

Telenursing through SMS (Short Messaging Service): It's Effect on Knowledge and Adherence

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ABSTRACT

The DeFIT it! Program utilizes the use of a diet diary and health teaching through the use of SMS texting. It was designed for the respondents to acquire knowledge on proper diet and physical activity. The program aims prevention of weight-related diseases such as Hypertension, Type II *Diabetes mellitus*, and cardiovascular diseases among overweight college students. The sample consisted of 24 students with a body mass index (BMI) between 25.00-25.99 kg/m². Respondents in the experimental group were subjected to telenursing by receiving 4 daily short messaging services (SMS) for 21 days regarding health education on proper diet and physical activity, and reminders to follow the DeFIT it! Program. Both the experimental and control group were administered with a pretest and a posttest knowledge evaluation questionnaire before and after the implementation of the study, underwent a weekly body mass index assessment, and were given a DeFIT it! Booklet and DeFIT it! Diary during the initial contact with the respondents. Interestingly, statistical analysis of the data showed that there is a significant increase in the knowledge of telenursing users. However, there is no significant difference on the physical activity and diet adherence scores of telenursing users when compared to nontelenursing users. Also, it was observed that there is a significant decrease in the BMI of the nontelenursing users group which may be attributed to their low diet adherence scores. Thus, telenursing with the use of SMS is effective in increasing the subjects' knowledge regarding proper diet and physical activity.

Keywords: Telehealth-Telenursing-Knowledge-Adherence-Diet

INTRODUCTION

Telehealth nursing is the use of nursing process to provide care to individual patients or defined patient populations over telecommunication devices. [1] It is the delivery, management, and

coordination of care and services provided via telecommunications technology within nursing domain. [2] With its uses and advantages, telehealth nursing is one intervention that may be implemented to address growing concerns regarding health.

One of the growing health concerns is the problem on the risks of being overweight. Being overweight is having a body mass index (BMI) equal to or above 25. Throughout the world, there were approximately 1.6 billion adults aged 15 and above who were overweight in the year 2005 and it is further projected that by the year 2015, approximately 2.3 billion adults will be overweight. [3] In the Philippines, 19.6% of the population is classified as overweight. [4]

Globally, this is attributed to factors such as the shift in diet towards increased intake of energy dense foods which are high in fat and sugars but low in vitamins, minerals and micronutrients. Another factor is the growing trend towards decreasing physical activity due to the increasing sedentary nature of work, changing modes of transportation and increasing urbanization. [3]

People who are overweight are directly associated with the risk of acquiring a lot of chronic illnesses such as heart disease, hypertension, hyperlipidemia, and Type II *Diabetes mellitus* (T2DM). [4][5][6] Maintenance of a healthy weight through the practice of a healthy lifestyle largely contributes to the prevention of the aforementioned diseases.

Different lifestyle modification programs, diet regimens and exercises are being developed and presented for weight loss and healthy weight maintenance. According to Lang and Froelicher (2006) [7], it is recommended that the combination of diet therapy with low-calorie diet, increased physical activity, and inclusion of behavioral therapy should be incorporated to achieve best treatment outcomes. Some of these programs may be proven highly effective if people who enrolled became aware of proper diet and physical activity and know the importance of understanding and adhering to healthy lifestyle.

The study utilized telehealth nursing care in providing patient education and monitoring its effects on patient knowledge and adherence on a proper diet and exercise program in an effort towards health promotion and disease prevention.

METHODS

Design

The study utilized the quasi-experimental with a Pretest Posttest Nonequivalent Control Group design, where in the participant were given a pre-test before and after the program was executed. Participants in the experimental group were subjected to telehealth by receiving 4 daily SMS for 21 days regarding health education for proper diet and physical activity, and reminders to follow the DeFIT it! Program. Both the experimental and control group were administered with a pretest and a posttest questionnaire before and after the implementation of the study, underwent a weekly body mass index assessment, and were given a DeFIT it! Booklet and DeFIT it! diary during the initial contact with the respondents. This design determined whether a provision of health teachings and reminders through SMS increased the experimental group's awareness to proper diet and physical activity and adherence to the dietary and physical activity modification program and decreased their weight compared to the control group who did not receive reminders and teachings through SMS.

