respiratory disease (CORD) and cancer. Health system and community engagement in these issues is led under the banner of the DHB's Creating a Better Future strategy. Implementation of a targeted approach for those at high risk of type 2 diabetes and CVD would also lead to improved risk factor profiles for cancer and to a lesser extent, CORD.

The authors were asked to specifically seek evidence about T2D prevention programmes for indigenous and migrant populations and for those with mental illness, as well as CVD primary prevention programmes.

While randomised controlled trials are the gold standard for assessing efficacy, the ability to generalise their results beyond the RCT setting is acknowledged to be challenging. Hence, the report's sponsors requested that there be a focus particularly on programmes run outside of the randomised controlled trial setting. Knowing about an intervention's reach, uptake, acceptability, cost and implementation, as well as how the intervention worked in specific sub populations, is of key interest to funders and planners.

## 4.2 Review methodology

The review methodology comprised the following elements:

- A search string was developed, (see appendix one for key words/phrases) and these were combined in various strings with the Boolean operators OR and AND;
- A search was made of the following databases: OVID, PubMed and Google Scholar;
- The search was confined to full text articles in the English language published between 2008 and the present day;
- In addition, papers identified in reference lists were also accessed;
- Papers identified in the book Diabetes Prevention in Practice,<sup>10</sup> were also accessed, if they had not already been identified;
- Authors identified in papers as author for correspondence were contacted with queries re the papers, as were key New Zealand experts in the area, either by e-mail or telephone;
- Analysis of findings;
- A draft report outlining the key aspects of the various programmes, and incorporating feedback from authors and New Zealand experts contacted, was developed;
- Following a review of the draft report by key CMDHB personnel, a final report was submitted.

## 5 Approaches for those at high risk of developing diabetes

This section of the report provides an overview of key characteristics of the translational studies that targeted those at high risk of developing T2D.

### 5.1 Who to target and what screening process

Plainly, deciding how to identify those at high risk of diabetes or with undiagnosed diabetes is an initial step. In 2003 the *Cardiovascular Risk Assessment and Management Guidelines* were launched in New Zealand.<sup>11</sup> Information from this guideline and others was updated in the 2009 *New Zealand Cardiovascular Guidelines Handbook*.<sup>12</sup> Within this resource, guidance is provided regarding the age to start risk assessment for CVD and diabetes; this varies between genders and between population groups.

While New Zealand has already produced evidence based guidance for those in primary care, the target populations and the method of identification of those of interest varies across the world.

Table one below outlines the target populations, recruitment strategies and settings from the translational research studies considered in this review.

Table 1: Overview of the target populations, recruitment strategies and settings in key translational research projects

Programme	Targeted population	Exclusion criteria	Recruitment strategies	Recruitment setting	Reference
<b>Life! Taking action on diabetes (Australia)</b>	50 yrs and >	Diagnosis of diabetes	Screening in primary care and self referral	Primary health care and community	13
<b>Sydney Diabetes Prevention Programme (Australia)</b>	50-65 years, (18 yrs and > indigenous) without known diabetes	New or previous diagnosis of diabetes, use of hypoglycaemic medicine, use of weight loss medicine or contra-indication to participation in physical activity programme	Opportunistic screening, mail outs & local media	Primary health care	14
<b>Greater Green Triangle DPP (Australia)</b>	Individuals utilising primary care	Cancer, recent myocardial infarction or stroke, substance abuse, cognitive impairment, pregnancy or previous diagnosis of T2D	Opportunistic screening	Primary health care	15 16
<b>Culturally appropriate programme for migrant female Pakistanis (Australia)</b>	Pakistani born women, 20-60 yrs, migrated to Australia > 5yrs and residing in Melbourne, 1 component of metabolic syndrome present	Not reported	Advertising in local & community media in areas known to have high Pakistani migrants	Community	17
<b>De-Plan (Greece)</b>	All people without diabetes	Diagnosis of diabetes & refusal to take an oral glucose tolerance test (OGTT)	Opportunistic and planned screening	Primary and occupational health care	18
<b>GOAL - LIT (Finland)</b>	Aged 50-65 yrs with known risk factors	Diagnosis of diabetes, a mental health problem or suspected substance abuse, acute cancer, myocardial infarction within last 6 mths or refusal to take OGTT	Targeting those with known diabetes risk factors	Primary health care	19 20

<b>Programme</b>	<b>Targeted population</b>	<b>Exclusion criteria</b>	<b>Recruitment strategies</b>	<b>Recruitment setting</b>	<b>Reference</b>
<b>Montana Cardiovascular Disease and Diabetes Prevention Programme (USA)</b>	Adults 18 yrs and >, overweight and 1 or more risk factor for diabetes or CVD, diagnosis of pre-diabetes, IGT, IFG, hypertension, dyslipidemia, gestational diabetes or giving birth to a baby > 4.1kgs; confirmation of readiness to change	Diagnosed with diabetes, unstable cardiac disease, cancer and currently undergoing Rx, end-stage renal disease or currently on dialysis, unable to participate in moderate physical activity, pregnant or planning to become pregnant in next 6 mths	Multiple including, contacting of local physicians, advertising via media, local employers, work sites, churches and service groups	Primary health care and community	<sup>21</sup>
<b>The DEPLOY Pilot Study (USA)</b>	Adults with known diabetes risk factors	Free of comorbidity expected to limit lifespan to < 3yrs, light/moderate physical activity contraindicated	Mail outs	Community	<sup>22</sup>

Of the programmes reviewed, primary health care was the key setting for recruiting participants and this was generally undertaken in an opportunistic manner. The majority of adults have a medical home and access their general practitioner at least once a year. Counties Manukau District Health Board is one of the District Health Boards where adults are more likely to access a primary health care provider.<sup>23</sup> In New Zealand five out of six adults see a health care worker from their usual primary health care provider during a year and use of primary health care unsurprisingly increases with age.<sup>23</sup> In view of this level of access and the fact that since 2003 there has been a focus in this setting on promoting cardiovascular and diabetes screening,<sup>11</sup> it is worth considering how this process can be further supported.

Primary health care, however, is accessed less by Asian populations. Counties Manukau DHB has a growing Asian population and they are not a homogenous group. The Asian Health in Aotearoa report<sup>24</sup> states that Chinese are least likely to have a usual health practitioner or service they attend when first feeling unwell compared to those of South Asian or other Asian origin and all groups are less likely to have a usual health practitioner compared to Europeans. However, the same report found that practice staff were more likely to discuss lifestyle risk factors related to cardiovascular disease and diabetes (e.g., nutrition, weight and exercise) with South Asian people, and with Maori and Pacific, than with European.<sup>24</sup> The DHB will need to consider ways of improving access and utilisation of primary health care services for this population, however once they are engaged it appears that practice staff are more likely to discuss preventive health care with them.

A recognised expert in the field of T2D prevention, Professor Peter Schwarz from Germany, considers the occupational health setting also to be an advantageous setting for recruiting participants and implementing prevention programmes. In his opinion, recruitment is frequently easier and people targeted are generally those who do not access a GP, particularly men.<sup>A</sup> While it is acknowledged that the drivers for occupational health differ between countries, this setting could provide a useful adjunct to the primary care setting.

In the major clinical trials that demonstrated the efficacy of T2D prevention, participants were diagnosed with either impaired glucose tolerance, (IGT) or impaired fasting glucose, (IFG).<sup>25</sup> Here in New Zealand, the guideline recommendation is to use a fasting glucose test as part of the assessment.<sup>11</sup> For people with elevated blood glucose levels diagnosis is based on internationally agreed thresholds, as outlined in the table below.

**Table 2: Methods for diagnosing diabetes**

Category	Blood test	Venus plasma glucose (mmol/L)
Diabetes mellitus	Fasting Or 2 hr post glucose load Or both	≥ 7 ≥ 11.1
Impaired glucose tolerance (IGT)	Fasting if measured And 2 hr post glucose load	< 7.0 ≥ 7.8 and < 11.1
Impaired fasting glycaemia (IFG)	Fasting And (if measured) 2 hr post glucose load	≥ 6.1 and < 7.0 <7.8

<sup>A</sup> Personal communication between Professor Peter Schwarz and Fiona Doolan-Noble, 19<sup>th</sup> January 2011

From a practical point of view a requirement to have a blood test can be a barrier for some people. In the DE-PLAN study,<sup>18</sup> just under half (49%) the individuals identified as high risk declined an oral glucose tolerance test. It may, therefore, be worth considering some "looser" criteria for programme eligibility. The use of a questionnaire tool to identify those at high risk is one option. Two examples are the Australian Diabetes Risk Assessment (AUSDRISK) and the Finnish Diabetes Risk Score (FINDRISK) tools (see appendix two). These tools were extensively employed in the translational research as screening tools, as can be seen in table three below. Both have been evaluated and found to provide a simple, inexpensive, non-invasive and reliable method for screening for unrecognised diabetes and high diabetes risk.<sup>26 27</sup> Those individuals who score high on these questionnaires will benefit from a lifestyle change programme regardless of their glycaemic status; the question is really one of sustainability.

Another option is to data mine patient management systems in primary care to identify those at high risk. This, of course, is reliant on the completeness of data.

The following table provides an overview of the screening strategies used in the translational research.

**Table 3: Screening strategies employed by the key translational research studies**

<b>Programme</b>	<b>Screening strategy</b>	<b>Diagnostic strategy</b>	<b>Reference</b>
<b>Life! Taking action on diabetes</b>	AUSDRISK >12	FGT	13
<b>Sydney Diabetes Prevention Programme</b>	AUSDRISK > or = 15	Collection of a capillary sample of whole blood, followed by FGT & possibly OGTT	14
<b>Greater Green Triangle DPP</b>	The Diabetes Risk Score > or =12	FGT and or OGTT	15 16
<b>Culturally appropriate programme for migrant female Pakistanis</b>	Not specified	Not specified	17
<b>De-Plan, Greece</b>	FINDRISK > or = 15	OGTT	18
<b>GOAL - LIT</b>	The Diabetes Risk Score > or = 12	OGTT	19 20
<b>Montana Cardiovascular Disease and Diabetes Prevention Programme</b>	Screened patients based on eligibility criteria	Blood glucose test, (query fasting, not specified)	21
<b>The DEPLOY Pilot Study</b>	Determination of BMI American Diabetes Association diabetes risk assessment	Collection of a capillary sample of whole blood to assess casual capillary blood glucose	22

## 5.2 Overview of key programmes

This next section provides an overview of the key characteristics of the studies including, who facilitated the programme and the training they received, what the intervention was, the outcome measures used, and if there was quality monitoring incorporated.

