ABSTRACT

Objectives. The rapid increase in the prevalence of type 2 diabetes (T2D) has created an urgent need to develop new practices to prevent and treat it. One possibility is to provide specialists services to remote areas through videoconferencing (VC). Therefore, the aim was to study the feasibility of short-term group counselling by a clinical nutritionist (4 sessions at 1.5-hour each at 2-week intervals from baseline, and the session 5 at 6 months) performed by videoconferencing (VC).

Study design. We recruited 74 subjects at high risk of T2D, and compiled 5 VC groups (each group included 5–9 subjects, total n=33) and 6 face-to-face groups (FF, total n=44). The subjects were also asked to participate in a follow-up visit 15 months after the last counselling session.

Methods. Data were collected by a questionnaire (satisfaction with group counselling via videoconferencing), by theme interviews (experiences on group counselling) and by metabolic measures (laboratory tests).

Results. Only one of the 74 subjects dropped out during the first 6 months. The proportion of subjects who had received social support from group peers was higher in the videoconferencing group than in the face-to-face groups (p=0.001). The experiences of group counselling transmitted by videoconferencing were positive. Waist circumference decreased significantly at 0 to 6 months of counselling (p<0.01), and was significantly lower at 21 months than at baseline in FF groups (p=0.015). However, no significant differences were observed in most of the measurements between VC and face-to-face groups.
Conclusions. Short-term group counselling by a clinical nutritionist through videoconferencing is a feasible way and a practical model to provide specialists services to remote areas, and thus can be used as an option to diminish inequality related to restricted health care services in sparsely inhabited areas. (Int J Circumpolar Health 2010; 69(5):500-511)

Keywords: prevention, type 2 diabetes, group counselling, lifestyle, diet, videoconferencing

INTRODUCTION

Lifestyle intervention focusing on changes in dietary and exercise habits has been shown to be effective in the prevention of type 2 diabetes (T2D) among high-risk subjects (1–4). Even a moderate weight loss (5–10%), a diet low in saturated fats, high in fiber and moderate in unsaturated fats, and regular physical activity (4 hours/week) are important behavioural aims in the prevention of T2D (5–7). A diet low in fat and high in fiber is a significant predictor of sustained weight reduction and decreases the risk of progression to T2D in high risk subjects (6). Furthermore, restraint eating (high cognitive control over food intake in order to influence body weight) is associated with success in weight loss and maintenance (8,9).

In the struggle against T2D in health care, new and best practices should be developed. One possibility is to use group counselling, and another is to develop counselling and its methods so that they are more effective; this could be done through learning theories. Group counselling costs less per person than individual counselling, and social support from peers might be one of its benefits. Furthermore, the weight loss results from group counselling are at least as good as from individual counselling (10). Most lifestyle intervention studies have reported the effects of the intervention on outcome measurements and some have mentioned the aims of the counselling, but many of these lack a theoretical framework for behavioural change and learning process, and interventions have not been described in sufficient detail (11,12).

While the prevalence of type 2 diabetes is increasing at alarming rates all over the world (13), the general challenge in all circumpolar countries should be to translate the scientific evidence regarding prevention of T2D into daily clinical practice and public health. Three concurrent strategies for prevention can be used: the population strategy, the high-risk strategy and the strategy of early diagnosis and management (14). One possibility is to generate regional and local models and programmes for the prevention of T2D. These can include best practices and models to integrate specialists’ services to treatment pathways. While there is usually lack of health care specialists in remote areas with sparse populations, new technological applications can also be used in health care to provide specialists services in remote areas.

Videoconferencing involves real-time face-to-face contact (image and voice) via videoconferencing equipment to connect caregivers and one or more patients, usually for instruction (15). Videoconferencing is a practical,
cost-effective and reliable way of delivering a worthwhile health care service to diabetics (16,17). Therefore, the aim was to study the feasibility of a model to integrate a specialist’s service, namely, interactive group counselling by a clinical nutritionist through VC, to the processes of occupational and primary health care aimed to the prevention of type 2 diabetes. Feasibility of group counselling via videoconferencing was assessed from the feedback of group participants obtained by questionnaires and through theme interviews and also by evaluation of the effect of counselling on metabolic measures.