Subjects

The sample consists of 12 subjects for the experimental group and 12 subjects for the control group. The researchers gathered subjects that fitted the inclusion criteria. Convenience sampling was used and no randomization was done. At the start, 30 subjects were gathered and subjected to the study. During the first week of implementation, 6 subjects withdrew from the study, 3 respondents from the experimental group and 3 respondents from the control group. Their reason was because of the lack of time because of the busy schedule.

The respondents came from non-health related courses in the University of Santo Tomas. From this population, the researchers chose those who met the inclusion criteria; students who have a BMI of 25.0 kg/m² to 29.99 kg/m², own and know how to use cellular phones, are aged between 18-25 years old, passed the Physical Activity Readiness Questionnaire (PAR-Q test), have a place to jog/ do physical activities or have exercise equipment such as treadmill or bicycle, not enrolled in other weight reduction programs, willing to undergo a 21-day program regarding proper diet and physical activity, not smoking and are enrolled in a non-health related course in the University of Santo Tomas.

Knowledge Exam

It measured the subject's knowledge on proper diet and physical activity and being overweight as a risk factor for weight-related diseases. The reliability coefficient of the questionnaire was tested through Cronbach's Alpha and the computed value is 0.79.

DeFIT it! Booklet

The DeFIT it! Booklet contained information related to proper diet and physical activities. For the diet part of the booklet, it contained the food exchange list and a diet plan. The physical activity part of the booklet contained the steps for warm up and cool down exercises, guidelines about the physical activity proper, and the Borg Scale: Rate of Perceived Exertion for the respondents to identify the intensity of their exercise.

DeFIT it! Diary

This contained a daily health tip either about diet or exercise regarding the different weight related diseases specifically cardiovascular disease, hypertension, and Type II *Diabetes mellitus*. The researchers provided a food and physical activity diary for both the experimental and control group. All the subjects were asked to place a check mark in a four point scale rank as follows:

- 0- Had not eaten/ done anything
- 1- Less than recommended
- 2- As recommended
- 3- More than recommended

They were instructed to accomplish this when they did the physical activity and diet recommended for the day. This reflected the subject's recent dietary intake and physical activities.

Telehealth Nursing Protocol

The telehealth nursing protocol consists of sending daily SMS to the subjects of the treatment group for 21 days. The protocol consists of the list of messages that was sent every day.

The SMS are classified into two. SMS health teaching messages were based on health teachings written in the booklet. On the other hand, SMS reminder messages consist of messages which remind the subjects to perform their physical activity and follow the recommended diet plan given for the day.

Data collection procedure

Permission for data collection was obtained from the Deans of the different non-health related colleges. The researchers informed the participants regarding the study through an orientation, explaining the procedures of the program and the advantages and disadvantages of the study to be conducted. Initial body mass index was assessed and recorded. The participants were then given a

knowledge exam, which they immediately accomplished, a DeFIT it! booklet and a DeFIT it! diary. Only those participants who were assigned to the experimental group were given SMS messages, following the telehealth nursing protocol, from the researchers to remind them to accomplish the assigned tasks and diet plans in the diary. Both groups were then messaged after every seven days for three consecutive weeks to return their accomplished weekly diary, their body mass index were then assessed and recorded. On the third week, the participants were given the same set of knowledge exam and final body mass index and diaries were collected.

Statistical Analysis

For the statistical treatment, the researchers used the Microsoft Excel ver. 2007. They also utilized the following statistical tools. Paired t-test was used to compare the pre-test and post test of the participant as well as their body mass index before and after the program. Independent t-test was then used to compare the control and experimental group's adherence to the recommended physical activity and diet.

RESULTS

Patient Characteristics

Based from the inclusion criteria, a total of 24 subjects were included in the study. Twelve subjects were assigned to the experimental group and twelve subjects were assigned to the control group. Convenience sampling was used and no randomization was done. All of the respondents came from non-health related colleges of the University of Santo Tomas.

Adherence

As measured by the Physical Activity Adherence Scale (PAAS), the mean score of both the nontelenursing users (3.01) and the telenursing users (2.83) are non-adherent to the prescribed physical activity because they perform it in less than the recommended amount. The t Stat between the two groups is 0.29 while the t Critical two-tail is 2.08 (Table 1). Since the t Stat value is less than the t Critical two-tail, it means that there is no significant difference between the two groups.