### 5.2.1

#### Training

Table 4: Overview of background of facilitators and broad overview of training provided

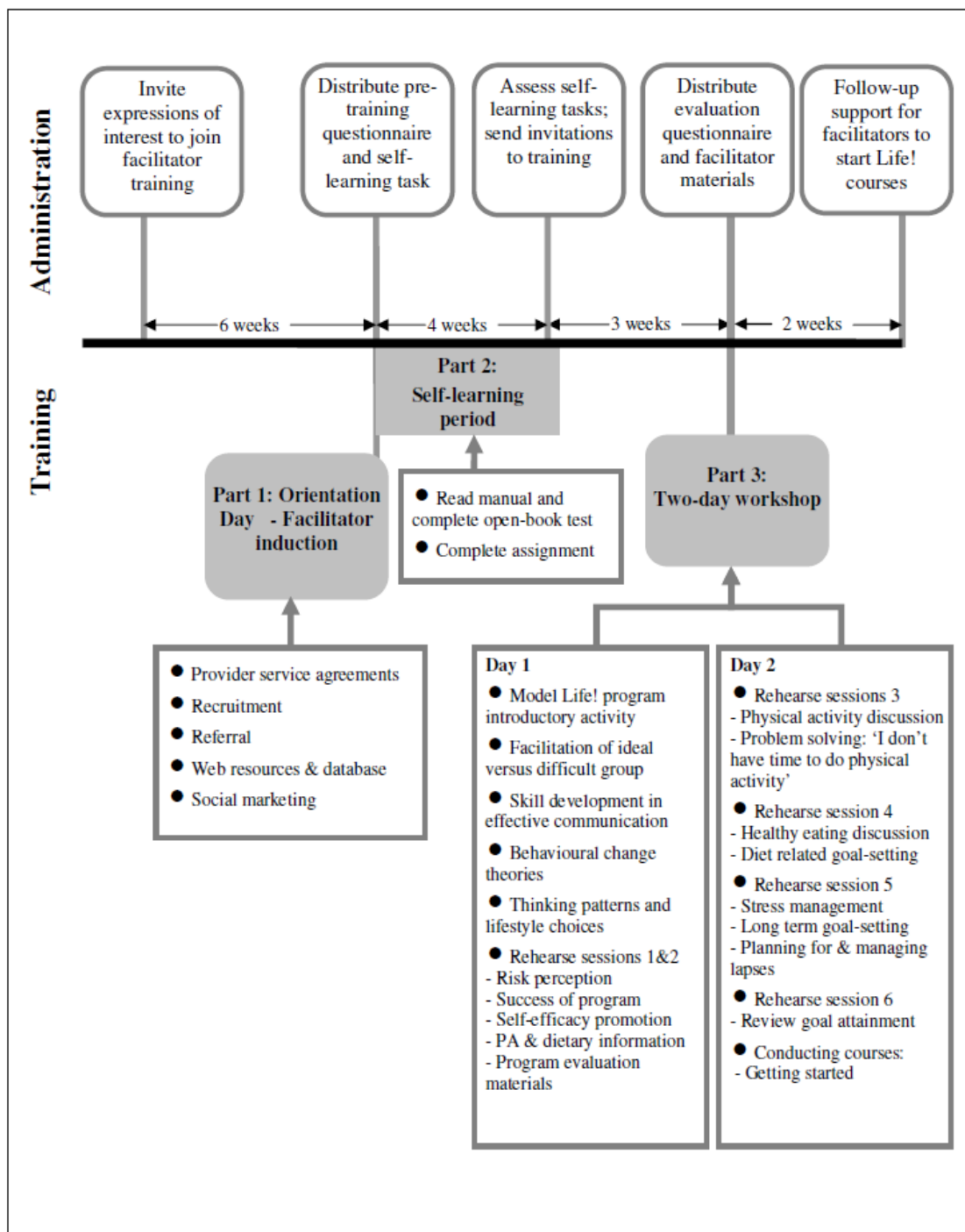
Programme	Facilitators	Facilitator training	Reference
<b>Life! Taking action on diabetes</b>	Various health professionals including, dietitians, nurses, psychologists, exercise physiologists. A trained facilitator conducts the sessions. A physiotherapist / exercise physiologist co-facilitates, physical activity session and a dietitian co-facilitates nutrition session.	Orientation day, self learning period and 2 day workshop. Required to attend an annual review day to maintain certification	13
<b>Sydney Diabetes Prevention Programme</b>	Lifestyle officers - various health professionals including, dietitians, nurses, psychologists, exercise physiologists	Specific training in health coaching, group programme delivery, data collection	14
<b>Greater Green Triangle DPP</b>	Nurses, dietitians and physiotherapists	Three day training, plus a yearly development day to maintain certification	15 16
<b>Culturally appropriate programme for migrant female Pakistanis</b>	Nutritionist with expertise in obesity management	Not stated	17
<b>De-Plan, Greece</b>	Registered dietitian	Not stated	18
<b>GOAL - LIT</b>	Public health nurses	2 day training, provided with training manuals and included practical exercises	19 20
<b>Montana Cardiovascular Disease and Diabetes Prevention Programme</b>	Lifestyle coach - shared position, 0.5 FTE dietitian and 0.5FTE health professional with education and training in exercise science	2 day training by 2 DPP site coordinators. Training focused on implementing the DPP curriculum in a group setting and standardised procedures for collecting anthropometric measures.	21
<b>The DEPLOY Pilot Study</b>	YMCA instructors	2.5 day training by a DPP investigator	22

All 3 programmes use a very similar training package

Apart from the DEPLOY study,<sup>22</sup> programmes used a variety of health professionals to facilitate the intervention. The most detailed information available on training content was available on the programme for training facilitators in the key Australian programmes,<sup>13 14 16</sup> hence a more detailed description of this follows.

The Life! programme<sup>13</sup> evolved from the Greater Green Triangle DPP. The Greater Green Triangle University Department of Rural Health developed the training materials and conducts the training for facilitators of the Life! programme.<sup>13</sup> The Life! training programme comprises three phases<sup>10</sup> and an overview of the programme can be seen in Figure 1 below.

Figure 1: Overview of the Life! training programme



The training contains ten topics:

1. Life! programme administration requirements;
2. What is diabetes?
3. Summary of diabetes prevention evidence;
4. Physical activity and eating habits to prevent diabetes;
5. Group session facilitation;
6. Health behaviour change;
7. Effective communication;
8. Positive and negative thinking;
9. Goal setting and problem solving;
10. Stress management.<sup>10</sup>

Once trained, facilitators are required to attend a yearly professional development and review day to maintain their certification.<sup>10</sup> At the review day, facilitators receive feedback about the programmes they have conducted, this includes a summary of the participants' evaluations and performance measures. Facilitators are also encouraged to discuss their experiences as a way of supporting peer learning.<sup>10</sup>

As a result of their experience in training facilitators the Greater Green Triangle Department of Rural Health have developed a set of recommendations for health organisations to consider prior to establishing a training programme for facilitators. The recommendations are:

- Apply adult learning principles such as, utilisation of a variety of teaching methods, provision of a safe learning environment which promotes discussion, and ensuring that the learning is applicable.
- There is no clear evidence regarding the preferred profession to deliver the programmes; nurses, dietitians, physiotherapists, those with training in psychology and motivation have all been used in the key translational programmes and lay people have all been used in the indigenous and migrant programmes.
- Scheduling of a programme orientation day and self learning period before the training workshop appears to be useful. Following attendance at a training day approximately 15% of trainees withdraw. Attendance at the orientation day and stipulation of the self learning tasks as a prerequisite to attendance at the two day workshop appears to drive a self selection process. The self learning period allows for more time at the two day workshop to be focused on facilitation skill development and session rehearsal.
- Utilise existing health education materials as training resources where possible. Included in the Life! training manual are health education resources developed by reputable organisations which complement the programme specific material. Utilising these resources has the advantage that facilitators can readily access them.
- Provision of a supportive workshop environment. It is important to create an environment where participants feel safe, valued and able to contribute. Selection of the venue itself is also important in regard to facilities, ease of access, parking etc
- Employ group processes appropriately. The majority of the workshop is focused on small group activities as most of the factual learning is completed during the self learning period. As the training team have access to participant information (such as, demographics, profession, geographical location, knowledge of T2D and previous experience in facilitating groups) prior to the two day workshop, they can organise the small group activities appropriately.

- Exercise high quality facilitation skills in the workshop. Trainees need to be able to observe high quality facilitation skills in action. It is important that the two day workshop also cover suggestions for managing difficult group situations, demonstration of effective non verbal communication and an understanding of cultural factors which impact on communication.
- Include a variety of interactive activities in the workshop.
- Manage workshop time carefully. As participants are busy people themselves they expect to participate in a well run course where time is used to its full potential and not wasted.
- Evaluate the facilitator training by monitoring changes in knowledge. This information is useful for trainees to reflect on their areas of strength and weakness and for training programme development and quality control. The evaluation questionnaires link to the 10 training topics. Trainees are also asked to comment on their satisfaction with the training.
- Make sure facilitators commence conducting a course soon after completion of the training. Facilitation skills need practice to enhance proficiency so it is important to ensure a minimal amount of time between completion of training and commencement of the facilitators' first course.
- Ensure a comprehensive system is developed to standardise facilitator training for large scale programmes.<sup>10</sup>

A significant amount of consideration appears to have been invested in the initial development of this programme and in applying robust quality improvement processes to its ongoing refinement. The importance of a comprehensive training programme for facilitators with attention to training for group delivery is emphasised. This is reinforced internationally by the tendency for nurses in the GOAL-LIT programme to continue to offer individual counselling as the primary mode of intervention for patients not included in the trial, despite having undertaken training in group counselling<sup>10</sup> - people tend to revert to methods with which they are most familiar. Personal communication from Absetz Pilvikki acknowledges that they have expanded their training programme to better prepare the nurses (Appendix 2).

## 5.2.2

### Objectives, delivery, processes and measures

This next table provides an overview of the programme objectives, and how the programme was delivered, including, group versus one on one, number of sessions, approaches utilised, outcome measurements and their timing.