MATERIAL AND METHODS

Study subjects
We recruited 74 subjects at high risk of T2D, and compiled 5 videoconferencing groups (VC, n=33) and 6 face-to-face groups (FF, n=41) in our study, “The Effectiveness and Feasibility of Activating Counseling Methods and Videoconferences in the Dietary Group Counseling of Subjects at High Risk of Type 2 Diabetes.” The participants were recruited by nurses working in basic health care (Oulunkaari Region in northern Finland) and by occupational health care personnel, and they used the Finnish Diabetes Risk Score in the selection of subjects (http://www.diabetes.fi/english/risktest/, (18–20). Subjects scoring 12 points or more in the T2D risk test were suitable, if a change in lifestyle was considered to be important from the aspect of work ability. The subjects had to be motivated and willing to participate in group counselling, and those with ongoing serious illnesses (cancer, stroke, poor control of depression or other severe mental diseases), using medication to treat obesity or on VLC diets were excluded.

Five VC groups included subjects (5–9 subjects in each group) from 4 different municipalities. Each group had their group sessions in the meeting room of the health centre of their place of residence. The distance from the counsellor (in the city of Oulu) to these municipalities of the Oulu Arc Subregion ranged from 40 to 91 km; and the distance between the municipalities ranged from 75 to 150 km. FF groups included altogether 41 subjects who worked in Oulu and had their occupational health care in the area of the city. Because of the long distances and as a way to develop new practices of using specialists’ services, the randomization was not done.

Two women became pregnant during the 6-month period and were thus excluded from the analyses. Participants who were not able to attend a group session usually called the counsellor beforehand. The most usual reason for absence from a group session was related to work (e.g., work-related travelling). Only one subject did not participate in any of the 6-month follow-up measurements or group sessions. The subjects were asked to participate in an extra follow-up session at 21 months from baseline.

The study was approved by the Ethics Committees of the Hospital Districts of Helsinki and Uusimaa in 2007, and the 21-month follow up procedures in 2008. The participants received oral and written information regarding the study, and signed a written informal consent form for the collection and use of the data for research purposes. After this they were sent a questionnaire, a timetable and instructions to prepare for a laboratory test and group session.
**Intervention**

The dietary group counselling included 4 90-minute group sessions (5–9 participants in each group) at 2-week intervals with the fifth session at 6 months, and was given by a clinical nutritionist. The overall aim of the dietary counselling was to increase skills to normalize eating behaviour (to improve cognitive eating control) in order to improve weight control; to follow a diet high in fiber, moderate in unsaturated fats, and low in saturated fats; and to exercise regularly at least 4 hours per week. The content of the counselling was similar for both groups; the only difference was that the counselling of VC groups was transmitted via videoconferencing. Videoconferences were transmitted via the PCs of the clinical nutritionist and were held in the meeting rooms of the health centre of the participants’ place of residence. Both PCs had Canon VC-C4 communication cameras. The videoconferencing system worked on the secure, virtual private network of the Oulu Arc Subregion.

Group counselling was aimed at promoting learning and a process of change, and the counselling methods that were used were developed and chosen within a framework of learning theories (constructivism, experimental learning and collaborative learning) and the Transtheoretical Change Model (21). The content of the counselling was well planned and counsellors followed written instructions as far as possible, thus counselling was as similar as possible in all the groups. The material was delivered at the beginning of each group session. The themes of the group sessions were as follows: (1) considering a change in lifestyle, (2) frequency of eating, plate model, amount and quality of food, (3) eating behaviour, (4) good life and weight management, and (5) evaluation of current situations and future plans. Between the sessions, the participants had homework to do, for example, filling out questionnaires and keeping diaries in order to recognize their own habits and to make plans to change unhealthy behaviour; bringing a healthy snack to the meeting; and reading nutritional information labels on food packaging. Counselling methods were intended to activate the participants. These methods included pair and group discussions, a dice game, pictures, booklets, a case example, a snack and written material with different tasks and introspection homework. To increase physical activity, a pedometer was given to all participants in the first group session, and, if they participated in at least 4 of the 5 sessions, they were allowed to keep it.