Table 1 Summary of the Independent T-test Scores Scores of Nontelenursing and Telenursing Users

	Control, (n=12)	Experiment, (n=12)
Mean	3.01	2.83
Variance	2.88	1.93
Observations	12	12
t Stat		0.29
P(T<=t) two-tail		0.78
t Critical two-tail		2.08

n, number of participants

The mean diet adherence scores of the telenursing and nontelenursing users group fall in the non-adherent category since both groups eat the less than the recommended amount of food. However, the telenursing users group has a mean score which is closer to the adherent category in terms of their fruit, meat, fat and rice intake. When the diet adherence scores were subjected to statistical treatment, (Table 2) all t Stat values are

below the t critical two-tail values which is why it can be concluded that there is no significant difference in the diet adherence scores of the telenursing and nontelenursing users group.

Table 2 Summary of the Independent t-Test Scores for Diet Adherence

	Fruit		Meat		Fat		Rice		Milk		Vegetable	
	C	E	C	E	C	E	C	E	C	E	C	E
Mean	5.46	5.75	6.99	7.72	6.89	7.46	6.01	6.08	0.39	0.34	1.50	1.42
Variance	1.58	3.45	1.01	2.74	1.51	2.06	2.84	1.61	0.25	0.08	0.75	1.12
Observations	12	12	12	12	12	12	12	12	12	12	12	12
t Stat	-0.44		-1.30		-1.04		-1.12		0.29		0.19	
P(T<=t) two-tail	0.66		0.20		0.31		0.91		0.78		0.85	

t Critical two-tail	2.09	2.10	2.07	2.09	2.11	2.08
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C, Control group; E, experimental group

Efficacy

Compared to the pre-test scores, there is an increase in the post-test scores of the respondents included in the nontelenursing and telenursing users group. Both group's pre-test score average is 14. However, the telenursing user's post-test score average of 16 is higher as compared to the nontelenursing users post-test score average of 15. When subjected to statistical treatment (Table 3), the telenursing users group's t Stat value of 1.88 is more than the t Critical one-tail value of 1.80

which means that there is a significant increase in their knowledge before and after the study. Meanwhile, the nontelenursing users group's t Stat value of 1.01 is less than the t Critical one-tail value of 1.80 which means that there is no significant increase in their knowledge before and after the study. Although the telenursing users had a higher post-test score average, it was not enough to bring about a significant difference.

Table 3 Summary of the Paired T-Test for Two Sample Means for the Pre-Test and Post-test Scores of the Nontelenursing and Telenursing Users Group

	Control, (n=12)		Experiment, (n=12)	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Mean	13.67	14.58	14.42	15.75
Variance	3.52	8.63	1.90	8.93
Observations	12	12	12	12
Pearson Correlation	0.20		0.58	
t Stat	1.01		1.88	
P(T<=t) one-tail	0.17		0.04	
t Critical one-tail	1.80		1.80	
P(T<=t) two-tail	0.33		0.09	
t Critical two-tail	2.20		2.20	

n, number of participants

There is a decrease in the mean body mass index from 27.25 to 26.94 in the telenursing users group after they were given health teachings and reminders on proper diet and physical activity. However, there are those who had an increase their body mass index after the study. Meanwhile, the nontelenursing users group generally had a decrease in their body mass index after the study. The control group's t Stat value of -3.33 is more than the t critical one-tail value of 1.8 which means that there is a significant decrease in the body mass index of the nontelenursing users before and after

the study (Table 4). On the other hand, the experiment group's t Stat value of -1.63 is less than the t critical one-tail value of 1.8 which means that there is no significant decrease in the body mass index of the telenursing users before and after the study (Table 4). When the mean scores of both groups were subjected to statistical treatment, it shows that there is no significant difference between the body mass index of the telenursing users and nontelenursing users after the study.