Table 5: Overview of programme delivery and data collection

Programme	Objectives	Number of sessions	Group versus 1 on 1	Venue	Cost to individual	Approaches utilised	Data collected and timings	Reference
<b>Life! Taking action on diabetes</b>	Based on Finnish Diabetes Prevention Study: No more than 30% of energy consumed from fat No more than 10% energy from saturated fat At least 15g fibre/1000kcal At least 30 mins/day of moderate intensity physical exercise At least 5% weight reduction	6x 90 minutes, also available via telephone health coaching. First 5 sessions fortnightly, 6 <sup>th</sup> session at 8 months	Group, max 15 participants	Community venues	Free	Discussion, manual with materials for group sessions and take home tasks, problem solving and goal setting and self monitoring	Demographic, anthropometric, biochemical, anxiety and depression, programme goals, group size, participant evaluation, attendance rates. Data collected at sessions, 1, 5 and 6	<sup>13</sup>
<b>Sydney Diabetes Prevention Programme</b>	Based on Finnish Diabetes Prevention Study: At least 30mins/day of moderate to vigorous intensity physical activity, including aerobic exercise 3 or more days/week plus strength training at least 2 x weekly, (210 min/wk structured exercise are recommended). Reduction in intake of energy from total fat to less than 30% Reduction in intake of energy from saturated fat to less than 10% Fibre intake of at least 15g/1000kcal Achievement of a 5% reduction in body weight	Computer Assisted Telephone Interview (CATI) survey followed by 1 individual session with a lifestyle officer followed by 3 x 2 hr group sessions Option of 3 individual sessions by telephone if unable to attend group sessions; Follow up calls at 3, 6, and 9 months, CATI survey repeated at 12 months	Group of approx. 10 participants	Community venues	Not stated	Programme underpinned by stages of change model, social cognitive theories and health coaching. Participants encouraged to set goals and self monitor and group discussions	Changes at 12 months in weight loss, increase in moderate and vigorous physical activity, increase in dietary fibre consumption, decrease in fat consumption and decrease in saturated fat. A regression analysis will determine programme and participant factors associated with above. In addition process and economic evaluations are planned	<sup>14</sup>

Programme	Objectives	Number of sessions	Group versus 1 on 1	Venue	Cost to individual	Approaches utilised	Data collected and timings	Refer-ence
at 12 months								
<b>Greater Green Triangle DPP</b>	Based on Finnish Diabetes Prevention Study: Weight reduction >5% Fat intake reduced to < 30% of energy intake Saturated fat intake reduced to <10% of energy intake Fibre intake > 15g/1000kcal Physical activity >30 minutes per day	6 x 90 minutes, first 5 sessions within the first 3 months, 2 week intervals between sessions, final session at 8 months	Group	Primary care setting	Not stated	Goal setting approach, self monitoring, group discussions	Anthropometric Biochemical at baseline, 3 months and 12 months as well as Kessler 10 Psychological Distress Scale, Hospital and Anxiety and Depression Scale and SF-36v2 at baseline and 12 months	<sup>15</sup> <sup>16</sup>
<b>Culturally appropriate programme for migrant female Pakistanis</b>	Overall decrease in energy intake Increase in physical activity	12 modules, delivered weekly	One on one counselling, face to face and via telephone	Community	Not stated	Goal setting and self monitoring	Anthropometric, physical activity, BP, and biochemical measurements. All parameters were measured at 0,12 and 24 wks	<sup>17</sup>
<b>De-Plan, Greece</b>	Based on Finnish Diabetes Prevention Study: Weight reduction >5% Fat intake reduced to < 30% of energy intake Saturated fat intake reduced to <10% of energy intake Fibre intake > 15g/1000kcal Physical activity >30 minutes per day	6 sessions, 60 mins	Group, 6-10 participants	Community - at site of work or near residence of participants	Not stated	Empowerment <sup>28</sup> via group discussions	Nutritional and physical activity questionnaires, anthropometric, BP and biochemical measurement at baseline and 12 months.	<sup>18</sup>

Programme	Objectives	Number of sessions	Group versus 1 on 1	Venue	Cost to individual	Approaches utilised	Data collected and timings	Refer-ence
<b>GOAL - LIT</b>	Weight reduction >5% Fat intake reduced to < 30% of energy intake Saturated fat intake reduced to <10% of energy intake Fibre intake > 15g/1000kcal At least 4h/wk moderate level physical activity	6 x 2 hr sessions, first 5 sessions over 8 weeks, final session at 8 months	Group	Primary health care	Not stated	Goal setting and planning, self monitoring of behaviour, and group discussions	Anthropometric and biochemical measurements at baseline and 12 months; Questionnaires, 3 day food diary and physical activity one week monitoring sheet collected one month pre intervention and at 12 months. Demographics collected at baseline included employment status, marital status and level of education	19 20
<b>Montana Cardiovascular Disease and Diabetes Prevention Programme</b>	Based on the objectives of the DPP, 7% weight loss and moderately intensive physical activity for > or = 150 mins weekly	16 weekly 1 hr sessions, followed by monthly group sessions over 6 months	Group, size ranged from 8-34	Community	Two sites charged a fee of \$50 and \$150. Site charging \$50 returned \$25 after completion of 16 sessions and remainder after completion of follow up sessions. Site charging \$150 used monies to fund programme	Participatory, interactive group discussions, self monitoring	Anthropometric, biochemical and clinical measurements at baseline, following 16 sessions and at completion of 6 mth follow up programme. Participant self monitored the following: daily fat intake and weight from session 2, physical activity from session 5 and if necessary calorie intake from session 7. Self monitoring measures collected by lifestyle coach weekly. Participants were weighed weekly	21

Programme	Objectives	Number of sessions	Group versus 1 on 1	Venue	Cost to individual	Approaches utilised	Data collected and timings	Refer-ence
<b>The DEPLOY Pilot Study</b>	Based on the objectives of the DPP, 5-7% reduction in body weight and 150 minutes of moderate level physical activity wkly.	16 x 60-90 min sessions over 16-20 wks, followed by monthly sessions, unclear how long these continued for.	Group, 8-12 participants	Community	Not stated	Goal setting and problem solving and self monitoring	Weight, biochemical and clinical measures at baseline, 4-6 months and 12-14 months	<sup>22</sup>

Table six below reviews the outcomes achieved by the different programmes. This table can only provide an overview as the different programmes reported different variables. It's also important to note that each programme was also constructed quite differently.

**Table 6: Programme outcomes**

Programme	Drop out rate	Outcomes achieved	Reference
Life! Taking action on diabetes	Still being evaluated	Still being evaluated	<sup>13</sup>
Sydney Diabetes Prevention Programme	Still being evaluated	Still being evaluated	<sup>14</sup>
Greater Green Triangle DPP	24% dropped out between baseline and 12 month measurements	Changes from baseline to 12 mths, mean weight (kg) ↓2.52 BMI ↓ 0.93 Waist circumference (cm) ↓4.17 Fasting plasma glucose ↓0.14 Total cholesterol ↓0.29 Systolic BP ↓ 1.01 Diastolic BP ↓ 2.14	<sup>15 16</sup>
Culturally appropriate programme for migrant female Pakistanis	25% dropped out between weeks 0 and 12	Physical activity increased from 4,000 +/- 22.6 steps to 8,617.4 +/-596.8 Average cholesterol reduced from 6.8mmol/l +/- 0.15 to 5.5mmol/l+/-0.10 Fasting blood glucose reduced from 6.4 +/- 0.33 to 5.9+/-0.33 Insulin levels also reduced from 45+/-6.3 to 24.14+/- 1.8	<sup>17</sup>

Programme	Drop out rate	Outcomes achieved	Reference
De-Plan, Greece	35% dropped out between baseline and 12 months	Weight 89.0 +/- 13.4 reduced to 88.0+/- 4.7 BMI 32.0+/- 4.3 reduced to 31.6+/- 4.0 Waist circumference 102.9+/-11.0 cms reduced to 102.6+/- 10.6cms BP 133/79 reduced to 127/80 Fasting blood glucose 5.8+/-0.63 mmol/l reduced to 5.7+/- 0.63mmol/l Total cholesterol 5.9+/- 0.88mmol/l reduced to 5.5+/-0.95mmol/l	18
GOAL - LIT	13% drop out between baseline and 12 months	Weight reduced from 90.0kg+/- 16.6 by -0.8kg+/-4.5 BMI reduced from 32.6+/- 5.0 by 0.3 +/-1.6 Waist circumference reduced from 105.3cm+/-12.3 by 1.6cm+/-4.8 Fasting blood glucose reduced from 6.6mmol+/-1.7 by 0.1mmol/l+/-1.7 Total cholesterol reduced from 5.5mmol/l+/-1.0 by 0.1mmol/l+/-0.9	19 20
Montana Cardiovascular Disease and Diabetes Prevention Programme	17% drop out rate over 16 week course	Weight reduced from 99.3kg+/-19.7kg to 92.6kg+/-18.8 BMI reduced from 35.9+/-6.5 to 33.5+/- 6.3 Physical activity increased from week 6, 210 mins+/- 160 to 290mins+/-192 at week 16	21
The DEPLOY Pilot Study	37% drop out in intervention arm compared to 28% in control arm	Standard advice 12-14mths % change in weight↓1.8 % change in BMI↓1.4 Change in HbA1c 0.0 Change in total cholesterol (mg/dL)↑11.8 Change in systolic BP (mmHg) ↓2.7	Group DPP 12-14mths % change in weight↓6.0 % change in BMI ↓6.7 Change in HbA1c↓0.1 Change in total cholesterol (mg/dL)↓13.5 Change in systolic BP (mmHg) ↓1.6

Of all the programmes the Montana Cardiovascular Disease and Diabetes Prevention Programme<sup>21</sup> and the DEPLOY study<sup>22</sup> demonstrated the most significant successes. In the DEPLOY study a mean weight loss of 6% was achieved and maintained, compared to 5% in the Diabetes Prevention Programme<sup>29</sup> which was associated with a significant reduction in the incidence of diabetes. Points of note, however, in regard to the DEPLOY study<sup>22</sup> are that it was a small pilot, it recruited motivated individuals and if the weight loss of non-responders had been able to be taken into consideration in might have lowered the mean weight loss achieved. In the Montana study,<sup>21</sup> 45% of participants achieved the weight loss goal of  $\geq 7\%$  and 70% achieved the physical activity goal of  $\geq 150$  minutes of physical activity a week. These results are comparable to the Diabetes Prevention Programme.<sup>29</sup> In addition the Montana study<sup>21</sup> did not limit recruitment to those with impaired glucose tolerance. Anyone who was overweight and had one or more risk factors for cardiovascular disease or diabetes was eligible. However, to be included in the programme participants had to be ready to change as determined by a readiness to change assessment.

A very recent paper has been published by the Montana Cardiovascular Disease and Diabetes Prevention Workgroup, looking at factors associated with maintenance or achievement of the weight loss goal at follow up.<sup>30</sup> Of the 466 high risk adults who completed the programme between 2008 and 2009 188 responded to a survey. Of this group 73 (39%) maintained or achieved the weight loss goal post intervention. Achievement or maintenance of the weight loss goal post intervention was associated with attendance at more after core sessions as well as losing more weight upon completion of the core programme and after core programme, compared to those not initially or ever achieving the weight loss goal.<sup>30</sup> The participants who achieved the weight loss goal were also more likely to monitor their weight, engage in high levels of physical activity and to identify and correct dietary choices that could lead to weight regain during the follow up period.<sup>30</sup>

### 5.2.3

#### Main themes to emerge from the literature

Translation research programmes for the prevention of T2D overall utilised the objectives of the Finnish Diabetes Prevention Study<sup>6</sup> or the Diabetes Prevention Programme.<sup>3</sup> The majority of the interventions were group based. The groups tended to be no greater than 15 participants. The groups described in the papers were participatory and discussion was encouraged. In a scientific statement from the American Heart Association they comment that the group format provides participants with expanded resources for information, feedback, and coping strategies, as well as creating an air of accountability.<sup>31</sup> Social support has been shown to be effective in weight loss programmes and walking groups and is a valuable strategy in supporting those who are at greatest risk of failing<sup>32</sup>, the modality providing support to those who may need additional encouragement.<sup>32</sup> In all the programmes sessions decreased in frequency over time.