During the first sessions of the videoconferencing groups, the counsellor informed participants that interaction would take place in the enclosed videoconferencing connection, and instructed the subjects in the use of the equipment and practical issues. At the beginning of each session, the counsellor checked the practical issues related to the interaction transmitted by videoconferencing. This included, for example, volume of voice, speaking one at a time, ensuring the microphone was not covered and arranging chairs in a semi-circle, so that the participants could see each other and so the counsellor could see the faces of all the participants via the camera of the VC device.

**Data collection and analyses**

The subjects were asked to fill in a questionnaire to evaluate the group counselling and feasibility of the videoconferencing, and to rate their own activity in group sessions at 6 months. Furthermore, 2 people were selected randomly from each of the 5 videoconferencing groups for the theme interview at 6 months.
Feasibility of videoconferencing in group counselling

To find out the effects of group process on metabolic control, body weight and waist circumference were measured before the first and last group sessions, and then again after 6 months. Two-hour oral glucose tolerance tests (OGTT), high-sensitivity C-reactive protein (hsCRP) and serum lipids were performed at baseline and after 6 and 21 months. Fasting plasma glucose, total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides were analysed by an automatic analyser (Advia 2400, Siemens, Tarrytown, USA) and insulin by a chemiluminescence system (Advia Centaur) of the same company. HsCRP was measured in serum samples (22).

Theme interviews provided data on experiences of group counselling via videoconferencing

Ten people were interviewed on their experiences of participation in group counselling via videoconferencing. The questions asked were as follows: (1) What was it like to take part in group counselling transmitted by videoconferencing? (2) Do you think it would have been different if the counsellor had been in the same room? If yes how? (3) What are the positive aspects related to group counselling transmitted by videoconferencing? (4) What are the negative aspects? (5) Do you have any ideas on how to develop group counselling transmitted by videoconferencing? (6) How did the videoconferencing influence the group, its work, the atmosphere during the group session, and the role of the counsellor?

The interviews were tape-recorded and transcribed. The qualitative data were analysed by inductive content analysis (23,24) with the help of QSR NVivo 8 software (QSR International Pty Ltd, Melbourne, Australia 2009). First, data were read several times in order to understand a sense of the whole. Second, significant utterances were extracted from the text. Utterances with the same meaning were grouped into subcategories that were named according to their content. The subcategories were considered and the main categories were constructed and named according to their content. Computer assisted qualitative analysis is a good tool for the analysis of large qualitative data. The suitability of QSR NVivo 8 software for inductive content analysis has been examined earlier by Korkiakangas and co-workers (25), who concluded that NVivo is a suitable tool for inductive content analysis.

Statistical analyses

Statistical analyses were performed by the SPSS 15.0. To test statistical significance, Fisher’s exact test and an independent samples t-test were used to find out the differences in outcome measures between the groups. To assess the statistical significance of the metabolic outcome change at 0 to 6 months and at 0 to 21 months, a paired samples t-test was used.

RESULTS

A total of 74 subjects (33 men and 41 women, mean age 49) participated in the study, and only 1 dropped out before the measurements at 6 months. The level of education was somewhat lower among those in videoconferencing groups than in the face-to-face groups (Table I).

Of the participants, 54 returned the questionnaire (26 men, 28 women), 45 participated in laboratory tests and 29 (16 men, 13 women) participated in the extra 21-month follow-up session.
Satisfaction with group counselling via videoconferencing obtained by questionnaire

Group participants gave positive feedback regarding group counselling via videoconferencing. Eighty percent of the subjects in VC group considered that group counselling via videoconferencing was very successful. The results presented in Table II are based on the data collected by the questionnaire. The proportion of subjects who gave positive feedback was higher in the VC groups than in the face-to-face group, especially related to the perceived social support from groups.