Table 5 Summary of the Paired T-Test for Two Sample Means for the Initial and Final Body Mass Index of the Nontelenursing and Telenursing Users Group

	Control Group, (n=12)		Experiment Group, (n=12)	
	Initial	Final	Initial	Final
Mean	26.99	26.27	27.25	26.94
Variance	4.0	2.73	2.96	3.64
Observations	12	12	12	12
Pearson Correlation	0.93		0.94	

t Stat	-3.33	-1.63
P(T<=t) one-tail	0	0.07
t Critical one-tail	1.8	1.8
P(T<=t) two-tail	0	0.13
t Critical two-tail	2.20	2.20

n, number of participants

DISCUSSION

The use of telenursing intervention in increasing the knowledge of participants regarding proper diet and physical activity for the prevention of weight related diseases such as Hypertension, Type II *Diabetes mellitus*, and cardiovascular disorders has a significant difference compared to not using telenursing intervention. However, telenursing interventions do not have a significant impact to a participant's adherence to a recommended diet and physical activity when compared to a participant not receiving telenursing interventions.

Subjects of the DeFIT it! Program stated that they have little time to do physical activities due to their academic activities. Even though the researchers were able to make the physical activity plan flexible to their time, participants still had a hard time adhering to it. Lack of time is one common de-motivator of participants in a physical activity program.^[8] Recommending the exercise to be done in fraction would be more achievable than recommending it in bulk. The choice of diary may also have affected their adherence. Giving the subjects a choice of their own type of diary, may improve adherence which in turn, may improve weight management outcomes.^[9]

Telenursing did not affect the adherence of experimental group to the diet plan recommended as shown in the similarities of the mean scores of adherence to the control group. This may be attributed to lack of money and lack of time. College students generally have very poor diet habits. College is inordinately expensive and even though financial aid can help cover these expenses, students often don't have a lot of money left over to live.^[10] Eating healthy can be expensive. A lack of time also makes it difficult for college students to eat healthy. The full time student usually has 8 hours of class a day, time for eating usually is taken for granted. They eat too much junk food and they eat sporadically, eating a huge breakfast (or no breakfast at all) before classes, and then cramming as much food as they can in during their lunch break.

The increase in the mean scores between the pre-test and post-test scores of the telenursing group may be attributed to the health teachings which are included in the DeFIT it! Diary and the daily text messages sent to them. The effect of educational reminder messages was produced as soon as the intervention was delivered and maintained throughout the intervention period.

There was no evidence of the effect of the intervention wearing off.^[11] On the other hand, the control group did not receive daily text messages to remind them of the health teachings which are included in the booklet. If there are no reminder messages, then the control group will not have a tool to use a means of retaining knowledge other than their DeFIT it! Booklet.

As discussed earlier, it can be identified that the nontelenursing users are adhering less in more aspects of the diet plan (fruit, meat, fat and rice intake) than the telenursing users. The nontelenursing users have a lesser average when it comes to knowledge on proper diet and exercise. Based on the Information Processing Paradigm, lesser knowledge may bring about lesser adherence. Lesser adherence to the diet plan by having lesser intake than recommended may result to a greater decrease in weight which may result to a greater decrease in body mass index of the nontelenursing users compared to the telenursing users.

CONCLUSION

The use of telenursing intervention is effective in increasing the participants' knowledge, but not adherence, to proper diet and physical activity for the prevention of weight-related diseases such as Hypertension, *Diabetes mellitus* Type 2 and cardiovascular disorders.

RECOMMENDATIONS

Telenursing is an emerging field of health care not only in the Philippines but all around the world. It can be promoted and taught to students through seminars to equip budding nurses with the new and continually developing skills and knowledge which can help them be competitive in a worldwide setting. Other forms of telenursing interventions can be implemented in future studies because it can help save both the time of the nurse and the client since assessment, follow-ups and inquiries could be done through call and text. However, it must be remembered that telenursing enhances health care and that there is no alternative for human care through face to face contact. Also, this study can be replicated in a different setting and population. Since the study was conducted in three weeks time only, future researchers may conduct a similar study but with longer time frame. The recommended length of implementation is three

months to achieve gradual and healthier weight loss. A time-series design can be used to observe the subjects' change in behaviour while having the telenursing intervention. Also, subjects who have more time to adhere and do the program are recommended because full time college students have their academic curriculum as priority.

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