The use of goal setting and problem solving was another key component in the programmes. Research has shown that setting specific goals at the outset of a programme leads to higher performance compared to no or vague goals.<sup>31</sup> Goals that focus on behaviours as opposed to physiological target are preferable as they are under the control of the individual.<sup>31</sup> Provision of feedback on goal attainment is important as it instils a sense of learning and achievement<sup>31</sup>

Of the eight programmes reviewed, six overtly mention the use of goal setting. Feedback was also employed as an adjunct to goal setting. Feedback from a facilitator assists an individual learn new skills and assess their progress.<sup>31</sup> Feedback after initial screening can raise awareness amongst individuals of the need for behaviour change and feedback during the programme and at follow up provides information to the individual about their behaviour change efforts.<sup>31</sup> Problem solving is a useful strategy to assist individuals to navigate barriers to behavioural change and it encompasses five steps: identifying and defining the problem, brainstorming solutions, evaluating pros and cons of potential solutions, implementing solution plan and evaluating success.<sup>31</sup>

Self monitoring was another strategy employed in the programmes. The purpose of self monitoring is to raise the individual's awareness of physical cues and/or behaviours and to identify barriers to changing a behaviour.<sup>31</sup> It also has the benefit of providing direct feedback to the individual of progress made towards a goal.<sup>31</sup> Self monitoring has been proven to be important in relation to achieving behaviour change. A recent weight loss study showed that participants who self monitored their food intake lost twice as much weight as those who did not.<sup>31</sup> Self monitoring appears to be an effective complement to behavioural interventions in both white and minority populations.<sup>31</sup>

None of the programmes reviewed were based on a single session. Trust is built up by frequent contact and has been shown to be important among ethnic and racial minority groups.<sup>31</sup> The number of contacts, defined as face to face contacts and telephone contact between participants and facilitators ranged from, six for the LIFE,<sup>13</sup> Greater Green Triangle,<sup>16</sup> GOAL<sup>20</sup> and DE-PLAN<sup>18</sup> to twenty two for DEPLOY<sup>22</sup> and the Montana<sup>21</sup> studies. The Sydney diabetes prevention programme consists of seven contacts, one individual face to face, three group sessions and three telephone contacts.

Skill building, such as understanding food labels or menus when eating out, took place in the programmes. Building skills assists in promoting a person's sense of self efficacy. Self efficacy relates to a person's belief they have the abilities to perform certain behaviours.<sup>31</sup> There is an extensive body of literature that indicates self efficacy influences successful behaviour change.<sup>31</sup>

In addition all programmes provided participants with information in a staged manner and the written materials were used to reinforce the verbal information. The programmes were all facilitated by trained personnel whether clinical or non-clinical.

#### 5.2.4

#### Programme curriculum

Typically, a T2D prevention programme covers the following content:

- Diabetes and its relationship to lifestyle factors;
- Nutrition advice and education, for example, understanding food labels and menus;
- Physical activity advice;
- Behavioural strategies to support the adoption and maintenance of lifestyle changes;
- Skills such as how to set goals and problem solve around barriers.

Appendix three provides an overview of two curricula as examples.

## 5.2.5

### Factors associated with participants meeting prevention goals

The literature suggests the following participant factors are positively associated with individuals meeting the programme targets.

- Conscientious monitoring and recording of dietary intake
- Marked increase in physical activity<sup>33</sup>
- Number of programme sessions attended
- Being of an older age<sup>33</sup>
- Being male is associated with achieving physical activity target<sup>33</sup>
- Lower levels of psychological distress and more years of education.<sup>16</sup>

## 5.3 Type 2 diabetes prevention and indigenous people

Addressing the risk factors for T2D is critical to reducing indigenous health inequalities in countries such as New Zealand, Australia and America.<sup>34</sup> Yet there is a dearth of high quality intervention research considering T2D prevention and treatment amongst indigenous peoples in these countries.<sup>34</sup>

Overall two key themes emerge from the literature related to T2D prevention and indigenous populations. The first is the significance of the role of community health workers and the second relates to how the programme is developed. Programmes targeted at this population group were developed using a community participatory research methodology. Whether the programme was an adaptation of one of the key diabetes prevention studies or an original programme this participatory approach was consistently used.

Two key initiatives with First Nations People in American were identified. The Indian Health Service implemented a five year project to establish diabetes prevention demonstration projects. To date the Special Diabetes Programme for Indians Demonstration Projects has funded 36 Indian Health Services, tribal and urban, to implement an adapted version of the Diabetes Prevention Programme (DPP). The goals for participants mirror those of the DPP. At present, no formal evaluation data is available, on either outcomes or what characterised a successful project (See Appendix four). This information will be available following a report to Congress. Between 2004 and 2006, \$38,523,600 US, was distributed in grants to the project sites. An economic analysis has begun but to date no results are available. Information re the demonstration projects can be found at the following site:

[www.ihs.gov/medicalprograms/diabetes/index.cfm?module=sdpi\\_pt\\_2](http://www.ihs.gov/medicalprograms/diabetes/index.cfm?module=sdpi_pt_2)

A second programme for First Nation Peoples of the Yukon has focused on implementing a "train the trainer" approach. The programme was designed to train, in the first instance, front line health workers with roles in health promotion.<sup>10</sup> As a result those receiving the training become the provider. To support the health workers in the delivery of the programme a manual was designed, A Do it Yourself: Diabetes Prevention Activities - A Manual for Everyone [http://www.yukondiabetes.ca/assets/files/DIY-Diabetes\\_Prevention\\_Activites.pdf](http://www.yukondiabetes.ca/assets/files/DIY-Diabetes_Prevention_Activites.pdf) The front line workers are trained in groups to support information sharing and problem solving, so

increasing their confidence when they return to their communities. Peer mentoring is an important part of the programme as it assists with personal development and builds the capacity of the health workers. Over the past two years 15 Yukon First Nations frontline health workers piloted the programme, consequently 35 frontline workers were trained as trainers. In addition, all 14 First Nations communities have received the DIY manual and toolbox. The manual is considered to be the most significant part of the project.<sup>10</sup>

The use of health workers/community health workers/navigators (a number of terms are used) is a theme in papers related to T2D prevention and indigenous populations.<sup>10 35-37</sup> The American Association of Diabetes Educators, also support the role of community health workers (CHWs).<sup>38</sup> They suggest the following principles:

- Diabetes educators and other health care professionals should support the role of CHWs in serving as bridges between the health care system and people with, and at risk for, diabetes.
- Diabetes educators and other health professionals should support the role of CHWs in primary and secondary prevention.
- CHWs should receive effective training in core diabetes skills and competencies.
- There should be a reciprocal exchange of information and support between CHWs and the health care team to facilitate the best outcomes for people with, and at risk for, diabetes.
- Diabetes educators and other health care professionals should support continued research that evaluates the roles, contributions and effectiveness of CHWs.

The Diabetes Prevention Programme, (DPP) has been adapted for Native Hawaiians and Other Pacific Islanders (NHOPIs).<sup>39</sup> The adaption was completed using a community based participatory research approach. The key changes from the original programme are outlined in table six below:

**Table 7: Adaption of the original Diabetes Prevention Programme for Native Hawaiians and Other Pacific Islanders**

<b>Original DPP</b>	<b>PILI 'Ohana Project</b>
Individual based	Group based
Health professional facilitated	Community peer leader facilitated
16 sessions over 24 weeks	8 sessions over 12 weeks
No additional topics	2 additional topics: <ul style="list-style-type: none"> <li>• Economics of healthy eating</li> <li>• Communicating more effectively with your doctor</li> </ul>
Wording as provided	Plain language with cultural/linguistic relevance to NHOPIs

In this pilot study, 239 participants enrolled, the mean age was younger than other studies (49 years) but like other transformational and clinical trials research in the area, the majority of participants were female. Fifty one percent had some college or technical training.<sup>39</sup> Improvements were seen in all clinical and behavioural measures from baseline to 12 weeks.

There was a modest change in weight, mean loss was 1.5kgs but like other programmes greater weight loss was associated with the number of sessions attended. For 128 participants who attended all eight sessions a greater mean weight loss of 1.8kgs was noted.<sup>39</sup> Positive changes were also seen in blood pressure, physical functioning as measured by the six minute walk test, and lifestyle behaviours such as dietary fat intake.<sup>39</sup>

Ngati and healthy is a community led diabetes prevention and healthy lifestyle intervention programme which targets the East Coast community of New Zealand.<sup>37</sup> The programme has three main elements, local community health promotion programmes, a community education programme for high risk individuals, their families and other motivated individuals and a structural element.<sup>37</sup>

The health promotion activities focused on the following:

- Local media and role models and included promotions and stories in newspapers
- Advertisements
- Jingles
- Interviews on the local radio station, Radio Ngati Porou
- Production of posters with key messages featuring local personalities and scenery.

The community education component was delivered from local community meeting places and comprised of the following:

- Cooking skills
- Nutrition
- Reading food labels
- Swapping recipes
- Exercise classes
- Smoking cessation
- Opportunity to weigh in if desired.

The structural intervention aimed to make the local environment supportive for people to make sustainable lifestyle changes. For example key local employers were engaged to ensure their support for the initiative and local schools were encouraged to develop, "water only" and "healthy lunchbox" policies.

The most significant changes noted were in women in the 25-49 year old age group. In 2006 60.3% (n=78) met the minimum recommended exercise level of 150+ minutes, compared to 45.1% (n=102) in 2003. This group also improved their bread consumption patterns with 65.4% (n=78) eating wholemeal or wholegrain bread in 2006 compared to 42.2% (n=102) in 2003. The frequency of the incidence of insulin resistance was greatest in this group of participants as well and was linked to their level of participation in the programme and the lifestyle changes they had made.<sup>37</sup>

The results of another lifestyle programme for lower income, minority adults at risk of diabetes,<sup>40</sup> are currently being analysed but the description of the programme and process contained some key messages. For this vulnerable community, individuals were assigned one on one counsellors to provide them with a sense of partnership and support, the continuity of the relationship was seen as pivotal. The support was provided over 12 months. The messages were simple: Get Active; Eat Smart; Eat your Colours and Eat Breakfast.<sup>40</sup> While the group approach has dominated the literature, it is possible that for minority groups, one on one support is

useful. The Indian Health Service in their demonstration projects utilise one on one coaching and this continues for as long as the participant remains in the project (Appendix four). For migrants whose second language is English, keeping the messages simple is vital. Literacy levels were not analysed frequently in the literature, which was surprising considering that most programmes utilised a manual and gave participants homework, such as documenting their goals. Laatikainen et al,<sup>16</sup> commented that non completers of the Greater Green Triangle DPP had lower levels of education. The relationship between literacy, uptake of preventive health interventions and generally poorer health is well established.<sup>41</sup> The almost complete absence of recognition of this relationship in the studies is a significant gap in the literature.