Table I. Characteristics of study subjects by group.

|                        | Videoconferencing groups | Face-to-face groups |
|------------------------|--------------------------|---------------------|
| Gender - males         | 11 (33%)                 | 22 (54%)            |
| Age (years) (mean + SD)|                          |                     |
| Level of education     |                          |                     |
| - matriculation exam   | 4 (13%)                  | 17 (42%)            |
| Vocational education   |                          |                     |
| - no vocational education | 5 (15%)               | 6 (15%)             |
| - vocational course / vocational college | 12 (36%) | 12 (29%) |
| - college level training/polytechnic | 6 (18%) | 14 (34%) |
| - university degree    | 1 (3%)                   | 5 (12%)             |
| - other education/education incomplete | 9 (27%) | 4 (10%) |

Table II. Evaluation of group counselling at 6 months.

|                        | Positive | Neutral | Negative | p-value* |
|------------------------|----------|---------|----------|----------|
| Atmosphere             |          |         |          |          |
| Videoconferencing groups (n=31) | 29 (97%) | 1 (3%)  | -        |          |
| Face-to-face groups (n=32)   | 26 (81%) | 5 (16 %) | 1 (3%)  | 0.104    |
| All (n=63)              | 55 (89%) | 6 (9%)  | 1 (2%)  |          |
| Interaction             |          |         |          |          |
| Videoconferencing groups (n=31) | 29 (94%) | 2 (6%)  | -        |          |
| Face-to-face groups (n=32)   | 25 (78%) | 7 (22%) | -        | 0.148    |
| Total (n=63)            | 54 (85,7)| 9 (14,3 %) | - |          |
| One’s own activity in the group |          |         |          |          |
| Videoconferencing groups (n=31) | 20 (65%) | 10 (32%) | 1 (3%)  |          |
| Face-to-face groups (n=32)   | 16 (50%) | 14 (44%) | 2 (6%)  | 0.311    |
| Total (n=63)            | 26 (57%) | 24 (38%) | 3 (5%)  |          |
| Expertise of counsellor  |          |         |          |          |
| Videoconferencing groups (n=31) | 31 (100%) | - | - |          |
| Face-to-face groups (n=32)   | 31 (97%) | 1 (3%)  | -        | 1.00     |
| Total (n=63)            | 62 (98%) | 1 (2%)  | -        |          |
| Received counselling material |          |         |          |          |
| Videoconferencing groups (n=31) | 31 (100%) | - | - |          |
| Face-to-face groups (n=32)   | 27 (84%) | 4 (13%) | 1 (3%)  | 0.053    |
| Total (n=63)            | 58 (92%) | 6 (6%)  | 1 (2%)  |          |
| Perceived social support from groups |          |         |          |          |
| Videoconferencing groups (n=31) | 26 (84%) | 4 (13%) | -        |          |
| Face-to-face groups (n=32)   | 15 (47%) | 8 (25%) | 9 (28%) | 0.001    |
| Total (n=63)            | 41 (65%) | 12 (19%) | 9 (15%) |          |
| Would you recommend this kind of group counselling to your friends and relatives? |          |         |          |          |
| Videoconferencing groups (n=31) | 31 (100%) | - | - |          |
| Face-to-face groups (n=32)   | 24 (75%) | 6 (19%) | 2 (6%)  | 0.005    |
| Total (n=63)            | 55 (87%) | 6 (10%) | 2 (3%)  |          |
| Perceived benefit from group counselling |          |         |          |          |
| Videoconferencing groups (n=31) | 30 (97%) | 1 (3%)  | -        |          |
| Face-to-face groups (n=32)   | 22 (69%) | 8 (25%) | 2 (6%)  | 0.006    |
| Total (n=63)            | 52 (83%) | 9 (14%) | 2 (3%)  |          |

* Fisher’s exact test, two-tailed p-values: positive vs. others (neutral and negative combined).
to perceived social support from group peers (p=0.001) and to perceived benefit from group counselling (p=0.006). Moreover, all participants in the VC groups would recommend this kind of group counselling to his/her friends and relatives, while the respective proportion was 75% in the face-to-face groups (p=0.005).

Experiences of group counselling via videoconferencing obtained by theme interviews
Technical problems and the malfunctioning of videoconference equipment, such as errors in connection or bad quality of voice, were listed as the negative experiences of the VC groups. However, participants understood that these difficulties are not really barriers to videoconferencing but a challenge to further developing the technique. They also claimed that a big screen would be better than the one used.

“It’d be fine if the connection was good, and the sound and picture quality was guaranteed, then that would be really good. But when it’s like this, it’s annoying.”

“Can it be helped if the equipment plays up? Sometimes it works fine. The technology, that is.”

