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# Educational Materials and Brief Counseling Improve Diabetes Knowledge and Self-Efficacy

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The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Assistant Dean for MSN and DNP Studies, on behalf of the program; we verify that this is the final, approved version of the student's DNP Project including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Tamara K. Wellman, Student

Dr. Karen Stefaniak, Advisor

Final DNP Project Report

Educational Materials and Brief Counseling Improve Diabetes Knowledge and Self-

Efficacy

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Spring 2013

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#### Dedication

I would like to dedicate this work to my family who have loved and supported me throughout this endeavor. Also, a special note to my friends and colleagues who I am fortunate to have in my life who have encouraged me and reminded me that with hard work anything is possible, especially Carol, Ruth and Terri who have lifted me up when I have needed it most. Finally, I would like to thank God who has walked silently and steadily beside me and blessed me with so much.

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Introduction to Final DNP Report

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Providing patients with information to manage their chronic disease, such as diabetes, and encouraging positive changes in healthcare behavior can lead to improved health and a decrease in medical expenses. Primary care providers may have limited time to take care of individuals with diabetes, so programs that provide these patients with information regarding diabetes and the skills necessary to manage their disease are increasingly important.

Implementing and evaluating interventions with a comprehensive approach is imperative, especially for those in rural areas. Interventions should increase patients' diabetes knowledge, self-efficacy and motivation allowing them to improve their diabetes self-management.

Low cost methods are needed for improving diabetes management, most commonly in low-literacy, low-economic and rural areas. Individuals that live in rural areas may have limited access to specialty care and may have decreased means to pay for education. It is important to determine education delivery that is accessible to the patient in the office setting, as well as in areas where healthcare professionals may not be easily accessible. Cost-effective methods involving technology may be beneficial; as if the patient is unable to afford the means to access the material there are often facilities that have such things as internet access or computers for public use.

Programs that are capable of being delivered in multiple ways may be of benefit to the patients with diabetes and those involved in their care. Programs available online may be combined with interaction from a healthcare professional in person or by means such as telephone or email to assist individuals in developing an action plan to improve diabetes knowledge, self-efficacy, and metabolic outcomes for the patient and educate others to

assist in their care. Programs such as this may decrease cost of delivery, as well as improve healthcare behaviors and preventive measures that will decrease overall healthcare costs. Review of Diabetes Teaching Methods

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#### **Review of Diabetes Education Delivery Methods**

Diabetes is a chronic and progressive disease that can impact the life of an individual as well as the lives of their friends and families. High levels of blood glucose resulting from defects in insulin production, insulin action, or both are characteristics of diabetes (Kentucky Cabinet for Health and Family Services, 2009). The number of people with type 2 diabetes is expected to increase worldwide from 175 million in 2000 to 353 million in 2030 (Yach, Stuckler, & Brownell, 2006). Approximately 23.6 million Americans have diabetes, this includes 5.7 million of who do not know that they have the disease (United States Department of Health and Human Services, 2010; National Institutes of Health, 2008). Diabetes can occur at any age but primarily affects people over the age of 40, however the chance for individuals to acquire diabetes increases 0.4% with each year over age 20 (Yach et al., 2006).

Diabetes management can be complex. Lifestyle behaviors and pharmacological treatments can affect the control of diabetes, which are primarily the responsibility of those affected. Successful management of type 2 diabetes requires individuals to commit to lifestyle changes such as healthy diet, physical activity and preventive care in order to adhere to recommended guidelines (American Diabetes Association, 2008; American Association of Diabetes Educators, 2008; Kentucky Cabinet for Health and Family Services, 2010). A person with diabetes needs knowledge about the disease, how it affects the body, and the ways in which lifestyle choices minimize the effect of the disease process (American Diabetes Association, 2008; American Association of Diabetes Educators, 2008). Normalization of blood glucose, levels of blood pressure and

lipids are some basic targets of diabetes education and control of these measurements are associated with a reduction in the risk of complications.

The goal of patient education is to empower patients by improving their diabetes knowledge, self-efficacy and confidence, enabling them to take increasing control of their disease. Structured educational programs for diabetes self-management are often directed by a provider or diabetes educator who has been specifically trained to help people with diabetes gain the knowledge that includes a multitude of interventions that provide information regarding the disease, as well as teach management skills regarding diet, exercise, self-monitoring and medication.