In summing up, community health workers have a pivotal role to play in T2D prevention and indigenous populations. The community needs to lead the development of the programme and the issue of literacy levels needs to be a significant consideration.

## 5.4 Type 2 diabetes prevention and people living with mental health issues and developmental disability

The challenge of initiating and maintaining lifestyle behaviour change is compounded in those with mental illness by psychosocial, emotional and cognitive issues. Internationally people living with serious mental illness, die, on average, 25 years younger than those in the general population, largely due to preventable health conditions.<sup>42</sup> A systematic review of literature pertinent to this area found only 22 studies, most of which were single site efficacy trials with small samples and under representation of racial and ethnic minorities.<sup>42</sup> The interventions had similar goals to the T2D prevention studies and all used a group format or a combination of group and individual sessions. Interventions were delivered by a range of health and fitness professionals similar to those delivering T2D prevention in the translational research.<sup>42</sup> Again, the programme content was similar to the T2D prevention programme content with incorporation of practical demonstrations, such as cooking demonstrations.<sup>42</sup> The following techniques were used to address the motivational impairment and cognitive deficits of participants:

- Simplifying hand out materials and printing them in large font
- Using educational games
- Repetition of lessons and modules
- Frequent homework and quizzes
- Reading aloud
- Integration of mnemonic aides and visual materials.<sup>42</sup>

Overweight and obesity are serious issues for those living with serious mental illness. Ten out of the 18 studies that reported weight loss found statistically significant reductions. The amount of weight lost was linked to the duration of the intervention. The average weight loss on an 8-10 week intervention was 1.5 kgs (3.3lbs) compared to 1.81kgs (4.0lbs) for a 52 week intervention. However, when the longer duration studies are considered on their own, those that ran for between 24 and 48 weeks achieved an average weight loss of 3.72kgs (8.2lbs).<sup>42</sup> Six of the 12 studies that examined the benefits of the interventions on cardiovascular risk factors found statistically significant findings for the following: systolic and diastolic blood pressure, blood glucose levels, triglycerides and/or central obesity.<sup>42</sup>

The Healthy Lifestyle Change Programme was designed for adults with developmental disabilities and was developed using a community based participatory research model.<sup>43</sup> The programme was a seven month, twice weekly education and exercise programme to increase knowledge, skills and self efficacy regarding health, nutrition and fitness. Peer mentors acted as participant leaders and primary motivators.<sup>43</sup> While numbers in the study were small, 85 signed up for the programme, 68 participated in the initial class and 44 completed. It resulted in improvement in lifestyles, weight loss (mean loss 1.18kgs [2.6lbs] and median loss 3.18kgs [7lbs]) and increased exercise duration from 133 minutes to 206.4 minutes per week.<sup>43</sup> While this is a small study, it suggests that community based lifestyle programmes are feasible for those with developmental disabilities.

## 5.5 Cost effectiveness of type 2 diabetes and CVD prevention

Several recent economic evaluations<sup>44 45</sup> of lifestyle interventions for the prevention of T2D and CVD concluded that lifestyle interventions appeared cost-effective in reducing the long-term risk of T2D and CVD. In 2007, a Health Technology Assessment was completed reviewing the evidence for screening for T2D, and it concluded there was a good case for screening for IGT with the aim of preventing diabetes and reducing cardiovascular disease risk.<sup>46</sup> Combined interventions, for example, diet and physical activity, were shown to have greater benefit than sole dietary or physical activity interventions.<sup>44</sup> Bertram et al<sup>45</sup> found that diet and exercise combined to be the most cost effective, with a cost effectiveness ratio of AUD 22,500 per disability adjusted life year (DALY) averted, compared to metformin with a cost effectiveness ratio of AUD 21,500 per DALY averted. A recent paper by the International Diabetes Federation (IDF)<sup>47</sup> was less conclusive, stating that, "the cost effectiveness of primary prevention strategies for type 2 diabetes has not been universally demonstrated", (p147) This view of the IDF could be driven by the fact that one study reviewing the cost effectiveness of DPP-like programmes, considered in the economic review by Saha, et al., did not find the interventions to be cost effective.<sup>44</sup>

Importantly, implementation of lifestyle interventions to prevent T2D and CVD, will also reduce the risk of other chronic conditions and, unlike drug treatments, have few side effects.<sup>44</sup>

## 6 Cardiovascular prevention programmes

Multiple risk factors increase a patient's overall CVD risk, with their effects being multiplicative.<sup>48</sup> While relatively good evidence exists on how to intervene for the four key behavioural risk factors (tobacco use, physical inactivity, unhealthy dietary practices and excessive alcohol use) individually<sup>49</sup>, there are gaps in knowledge in regard to the efficacy of multiple risk factor interventions in primary health care settings.<sup>50</sup> There is strong evidence to support multiple risk factor behaviour change from the secondary care sector, the evidence being derived from cardiac rehabilitation programmes.<sup>51</sup> Three systematic reviews of multiple lifestyle interventions in primary health care settings provide consistent conclusions that those at highest risk of CVD should be the target audience.<sup>52-54</sup>

The EUROACTION study<sup>55</sup> targeted patients with established CVD and those at high risk. Those at high cardiovascular risk were seen in general practice and they and their partners had a nurse assessment of lifestyle, risk factors and drug treatment.<sup>55</sup> The intervention for those at high risk involved weekly visits where the individual and their partner were seen by the nurse, who led the group session and by the general practitioner who monitored medications. Patients were provided with a personal record card for lifestyle and risk factor target documentation and their families received a support pack. Assessment of health beliefs, anxiety and depression, illness perception and mood were also collected at baseline.

At the one year assessment, the proportion of high risk patients in the intervention group who were not smoking, compared to the usual care group, did not differ. However, non smoking at one year was greater (but not significantly) in partners in the intervention group, than in partners in the usual care group. High risk patients in the intervention group increased their intake of fruit and vegetables, but no significant difference was noted between the intervention group and usual care for saturated fat intake and oily fish consumption. Increase in fruit and vegetable consumption for partners of those in the intervention group was also noted though this was not significantly different from partners in the usual care group. There was a significant difference in those in the intervention group attaining physical activity targets compared to usual care. Partners of those in the intervention group were also noted to increase their physical activity levels, though the increases were not statistically significant. High risk patients with a BMI > 25kg/m<sup>2</sup> in the intervention group were more likely than those in usual care to lose 5% of their body weight.<sup>55</sup>

A key theme through this study was the use of families as support for those at high cardiovascular risk. The results suggest there is a potential benefit in expanding the role of specialised cardiac rehabilitation services generally provided in secondary care to local preventive cardiology programmes tailored to the target population.

There is a lack of translational studies in the area of cardiovascular prevention programmes in the primary health care setting. However the evidence around multiple risk factor reduction in secondary care settings is robust and provides guidance as to the elements linked to success. These include:

- Assessment and tailoring of the intervention to patient needs
- Greater effectiveness of interactive education and skill building compared to didactic education
- Self monitoring, goal setting, identification of problems and problem solving

- Use of multidisciplinary teams or nurse led programmes
- Multiple follow up contacts<sup>56</sup>

## 7 Telephone interventions

The Montana group have trialled the DPP via telehealth.<sup>57</sup> This was only a very small study with 13 having the adapted DPP delivered in the group setting by health coaches and 14 having it delivered via telehealth. The telehealth group participated in weekly and monthly sessions via video conference. All participants had a manual covering each of the 16 sessions, a log book to track daily fat and calorie intake and physical activity minutes, and a book that assists with the estimation of fat and calorie content of food.<sup>57</sup> There was no difference in the achievement of the weekly fat or physical activity goals between the groups. Over 40% of both groups achieved the 7% weight loss goal and overall mean weight loss in both groups was greater than 6.4kgs.<sup>57</sup> These results suggest that the delivery of T2D prevention programmes via telehealth is feasible.

A systematic review of telehealth for secondary risk factor reduction in those with CVD concluded that, "telehealth interventions provided effective risk factor reduction and secondary prevention in patients with CHD. Provision of telehealth could increase the uptake of formal secondary prevention, by those who do not access cardiac rehabilitation, and narrow the current gap between evidence and practice".<sup>58</sup> Another example of a telehealth programme is outlined below.

The Coaching patients On Achieving Cardiovascular Health, (COACH), Programme,<sup>59</sup> was developed as a way of reducing the treatment gap in patients with coronary heart disease. In essence, the programme is a telephone delivered disease management programme that focuses on coaching people with heart disease to achieve the targets for risk factors and to take recommended medications.<sup>59</sup> A recent paper<sup>59</sup> which reviewed data on 656 individuals, 80% males with a median age of 61 yrs and an age range of 33-87yrs showed that patients had improved their cardiovascular risk factor status from baseline to programme exit (0-6 mths), and that at 24 months nearly all variables were significantly better than at baseline with the exceptions of BMI and adherence to anti platelet and beta blocker therapy.<sup>59</sup> While the COACH study reports to date do not focus on those at high risk, it provides evidence that supports the telephone as a modality for providing follow up and support to patients. Currently, the COACH programme is available in both public and private sectors in Australia for the following conditions:

- Coronary heart disease;
- Stroke and TIA;
- Peripheral vascular disease;
- Heart failure;
- Pre diabetes;
- Type 2 diabetes;
- COPD;
- High risk of vascular disease;
- High risk of type 2 diabetes.<sup>B</sup>

A programme examining the additive effect of telehealth counselling in addition to brief preventive counselling found that for the intervention group - risk factor feedback, brief advice, handouts and six weekly one hour teleconferenced group sessions of 4-8 participants -

<sup>B</sup> The COACH programme <http://thecoachprogram.com/health-services/>

adherence was better in the intervention group participants for exercise, diet and greater reductions in blood pressure.<sup>60</sup>

## 8 Maintaining quality of diabetes prevention programmes

Collecting, monitoring and providing feedback on quality indicators is a method of evaluating the quality of care. Quality indicators are currently used to evaluate care across the entire continuum of care, however, data are scarce on quality management in diabetes prevention programmes.<sup>61</sup> Below is a brief overview of the information identified in this area.