However, experiences were mainly positive. Discussion transmitted by videoconferencing was considered to be even more relaxed than discussion in the face-to-face groups. The main reason for this was the small number of group participants. Attitudes towards videoconferencing were positive. It was considered a modern way of providing the services of a clinical nutritionist to sparsely populated areas and municipalities. Only a few of the participants had earlier experiences of videoconferencing in consultations between general practitioners and patients in one municipality.

“...this kind of technique can be relaxing in a way...because the counsellor isn't actually present...”

“If the group is big, it’s difficult to arrange this. But with smaller groups, it works really well, no problem!”

“It’s cheaper anyway, than having to go somewhere. I guess that’s it. Nowadays you can do anything with technology, so why not? There should be more stuff like this.”

Videoconferencing had no influence on group work, atmosphere or the role of the counsellor. Participants claimed that it would be beneficial for a counsellor to meet each participant individually. The videoconferencing groups would also have liked one face-to-face session with the counsellor in order to strengthen networks and form a commitment to the group. For example, exercising by walking together was suggested.

“The only thing was, that we would have liked 10–15 minutes alone with the counsellor, or even in pairs with the counsellor. That was something that was missing at the end. It would have been the icing on the cake. Because there were 6 or 7 of us in our group, then in the 1.5 hour sessions we would have each got 15 min. I just think that would have been really good at the end. That we would have been closer somehow, and it would have been more personal.”
Table III. Anthropometric measurements and levels of glucose, insulin, serum lipids and high-sensitivity C-reactive protein [mean (SD)] at baseline and 6-month follow up.

| Videoconferencing groups | Face-to-face groups |
|--------------------------|---------------------|
|                          | p-value<sup>a</sup> | p-value<sup>b</sup> | p-values<sup>b</sup> differences between groups at baseline<sup>c</sup> and 6 months<sup>d</sup> |
|                          | 0 vs. 6 months | 0 vs. 6 months | 0 vs. 6 months | 0 vs. 6 months |
|                          | Baseline | 6 months | n=33 | n=33 | Baseline | 6 months | n=41 | n=37 |
| Body weight (kg)         | 92.0 (21.2) | 91.3 (21.1) | ns | 96.9 (15.4) | 94.8 (15.4) | ns | ns | ns |
| BMI (kg/m<sup>2</sup>)   | 33.7 (6.8) | 33.5 (6.9) | ns | 33.1 (4.8) | 32.4 (4.6) | ns | ns | ns |
| Waist circumference (cm) | 107.7 (16.2) | 105.8 (16.5) | 0.004 | 110.8 (10.6) | 107.4 (11.7) | 0.007 | ns | ns |
| Fasting blood glucose    |               |               |               |               |               |               |               |               |
| (mmol/l)                 | 6.0 (0.7) | 6.0 (0.7) | ns | 6.0 (0.7) | 5.9 (0.6) | ns | ns | ns |
| 30-min glucose (mmol/l)  | 9.5 (2.7) | 9.6 (2.5) | ns | 9.2 (2.1) | 9.2 (1.7) | ns | ns | ns |
| 120-min glucose (mmol/l) | 6.9 (2.5) | 6.8 (2.1) | ns | 7.1 (2.5) | 6.8 (2.1) | ns | ns | ns |
| Fasting insulin (mmol/l) | 13.4 (9.1) | 13.0 (8.5) | ns | 13.5 (7.3) | 12.6 (7.3) | ns | ns | ns |
| 30-min insulin (mmol/l)  | 94.5 (54.6) | 88.7 (46.6) | ns | 96.0 (61.2) | 97.6 (59.5) | ns | ns | ns |
| 120-min insulin (mmol/l) | 76.4 (73.0) | 71.7 (69.5) | ns | 80.8 (63.4) | 77.6 (64.8) | ns | ns | ns |
| Serum total cholesterol  |               |               |               |               |               |               |               |               |
| (mmol/l)                 | 5.4 (1.1) | 5.3 (1.1) | ns | 5.2 (0.9) | 5.3 (0.8) | ns | ns | ns |
| Serum HDL-cholesterol    |               |               |               |               |               |               |               |               |
| (mmol/l)                 | 1.47 (0.33) | 1.37 (0.24) | ns | 1.42 (0.30) | 1.43 (0.36) | ns | ns | ns |
| Serum LDL-cholesterol    |               |               |               |               |               |               |               |               |
| (mmol/l)                 | 3.6 (1.0) | 3.6 (1.0) | ns | 3.3 (0.8) | 3.4 (0.7) | ns | ns | ns |
| Serum Triglycerides      |               |               |               |               |               |               |               |               |
| (mmol/l)                 | 1.53 (0.69) | 1.67 (0.78) | ns | 1.72 (0.98) | 1.61 (0.73) | ns | ns | ns |
| High-sensitivity         |               |               |               |               |               |               |               |               |
| C-reactive protein       | 4.3 (4.4) | 6.1 (7.9) | ns | 3.9 (4.5) | 3.0 (3.1) | ns | ns | p=0.036 <sup>e</sup> |