This purpose of this review is to examine different teaching methods that are used to educate individuals with type 2 diabetes and the effectiveness of the method, according to the quality indicators.

#### Methods

**Search methods.** The EBSCO host electronic database was used to search for articles published from 2005 to 2012. The search used the electronic databases of CINAHL with full text, Education Full Text, ERIC, Health Source, MEDLINE, and PsychINFO. The EPOC search strategy was used using words such as "diabetes education," "intervention," "measurement," "outpatient," and "primary care," and all combinations were considered.

**Study selection.** A total of 1156 titles and abstracts were screened for eligibility. Studies included in this review discussed the effectiveness of outpatient diabetes education delivered to the patient with type 2 diabetes and the methods that were used to deliver the education. Studies included also identified different quality indicators that have been explored to measure the success of the program. Studies were included if they met the following criteria: 1) randomized or quasi-randomized trials randomized by patient, healthcare professional, or practice; and 2) nonrandomized studies controlled at a second site with data before and after the intervention. Studies not published in English, available only as abstracts, did not include evaluation of a quality indicator, or that did not address the patient in an outpatient setting were excluded.

#### Results

**Search results.** Twenty eight articles were identified that included evaluation of quality indicators, provide education by electronic delivery, provider-specific delivery or delivered by written educational material or lecture. These articles are identified in the table with the accompanying citation and level of evidence grade, utilizing the grading system recommended by the U.S. Preventive Services Task Force (2003).

#### **Characteristics of Included Studies**

**Participants.** Each study consisted of 29 to 2912 participants with diabetes, with a total of 12,085 participants. Additional participants included four physicians, 125 nurses (of various education levels), and one physician's assistant, increasing total participants to 12,215. There were 98 individuals that were training for camp counselors, but they were not included in our review. These studies were conducted in six countries and Canada. Participants in all studies were over age 18.

Twenty seven of the twenty nine articles discussed individuals with type 2 diabetes that received outpatient diabetes education. Two articles (Bell, Patel, & Malasanos, 2006; Siminerio, Piatt, & Zgibor, 2005) discussed mixed groups of participants that included patients, as well as healthcare professionals.

**Site selection.** All studies were designed specifically to evaluate outpatient diabetes education. This review used twenty nine articles that explored seven hospitals, three diabetes centers, and 156 primary care centers.

#### **Delivery Method**

Diabetes education was delivered to the patient using various techniques. The studies that were reviewed included delivery with written material and counseling, interactive web-design, video delivery and provider-led education.

**Electronic delivery.** Electronics were used in five studies. The study by Dyson, Beatty, and Matthews (2010) used lifestyle videos to accompany educational material delivered by a practice nurse. The study by Lee, Yeh, Liu, and Chen (2006) compared the results of guideline-based education accompanied by access to an electronic patient oriented diabetic management system (POEM), which showed significant positive changes in glycohemoglobin, fasting blood sugar and cholesterol. Song et al. (2009) and Huang, Chen, and Yeh (2009) used web-based interactive educational programs as alternatives to lectures given by healthcare professionals and the results showed improvement of diabetes knowledge, but no significance in blood sugar or self-efficacy. A computer program that included various topics of diabetes education was used to teach patients, as well increase the base knowledge of healthcare providers in the study by Bell et al. (2006). Although the healthcare providers had a higher base knowledge of diabetes than the patients, the post-test scores were indistinguishable.

**Provider-led delivery.** Specific details related to the provider that delivers the education were reviewed in fourteen studies. Four studies focused on providers that were educated with specific programs that pertain to diabetes education. Deakin and Whitham

(2009) discussed a study where the provider that was prepared with the X-PERT program, which was a structured self-management patient education program delivered the education. This study showed improvements in subjective and objective measurements. The other studies explored education by providers that were educated by a certified diabetes educator (Siminerio, Piatt, & Zgibor, 2005), using the American Diabetes Association guidelines (King & Wolfe, 2009) or specifically regarding diabetes (Sturt et al., 2008). The patients educated by these providers showed improvements in metabolic outcomes such as blood glucose, weight, blood pressure, cholesterol and waist circumference as well as increased diabetes knowledge, increased self-management skills and improved perceived quality of life. The study by Siminerio et al. (2005) found an incidental increase in blood pressure and Sturt et al. (2008) showed improvement in glycohemoglobin, but it was not significant.