The key approach used in the Life! programme,<sup>13</sup> to maintain fidelity to the programme and ensure effectiveness is the provision of feedback to facilitators. Facilitators are given periodic feedback reports which compare their performance against their peers for a number of biomedical and anthropometric measures taken from their group participants. Data is de-identified. While there is one on one discussion with the facilitator the significant discussion of this data occurs at the annual review day where facilitators discuss the reports and where specific attention is paid to the following:

- Can the variation be explained
- What are the more successful facilitators doing
- What is best practice
- Effective strategies for running groups.<sup>10</sup>

Solutions to specific programme delivery problems are developed using a collaborative methodology. This process supports professional development and peer to peer support.

The figure below illustrates how the annual review day fits into the Life! programme's continuous quality cycle.

Figure 2: Continuous quality improvement cycle of the Life! programme



The IMAGE group have published a quality and outcome indicator report.<sup>61</sup> Quality indicators are presented for different strategies: screening for high risk, as well as population level and

high risk prevention strategies. Additionally, scientific evaluation indicators with associated measurement standards are listed. These micro level indicators describe the measurements which should be used if scientific analysis and reporting are to be undertaken.

The *IMAGE* quality indicators are either related to structure, process or outcome.<sup>61</sup> The structure/process indicators form the quality criteria for diabetes prevention while the outcome indicators focus on outcome evaluation and monitoring. The outcome indicators include both intermediate and end result indicators, while the structure/process indicators are aimed at internal quality and can be utilised as a check list when planning and conducting a prevention programme. They are therefore amenable to being used to compare different programmes and different health care providers conducting a programme.<sup>61</sup> The indicators have been developed for a variety of users:

- Macro level: to be used by national decision makers whose role it is to produce the prerequisites for diabetes prevention;
- Meso level: to be used by those responsible for activities related to diabetes in district health boards, primary health organisations, non-government organisations;
- Mirco level - to be used by the person performing the preventive work, doctor, nurse, prevention manager.

The following table provides an overview of the classification of the *IMAGE* quality and outcome indicators.

Table 8: Overview of IMAGE quality and outcome indicators

<b>PREVENTION STRATEGY</b>	
Population strategy	Activities aimed at promoting the health of entire population
Screening for high risk	Identification of at-risk individuals
High-risk intervention strategy	Interventions on identified at-risk individuals
<b>LEVEL OF HEALTH CARE OPERATOR</b>	
Macro level	National-level decision makers
Meso level	Operative primary health care level
Micro level	Individual-level prevention work
<b>QUALITY CRITERIA</b>	
Structure indicators	Material and human resources, organizational structure
Process indicators	Activities undertaken to implement intervention
<b>QUALITY AND OUTCOME INDICATORS</b>	
Outcome indicators	Effects of interventions and activities related to diabetes prevention
Scientific evaluation indicators	Outcome measures for evaluation purposes
<b>RECOMMENDATIONS AND TOOLS</b>	
IMAGE audit tools	All quality criteria and indicators, and scientific evaluation indicators to be used to measure current practice in diabetes prevention against the IMAGE guideline recommendations (Appendix 2)
Scientific evaluation tool	The scientific evaluation indicators and corresponding recommendations for measurement protocols and references (Appendix 3)
Data collection form	An example of the content that is recommended for adaptation into local versions of the data collection forms at the micro level of diabetes prevention (Appendix 4)

The next table lists the indicators that the IMAGE group recommend be collected at the micro level; these are divided into core items, minimum data collected and additional, nice to have data.

Table 9: Recommended content to be included to support, monitor and evaluate micro level diabetes prevention.

	CORE ITEMS	ADDITIONAL ITEMS
1. Personal data	<ul style="list-style-type: none"> <li>- Personal identification</li> </ul>	<ul style="list-style-type: none"> <li>- Marital status</li> <li>- Education</li> <li>- Ethnicity</li> <li>- Employment status</li> </ul>
2. Screening	<ul style="list-style-type: none"> <li>- Method used in screening</li> <li>- Risk score type and result (if used)</li> <li>- Reason for intervention</li> </ul>	
3. Health and health behaviour	<ul style="list-style-type: none"> <li>- Chronic diseases</li> <li>- Regular medications</li> <li>- Smoking: Never/previously/currently</li> <li>- Physical activity: Type, frequency, intensity Method used in measuring (for example: interview, diary, recall, pedometers, accelerometers)</li> <li>- Nutrition: Dietary pattern: consumption of vegetables, fruits, spreads and oil, bread and cereal (whole / refined grain), sweets, beverages, alcohol e.g. Method used in measuring (for example: food diary, food frequency questionnaire or checklist)</li> </ul>	<ul style="list-style-type: none"> <li>- Family history of diabetes and CVD</li> <li>How often, products used</li> <li>Work-related, commuting, leisure</li> <li>Energy proportion (E%) of fat, saturated and trans fat, dietary fiber (g / day, g / 1000 kcal), total energy, alcohol (g, E%), added sugar (g, E%)</li> </ul>
4. Clinical data (measured)	<ul style="list-style-type: none"> <li>- Body weight</li> <li>- Body height</li> <li>- Waist circumference</li> <li>- Fasting glucose</li> <li>- Systolic and diastolic blood pressure</li> </ul>	<ul style="list-style-type: none"> <li>- 2 hour OGTT glucose</li> <li>- HbA1c</li> <li>- Lipids (total, LDL, HDL cholesterol and triglycerides)</li> <li>- Additional measures (fasting insulin etc)</li> </ul>
5. Content of the intervention	<ul style="list-style-type: none"> <li>- Type of intervention (group, individual etc.)</li> <li>- Frequency, duration and other details</li> <li>- Targets for the intervention: Weight, diet, smoking, physical activity</li> <li>- Reinforcement</li> </ul>	
6. Success of the intervention	<ul style="list-style-type: none"> <li>- Adherence (proportion of planned intervention visits completed)</li> <li>- Changes in: health and health behavior (item 3) and clinical data (item 4)</li> </ul>	<ul style="list-style-type: none"> <li>- The Diabetes Treatment Satisfaction Questionnaire: DTSQ</li> <li>- Health related quality of life</li> </ul>
7. Maintenance	<ul style="list-style-type: none"> <li>- Plans how to sustain possible lifestyle changes after intervention</li> </ul>	

## 9 Gaps in the literature

This review of translational diabetes prevention programmes has identified some fundamental gaps in the literature. These include how to make the programmes attractive to men and those of a younger age, effective cultural adaptations of clinical trial diabetes prevention programmes, how to overcome low literacy levels and how to sustain change.

**Men and younger populations:** Attracting males to participate appears to be a problem across all programmes, mainstream and indigenous. Feedback from the Indian Health Service (Appendix four) indicates that only 25% of their participants were male and in the Pili 'Ohana project<sup>39</sup> only 17% of participants were male. The DE-PLAN project in Greece had 40% male participants. Potentially this may be attributed to the fact that they used occupational health and workplace screening events to recruit.<sup>18</sup> Commentary back from Absetz Pilvikki (Appendix two) also supports the use of occupational health. In addition, he comments that telehealth delivered programmes may be more acceptable to males. However, this was not seen in the telehealth adaptation of the Diabetes Prevention Program.<sup>57</sup>

Counties Manukau DHB has a relatively young population.<sup>c</sup> Planners and funders therefore need to ensure that any programmes implemented are appropriate for this population. Currently Maori and Pacific populations are screened for CVD and diabetes at age 35 for males and 45 for females.<sup>12</sup> As these populations are at higher risk of developing diabetes it is essential programmes are acceptable and applicable to them. In the European, American and Australian studies the mean age of participants range from 53.6 yrs in the Montana study<sup>21</sup> to 60.1yrs for those in the intervention arm of the DEPLOY study.<sup>22</sup> However, in the indigenous papers considered, the mean age was younger. In the Pili 'Ohana study<sup>39</sup> the mean age was 49yrs and in the study of migrant Pakistani women the mean age was 37.6yrs.<sup>17</sup> It is highly likely that, when the results of the Indian Health Services Demonstration Projects are released, the mean age will also be younger. In view of this, CMDHB should consider the approaches and processes used in the delivery of these programmes.

**Cultural adaptation of programmes:** Two New Zealand studies, Ngati and Healthy<sup>37</sup> and Te Wai o Rona have focused on strategies to reduce the incidence of T2D in Maori communities. Only one T2D translation study looking at Pacific Peoples<sup>39</sup> was identified and apart from the Melbourne study<sup>17</sup>, no literature was identified looking at South Asian or other Asian populations. Counties Manukau has a multicultural population and will need to consider the acceptability and applicability of any programme or programmes implemented.

**Low literacy:** The majority of the translational T2D programmes provided participants with a manual and required participants to undertake homework such as complete food and physical activity diaries. This has implications for people with low literacy levels. Only one programme acknowledged this as an issue when they conducted an analysis of completers and non completers and found the later had fewer years of education. Maori and Pacific Peoples are less likely to achieve an upper secondary school qualification,<sup>62</sup> yet they are more likely to be pre-diabetic.<sup>37</sup> In addition, nearly 34% of the Counties Manukau population are living in very

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<sup>c</sup> About Counties Manukau DHB Accessed February 2011

[http://www.cmdhb.org.nz/about\\_cmdhb/overview/printpopulationprofile.pdf](http://www.cmdhb.org.nz/about_cmdhb/overview/printpopulationprofile.pdf)

deprived areas.<sup>c</sup> Low income is also linked to literacy levels.<sup>d</sup> The lack of consideration of literacy, or at least a surrogate marker, when analysing the data from the various studies was a significant omission.

**Sustaining change:** Of the translational T2D research only the researchers at the Greater Green Triangle University Department of Rural Health have considered ways of supporting participants to sustain the lifestyle changes seen at the end of a T2D programme. They hypothesised that provision of telephone support with group facilitators would result in better maintenance of outcomes 18 months after completing the original 12 month GGT DPP.<sup>15</sup> Participants were allocated to either a telephone support or self care group. However, the study failed to show any significant differences in mean outcome measures between the two groups. Effective strategies to maintain positive lifestyle changes are yet to be determined.