ns p>0.05; <sup>a</sup> paired samples t-test; <sup>b</sup> independent samples t-test for differences of mean by group; <sup>c</sup> at baseline; <sup>d</sup> at 6 months.

Table IV. Proportions of subjects with normal and abnormal glucose tolerance at baseline and 6 months and proportion of subjects by weight change from baseline to 6 months by groups.<sup>f</sup>

| Videoconferencing groups | Face-to-face groups |
|--------------------------|---------------------|
|                          | 6 months | 6 months |
|                          | n=27     | n=29     |
|                          | n=38     | n=35     |
| Normal glucose tolerance<sup>1</sup> | 52 % | 59 % | 58 % | 60 % |
| Elevated fasting glucose<sup>2</sup> | 26 % | 24 % | 18 % | 20 % |
| Impaired glucose tolerance<sup>3</sup> | 22 % | 17 % | 18 % | 17 % |
| Diabetes<sup>4</sup> | 0 % | 0 % | 5 % | 3 % |
| 100 % | 100 % | 100 % | 100 % |
| No weight change | na | 3 % | mean (range) | na | 0 % | mean (range) |
| Reduced weight | na | 52 % | -1.6 (-0.2; -4.8) | na | 39 % | -2.5 (-0.2; -8.1) |
| Weight gainers | na | 45 % | 3.5 (0.1; 10.3) | na | 61 % | 3.1 (0.1; 9.4) |
| na | 100 % | 100 % | 100 % |

<sup>1</sup> Fasting glucose <6.0 mmol/l, 2-hour glucose <7.7 mmol/l.
<sup>2</sup> Fasting glucose 6.1-6.9 mmol/l, 2-hour glucose <7.7 mmol/l.
<sup>3</sup> Fasting glucose <7.0 mmol/l, 2-hour glucose 7.8-11.0 mmol/l.
<sup>4</sup> Fasting glucose >7.0 mmol/l, 2-hour glucose >11.1 mmol/l.
<sup>f</sup> No significant differences between the treatment groups.
Results on waist circumference, body weight and metabolic control

Waist circumference decreased significantly (<0.01) in both groups during the first 6 months (Table III). No significant changes or differences between the groups were observed in body weight or in the mean values of glucose, insulin or serum lipids. The face-to-face groups had a significantly lower high-sensitivity C-reactive protein (hsCRP) at 6 months compared to the videoconferencing groups (p=0.036). Almost 2 out of 5 had abnormal glucose tolerance (Table IV). Of the subjects as a whole, 39% in the videoconferencing and 59% in the face-to-face groups had lost some weight during the first 6 months.

From baseline to 21 months, waist circumference decreased significantly (Table V). In other laboratory measures, no significant changes were observed.

DISCUSSION

This study provides a model of how to integrate specialist services into the processes aimed at preventing and treating type 2 diabetes in primary and occupational health care, and it shows that setting up counselling groups via videoconferencing in remote areas is feasible. Positive feedback from the VC groups may be a result of the special attention given to promoting good interaction during the sessions and because the counselling methods challenged the group participants to actively take part. Group counselling sessions were well-planned and had clear structures. These results are promising, as they show that new technological applications can be used in health care to provide specialist services in remote areas that diminish inequity related to the availability of health care services.
Feasibility of videoconferencing in group counselling