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<sup>d</sup> <http://nnlm.gov/outreach/consumer/hlthlit.html> Accessed February 2011

## 10 Key messages for consideration

- The components and intensity of the ideal T2D prevention programme are yet to be defined. It is probable that there will be no one size fits all and that a menu of options needs to be available to cater for the various populations within the CMDHB catchment. The menu should also include interventions at different intensities as some individuals may require very low intensity interventions whereas others and their families may require intensive support over an initial period.
- The programmes in the translational research were delivered mainly in the primary health care setting. However, the delivery of the programmes did not generally involve staff from the general practice setting undertaking the role in addition to their usual role. New health professional roles, such as "lifestyle facilitator", will be required to manage and deliver type 2 diabetes prevention programmes.
- Community health workers trained in T2D prevention are able to provide valuable support to their communities and other health professionals.
- In addition to community health workers there is a need to consider the use of other non-clinical professionals to support the sustainable delivery of these programmes. Fitness professionals are one group who are used to 'coaching' individuals on a day to day basis and tapping into this skill base needs to be considered as in the DEPLOY study.
- A programme that caters for those with low literacy levels will need to be carefully implemented.
- Primary health care has a key role in identifying and screening for those at high risk of T2D.
- The group session approach dominated the literature. However, a one on one session which was a precursor of the Sydney Diabetes Prevention Programme's group sessions may be a useful adjunct to any programme. Such a session would allow for the collection of measurements and for the completion of assessments.
- The Greater Green Triangle translation study was the only study to collect psychosocial measurements. In an attempt to establish what characteristics describe a T2D prevention programme completer or non-completer in the New Zealand setting it would appear to be sensible to ensure that any pilot collected this information to assist with programme development.
- Appropriate facilitator training, ongoing support and monitoring are vital to ensure fidelity to a programme's objectives and underlying principles.

## 11 Conclusion

While translating the interventions from structured trial settings into routine practice reduces the benefits, in terms of achievement of intermediate markers such as the degree of weight loss and level of physical activity demonstrated in RCTs to be associated with substantial diabetes risk reduction, the results of the translational research do suggest there is benefit and it is feasible. Even studies where only small changes were noted in intermediate markers, such as the *Greater Green Triangle study*<sup>16</sup>, resulted in improvements in percentage with normal glucose values and a reduction in the percentage with impaired glucose tolerance at the end of the study.

The establishment of programmes in primary and community health care will require the formation of effective partnerships between the clinical and community based components of any lifestyle programme. This will require clarity about the respective roles of the clinical and community partners, and the development of trust and good communication between them, thereby ensuring that limited resources are used wisely.

This is a very under-developed field of health care, with new evidence continually being produced. However, any programme implemented requires robust evaluation and dissemination of results, not only nationally, but internationally, to assist with the development of best practice guidance for type 2 diabetes prevention programmes.

## 12 Appendices

### Appendix 1: search terms

- Type 2 diabetes
- Pre-diabetes
- Primary prevention
- General Practice
- Primary care
- Dietary intervention
- Healthy eating
- Weight loss
- Physical activity
- Exercise
- Lifestyle intervention
- Indigenous populations
- Migrant populations
- Mental illness
- Cost effectiveness
- Economic evaluation
- Translational research.

## Appendix 2: AUSDRISK and FINDRISC tools



1. **Your age group**

Under 35 years	<input type="checkbox"/>	0 points
35 – 44 years	<input type="checkbox"/>	2 points
45 – 54 years	<input type="checkbox"/>	4 points
55 – 64 years	<input type="checkbox"/>	6 points
65 years or over	<input type="checkbox"/>	8 points
  
2. **Your gender**

Female	<input type="checkbox"/>	0 points
Male	<input type="checkbox"/>	3 points
  
3. **Your ethnicity/country of birth:**
  - 3a. **Are you of Aboriginal, Torres Strait Islander, Pacific Islander or Maori descent?**

No	<input type="checkbox"/>	0 points
Yes	<input type="checkbox"/>	2 points
  
  - 3b. **Where were you born?**

Australia	<input type="checkbox"/>	0 points
Asia (including the Indian sub-continent), Middle East, North Africa, Southern Europe	<input type="checkbox"/>	2 points
Other	<input type="checkbox"/>	0 points
  
4. **Have either of your parents, or any of your brothers or sisters been diagnosed with diabetes (type 1 or type 2)?**

No	<input type="checkbox"/>	0 points
Yes	<input type="checkbox"/>	3 points
  
5. **Have you ever been found to have high blood glucose (sugar) (for example, in a health examination, during an illness, during pregnancy)?**

No	<input type="checkbox"/>	0 points
Yes	<input type="checkbox"/>	6 points
  
6. **Are you currently taking medication for high blood pressure?**

No	<input type="checkbox"/>	0 points
Yes	<input type="checkbox"/>	2 points
  
7. **Do you currently smoke cigarettes or any other tobacco products on a daily basis?**

No	<input type="checkbox"/>	0 points
Yes	<input type="checkbox"/>	2 points

8. **How often do you eat vegetables or fruit?**

Every day	<input type="checkbox"/>	0 points
Not every day	<input type="checkbox"/>	1 point
  
9. **On average, would you say you do at least 2.5 hours of physical activity per week (for example, 30 minutes a day on 5 or more days a week)?**

Yes	<input type="checkbox"/>	0 points
No	<input type="checkbox"/>	2 points
  
10. **Your waist measurement taken below the ribs (usually at the level of the navel, and while standing)**

Waist measurement (cm)

**For those of Asian or Aboriginal or Torres Strait Islander descent:**

Men	Women	
Less than 90 cm	Less than 80 cm	<input type="checkbox"/> 0 points
90 – 100 cm	80 – 90 cm	<input type="checkbox"/> 4 points
More than 100 cm	More than 90 cm	<input type="checkbox"/> 7 points

**For all others:**

Men	Women	
Less than 102 cm	Less than 88 cm	<input type="checkbox"/> 0 points
102 – 110 cm	88 – 100 cm	<input type="checkbox"/> 4 points
More than 110 cm	More than 100 cm	<input type="checkbox"/> 7 points

Add up your points

- Your risk of developing type 2 diabetes within 5 years\*:**
- 5 or less: Low risk**  
Approximately one person in every 100 will develop diabetes.
  - 6-11: Intermediate risk**  
For scores of 6-8, approximately one person in every 50 will develop diabetes. For scores of 9-11, approximately one person in every 30 will develop diabetes.
  - 12 or more: High risk**  
For scores of 12-15, approximately one person in every 14 will develop diabetes. For scores of 16-19, approximately one person in every 7 will develop diabetes. For scores of 20 and above, approximately one person in every 3 will develop diabetes.

\*The overall score may overestimate the risk of diabetes in those aged less than 25 years.

**If you scored 6-11 points in the AUSDRISK you may be at increased risk of type 2 diabetes.** Discuss your score and your individual risk with your doctor. Improving your lifestyle may help reduce your risk of developing type 2 diabetes.

**If you scored 12 points or more in the AUSDRISK you may have undiagnosed type 2 diabetes or be at high risk of developing the disease.** See your doctor about having a fasting blood glucose test. Act now to prevent type 2 diabetes.

## TYPE 2 DIABETES RISK ASSESSMENT FORM

Circle the right alternative and add up your points.

### 1. Age

- 0 p. Under 45 years
- 2 p. 45–54 years
- 3 p. 55–64 years
- 4 p. Over 64 years

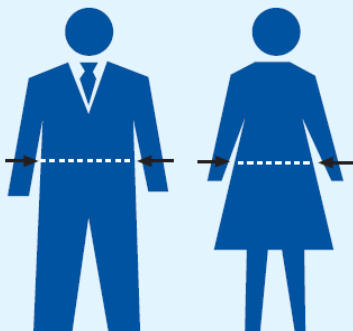
### 2. Body-mass index

(See reverse of form)

- 0 p. Lower than 25 kg/m<sup>2</sup>
- 1 p. 25–30 kg/m<sup>2</sup>
- 3 p. Higher than 30 kg/m<sup>2</sup>

### 3. Waist circumference measured below the ribs (usually at the level of the navel)

- |      | MEN              | WOMEN           |
|------|------------------|-----------------|
| 0 p. | Less than 94 cm  | Less than 80 cm |
| 3 p. | 94–102 cm        | 80–88 cm        |
| 4 p. | More than 102 cm | More than 88 cm |



### 4. Do you usually have daily at least 30 minutes of physical activity at work and/or during leisure time (including normal daily activity)?

- 0 p. Yes
- 2 p. No

### 5. How often do you eat vegetables, fruit or berries?

- 0 p. Every day
- 1 p. Not every day

### 6. Have you ever taken medication for high blood pressure on regular basis?

- 0 p. No
- 2 p. Yes

### 7. Have you ever been found to have high blood glucose (eg in a health examination, during an illness, during pregnancy)?

- 0 p. No
- 5 p. Yes

### 8. Have any of the members of your immediate family or other relatives been diagnosed with diabetes (type 1 or type 2)?

- 0 p. No
- 3 p. Yes: grandparent, aunt, uncle or first cousin (but no own parent, brother, sister or child)
- 5 p. Yes: parent, brother, sister or own child

### Total Risk Score

The risk of developing type 2 diabetes within 10 years is

- |                |   |
|----------------|---|
| Lower than 7   | Low: estimated 1 in 100 will develop disease              |
| 7–11           | Slightly elevated: estimated 1 in 25 will develop disease |
| 12–14          | Moderate: estimated 1 in 6 will develop disease           |
| 15–20          | High: estimated 1 in 3 will develop disease               |
| Higher than 20 | Very high: estimated 1 in 2 will develop disease          |

Please turn over

## Appendix 3: Communication from Absetz Pilvikki

Hi Fiona,

Thanks for your interest in our program. I'm attaching a pdf of a book published last year in connection with the Dresden WCPD congress (Diabetes Prevention in Practice, Eds. Schwarz, P., Reddy, P., Greaves, C., Dunbar, J., Schwarz, J.). In the chapter about the experience in Finland, I've described how the GOAL project proceeded from implementation to broader uptake, with care processes defined for screening, lifestyle counseling and follow-up.

To your questions:

1) Over the years, we've developed the facilitator training program quite a bit. It is now a very interactive 3-day program with a lot of discussion and practical exercises. Day 1 comprises 1) an overview to the above mentioned three care processes, 2) theoretical basis of motivation and behaviour change (a model integrating the HAPA, self-regulation and self-determination theories) and 3) the evidence-base behind and practical experiences with the model. Day 2 starts with an overview and practice of motivational, empowering interaction techniques (based on Motivational Interviewing) and then proceeds into the structured counseling program sessions. Day 3 is all about the sessions. To become familiar with the session structure, content and materials, the trainees act as group participants (having completed all homework at home and completing all other tests and materials on site as the group participants would do) and also take turns to practice being facilitators in small groups. It seems that by the end of the training program they are now much better prepared for starting a group.

2) Based on the attached book, the number of male participants is low in all primary health care delivered interventions around the world. At least for now, we do not have any alternative interventions for males. Experience from occupational health care (also in the book) suggests it's a better setting for reaching the males. Also, telephone delivered (live or automated) or internet coaching or counseling might be more suitable approaches with males (because they can be delivered as individual, some even anonym, all relatively independent of time & place). We've just submitted a paper on telephone coaching in disease self-management, where males participate more frequently than women, and we're just about to start testing internet + mobile phone for lifestyle change in occupational setting.