The proportion of subjects who received a lot of social support from other group participants was higher in the VC groups than in the face-to-face groups. The reasons for this are not known, and further studies are needed to understand this better. Perhaps group dynamics are different in videoconferencing groups compared to face-to-face groups. It is possible that the counsellor gave more room to the mutual interaction of the group participants due to the videoconferencing and thus favoured participant-centred action, although the content of the intervention was as similar as possible in all VC and FF groups. Social support is an important resource for health and lifestyle changes (26). Because the prevalence of T2D is increasing at alarming rates (27) and because the resources of health care are limited, one important aspect is to promote the formation of self-help lifestyle peer groups in the future that continue their activity in loose connection to health care. Members of a peer group can develop and share knowledge, as well as new strategies and ideas, solving problems together and supporting one another. Group counseling is a good way to start this process, and one of its important aims might be to encourage the peer group members to give and receive more social support to one another.

The study results show that the group counselling methods were beneficial for at least some of the participants. Waist circumference decreased during the first 6 months partly as a result of an increased level of exercise, as shown earlier (28). Furthermore, waist circumference was significantly lower at 21 months. Two out of 5 in the VC groups and 3 out of 5 in the face-to-face groups lost some weight during the first 6 months. However, when evaluating lifestyle counselling, there are cognitive and behavioural outcomes that are part of the continuum of outcomes (29,30). Our previous reports have shown that most of the subjects (68%) were in the contemplation stage at baseline and proceeded forward during 6 months to the preparation or action stage (31). In the contemplation and preparation stages, according to the Transtheoretical Change Model (21), the change process involves more cognitive processes, thus there are few marked changes in metabolic parameters as a result of behavioural changes. Working-aged people may be more prepared to commit themselves to shorter treatment protocols, as indicated by the low drop-out rate in this study, but evaluation methods to show that they have started the change process must be developed, because the contemplation phase has been proposed to last for up to 6 months. If changes in body weight or blood glucose are only measured to evaluate the effectiveness of the counseling and if cognitive and behavioural changes are not detected and made visible, the results may be disappointing for the participants and the counsellors alike, and the lifestyle change process may not move on to the action and maintenance stages.

The strengths of this study were that the counselling of the intervention was theory based and we used mixed methods to evaluate the feasibility of group counselling via videoconferencing. Feasibility was assessed from feedback to counselling and videoconferencing obtained by questionnaires and theme interviews, and by studying the effect of counselling on metabolic measures. One limitation of the study was that the subjects may have tried to please the interviewer during theme interviews, and thus the results related to the experiences of videoconferencing might be posi-
Feasibility of videoconferencing in group counselling
tively coloured. Another limitation was that we were not able to perform a randomized study because of regional reasons and long distances between the municipalities.

The main issue is still how to increase the effectiveness of dietary counselling and lifestyle interventions that can help healthy people at an elevated risk of T2D change their dietary habits and other lifestyle factors in order to prevent or at least to postpone the development of T2D, which is an increasing public health as well as occupational health problem. The DPS study on subjects with impaired glucose tolerance showed that the intervention was the most effective among the eldest and among those scoring the highest points on the diabetes risk test (20). It seems that the fear and threat of disease is a good motivator for lifestyle changes. In this study, most of the subjects had normal glucose tolerance and thus we can suggest that if the deterioration of health status is stopped by the promotion of a healthy lifestyle, then the intervention has been successful.

We used active counselling methods, the main idea of which was to challenge participants to actively take part in the sessions. The use of active counselling methods enabled the group to continue its work, that is, to play a dice game despite interaction with the counsellor being interrupted due to technical problems during the videoconferencing group. The feedback from the counselling session was positive. Almost all participants reported experiencing benefits from the group and claimed that they would recommend this kind of group counselling to their friends and relatives. Thus, this seems to be a good start to developing counselling methods that are effective. Learning theories could be used to further develop this process.

In conclusion, it is feasible to set up group counselling sessions with a clinical nutritionist through videoconferencing to remote areas. This process is one way to provide specialists services and diminish inequity related to health care services in sparsely populated areas. The development of lifestyle counselling in the context of learning theories should be continued in order to increase the effectiveness of these counselling methods.

Acknowledgements
This study was financially supported by the Academy of Finland (118176).

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