3) As I told, we've developed the initial training program a lot based on our experiences, research and facilitator feedback. We also have ongoing further training for facilitators at least once-a-year. Furthermore, we encourage new facilitators to team up with the more experienced ones for their first group, and we have provided facilitators with basic self-evaluation sheets they can use after each session ("This worked really well..."; "This needs some further development...")

4) As said above, this is described in the book chapter.

Based on our experience with several hundreds of groups over the years, we've omitted all the information provision modules from the program. This may sound radical, but in our experience, the group as a whole has all the knowledge the members need for making changes (because making a change is not a matter of knowledge). During group sessions, this knowledge is brought

into the open, discussed and evaluated together. The principle is that group members give each other information or if they feel the group does not have adequate information (but this is very, very rare), they may search for it for the next session. The facilitator is not there to provide information or ready-made solutions, but instead to help participants see what they already know, can, and will do. Another, also quite a radical (at least in the Finnish health care culture) recently adopted principle is to always start from identifying what already works really well in the participants' diet and physical activity, and then help them build further from that (instead of focusing on what's wrong and trying to fix it). With these two principles, it seems we're better able to strengthen the participants' self-efficacy and internal motivation. The next step then is to help set goals and plan so that they can be certain they will accomplish the goals.

I hope this helps.

Kind regards,

Pilvikki

Pilvikki Absetz

Adjunct Professor, DPsych, Senior researcher / Dos., PsT, Erikoistutkija

National Institute for Health and Welfare / Terveysten ja hyvinvoinnin laitos (THL)

Tel. / Puh. +358 20 610 8228

Fax +358 20 610 8591

Street address / Käyntiosoite: Mannerheimintie 164 a, 00300 Helsinki

Postal address: P.O. Box 30, FI-00271 Helsinki, Finland

Postiosoite: PL 30, 00271 Helsinki

[www.thl.fi](http://www.thl.fi)

## Appendix 4: An overview of two programme curricula

### GOAL-LIT Programme<sup>20</sup>

#### Sessions 1 and 2

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Learning to know one another</li><li>• Rules for group work</li><li>• Discussion on current beliefs: How does life-style influence health?</li><li>• Introduction: Diabetes, risk factors, effects, prevention</li><li>• Reflective discussion and re-evaluation of beliefs</li><li>• Exercise: Dream – where do we want to be in 12 mo</li><li>• Tools to make dream come true: goals, planning, home-work</li><li>• Homework assignments: dietary self-monitoring, PA schedules, examples of difficult and easy situations</li></ul> | <ul style="list-style-type: none"><li>• Introduction: Prevention really works</li><li>• Evaluation of own behaviour: PA schedules, fat &amp; fibre tests</li><li>• Discussion: own habits vs. preventive goals</li><li>• Role model stories: what contributes to success?</li><li>• Discussion: analysis &amp; re-attribution of previous experiences</li><li>• Homework assignment: preparation for goal setting, PA and eating habit schedules</li><li>• Discussion: barriers for group work</li></ul> |
|--|--|

#### Sessions 3 and 4

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Feedback from the PA schedule</li><li>• Introduction: health effects of PA</li><li>• Goal planning:<ul style="list-style-type: none"><li>– WHAT: are the goals concrete, positive, attainable, developing?</li><li>– Short-term WHERE, WHEN, HOW, EQUIPMENT</li><li>– Feedback: difficult and easy situations</li></ul></li><li>• Goal setting</li><li>• Homework assignments: feedback and re-reinforcement, PA and eating habit schedules</li><li>• Possibilities for PA in local community</li></ul> | <ul style="list-style-type: none"><li>• Food choices: feedback from dietary self-monitoring</li><li>• Introduction: How to eat healthy</li><li>• Goal planning:<ul style="list-style-type: none"><li>– WHAT: are the goals concrete, positive, attainable, developing?</li><li>– Short-term WHERE, WHEN, HOW, EQUIPMENT</li><li>– Feedback: difficult and easy situations</li></ul></li><li>• Goal setting</li><li>• Exercise: How to make favourites lighter</li><li>• Homework assignment: positive feedback in getting social support, PA and eating habit schedules</li></ul> |
|---|---|

#### Sessions 5 and 6

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Discussion: evaluating and refining goals</li><li>• Discussion: routines – have they already changed? PA schedule, fat &amp; fibre tests</li><li>• Intermediate goals (next 6 mo)</li><li>• Exercise: how to overcome barriers / use resources in maintaining behaviour change</li><li>• Possibilities for peer support system</li><li>• Homework assignments: PA and eating habit schedules</li></ul> | <ul style="list-style-type: none"><li>• Discussion: evaluating and refining goals</li><li>• Discussion: routines – have they already changed? PA schedule, fat &amp; fibre tests</li><li>• Discussion: analysis and re-attribution of success and failure</li><li>• Discussion: future goals</li><li>• Discussion: Evaluation of the group work</li></ul> |
|--|---|

Session content	Main messages
<p>Getting to know each other Group rules Introduction to the Life! course The Diabetes epidemic Reducing your risk and lifestyle change</p>	<p>Diabetes is a serious problem This course works to reduce your risk It's important to maintain your health and functional capacity Lifestyle change makes a real difference to your life in the future</p>
<p>Understanding your diet</p> <ul style="list-style-type: none"> <li>• The facts about fat</li> <li>• Learning about dietary fibre</li> </ul> <p>Skills for healthy eating</p> <ul style="list-style-type: none"> <li>• Food label reading</li> <li>• Recipe modification</li> </ul> <p>Setting healthy eating goals (part 1)</p>	<p>Small changes in my diet can make a big difference to my health Making dietary changes is not a difficult task when broken down into small, manageable steps Healthy eating does not have to be difficult</p>
<p>Balancing out your portion sizes Understanding Alcohol Small changes in eating habits can make a big difference Review of shopping lists and how to make healthier choices Making healthier choices, when:</p> <ul style="list-style-type: none"> <li>• Eating out</li> <li>• In a social situation with friends/family</li> </ul> <p>Setting healthy eating goals (part 2)</p>	<p>Its important to think about the impact that social situations can have on your healthy eating Having a plan to reach my healthy eating goals makes it more likely that I will succeed Eating well can be achieved with small diet changes Healthy eating does not have to be difficult</p>
<p>Being active, even if only just starting out The importance of physical activity for your health Being mindful of your actions Barriers to physical activity and how to overcome them Physical activity goal setting in the short term Strength training and Tai Chi (additional material)</p>	<p>Planning to reach your physical activity goals makes it more likely that you will succeed You don't have to be young, healthy and fit to be physically active. Everyone benefits from doing some physical activity Incorporating physical activity into your everyday lifestyle can be achieved with small changes</p>
<p>Stress and Relaxation Sleeping better Goal planning: make your goals concrete: moving forward with small, measurable steps Managing lapses (part 1) The importance of being supported to achieve your goals - talk about your plans and goals with other people</p>	<p>It is important to recognize the impact that stress can have on your health Sleep is important To achieve your goals it can be helpful to have support from your family and friends</p>
<p>Managing lapses (part 2) Review of progress and goal attainment Setting new goals to achieve in the long term Barriers to change - helping to overcome barriers by appraisal of successes and failures as well as factors that contributed to them</p>	<p>Planning and evaluating your actions ensures that you will reach your goals You are on the path to a healthier life What you have learnt in this course enables change now and in the future</p>

## Appendix 5: Communication from Kelly Acton, Indian Health Service Head Quarters

**From:** Fiona Doolan-Noble [<mailto:fiona@phocusonhealth.co.nz>]

**Sent:** Friday, January 21, 2011 3:16 PM

**To:** HQW Diabetes Program (OIT)

**Subject:** SDPI Diabetes Prevention Programme Demonstration Project

Kia ora from New Zealand,

My name is Fiona and I am currently reviewing the evidence for type 2 diabetes prevention for a large district health board in New Zealand. Counties Manukau District Health Board serves a large population with a high number of Maaori and Pacific Peoples. We are very interested in the work you have been undertaking with American Indians and Alaskan Natives. It was with great interest that I read the latest press release. I have also read the report, One Path to a Healthier Life which was very interesting. I do have a few questions that I am hoping you could answer for me.

Did any of the demonstration site show better results than the others and if yes were there any key characteristics that you think are associated with these sites?

Yes, some sites did seem to perform better than others. However, the analyses to identify key characteristics of successful sites haven't been done yet and no conclusions can be made at this point.

How important in your view are the monthly individual coaching sessions for participants and how long do these continue for?

Very important. Initial results have shown overall program success, and seeing as the individual lifestyle coaching sessions are part of the intervention, they have aided greatly in participant success. Participants meet monthly with their lifestyle coach throughout the Intensive Activities phase of the project (DPP curriculum), and are encouraged to continue to meet monthly throughout the After Core phase. Participants can move to quarterly lifestyle coaching sessions at the discretion of the lifestyle coach once they are in After Core. Lifestyle coaching continues as long as the participant remains in the project.

How long does the follow up after core programme continue for?

After Core continues as long as the program continues. As long as funding is available and the Director of IHS recommends that sites continue to run their programs as instructed, participation is at-will and could continue the length of program funding.

In many of the type 2 diabetes prevention programmes there is an over representation of females and people who are retired. Did you find that women were more likely to participate in your programme?

Yes, women are much more likely to participate than males. In our demonstration project, about 75% of the participants were female and only a quarter of them were male.

Do you have available the specific outcomes achieved by the various diabetes prevention demonstration projects such as reduction in weight, waist circumference, lipids, BP, increase in physical activity etc as opposed to individual success stories? Have you by any chance undertaken a meta analysis of the results and if yes is this available?

A brief summary of the specific outcomes achieved by our demonstration projects was included in the press release you were referring to. A more detailed analysis has been done and will be included in a Indian Health Service Special Diabetes for Indian 2011 Report to US Congress ( United States) that is going to be released soon. However, before it is officially released, we can not reveal the project results to others. I'm not quite sure what you mean by "meta

analysis". If you meant an analysis including all the demonstration sites, then yes, that analysis was done and will be included in the forthcoming Report to Congress.

Many of the other prevention programmes show a correlation between number of sessions attended and successful outcomes; have you found the same?

Yes, we did. And you'll see this finding in the forthcoming Report to Congress.

With the exercise sessions were these western type exercise sessions, i.e. gym based or did they include traditional American Indian and Alaskan Native physical activity?

A combination of both.

From the One Path to a Healthier Life I note that between 2004-2006 \$ 38,523,600 US, had been awarded in grants; have you completed an economic analysis of the projects and if yes is this available?

A Cost Analysis Project of the SDPI Demonstration Projects has recently begun. No results are available yet as it remains in the initial stages.

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