Four studies used providers that were protocol driven. McLoughney, Khan, and Ahmed (2007) administered diabetes education that had specific protocols included to treat lipids and hypertension in addition to diabetes. Although the rest of the studies did not include protocols to manage other diseases, Van Sluljsesther et al. (2005) followed the physician based education and counseling program (PACE), Adolfsson, Walkerengstrom, Smide, and Wikblad (2007) used providers that were trained with emphasis on empowerment and Clarke (2011) delivered community oriented diabetes education (CODE) which used emphasis in motivational and facilitating skills, problems solving and goal setting. These studies showed overall improvements in glycohemoglobin, blood pressure, body mass, self-efficacy, diabetes knowledge, and quality of life. Only the

study by Adolfsson et al. (2007) showed no significance in self-efficacy, body mass, or quality of life.

Four studies used Certified Diabetes Educators to deliver education. Gucciardi, Demelo, Booths, Tomlinson, and Stewart (2009) and Davies et al. (2011) had a CDE who led the entire education program. Siminerio, Ruppert, Emerson, Solano, and Piatt (2008) utilized an educator that was a nurse as well as a CDE and Song & Kim (2007) used a CDE that was only a part of an interdisciplinary team that delivered education. Conlon (2010) studied the effectiveness of education that was provided by a nurse practitioner compared to that of the primary care physician. The nurse practitioner group showed better glucose control, but the physician group demonstrated lower patient weights post education with relevance to noted hyperglycemia. Two of the educational programs led by nurse specialists were shown to increase blood pressure control and improve blood glucose. Kulzer, Hermanns, and Reinecker (2007) introduced a program that was led by health psychologists that conducted didactic oriented group interventions which showed improvements in body mass self-efficacy and diabetes knowledge, but the body mass and diabetes knowledge scores were the same in the control group as the intervention group.

Lecture/written delivery. The ten remaining studies delivered the educational material by lecture and written material (Table 2). Three studies focused on implementation of models such as the chronic care model (Yukawa et al., 2010); social cognitive theory (Sevick et al., 2012) using palm pilots, pedometers and glucometers; and Self-Efficacy Enhancing Intervention Program (SEEIP) (Wu et al., 2011). These studies showed improvements in self-efficacy, quality of life and glycohemoglobin, but the improvement in glycohemoglobin was not significant in the study by Sevick et al. (2012).

Two studies followed specific programs, Selea et al. (2011) used the Healthy Lifestyle with Type 2 Diabetes and Krakow and Feulner-krakow (2007) used the LINDA (Living, Interactive, New, Distinguished, Activate) program. Selea et al. (2011) showed increases in glycohemoglobin, diabetes knowledge and self-efficacy, but there were no improvements in glycohemoglobin after 18 months or diabetes knowledge after six months. Krakow and Feulner-krakow (2007) showed improvements in glycohemoglobin, body mass, blood pressure, quality of life and cholesterol, although cholesterol was improved in the control and intervention group.

The five remaining studies used pre and post-tests to evaluate the written educational program. Braun et al. (2009) modified his study to be specific to the geriatric population. Gucciardi, Demelo, Lee, and Grace (2007) directed attention towards solo verse group education and New (2010) used a focus group to create a program and then evaluated the material. These studies showed improvements in self-efficacy, diabetes knowledge and blood glucose in the control and intervention groups. Braun et al. (2009) showed an improvement in glycohemoglobin and New (2010) showed improvements in self-efficacy in only the intervention groups.

In this review there were a variety of measurements used to evaluate the effectiveness of the educational programs. The majority of the programs used metabolic outcomes to measure effectiveness, but measurements of diabetes knowledge, empowerment, confidence, self-management, quality of life and distress were also used to measure effectiveness of the diabetes education provided.

#### **Outcomes Studied**

The success of an educational program can be evaluated by a variety of quality indicators. These indicators can be objective (Table 3), which may include biodemographic values such as glucose, lipids, blood pressure and weight, as well as subjective indicators (Table 4) which rely on results from tests and questionnaires.

**Objective measurements.** Blood glucose measurements were evaluated in twenty one studies. Glycohemoglobin, which is the average glucose measurement over a three-month time period, were evaluated in seventeen studies. Six of these studies (Song & Kim, 2007; Conlon, 2010; Gucciardia et al., 2007; Lee et al., 2006; Kulzer et al., 2007; Reed, Revel, Carter, Hussein, and Dunn, 2005) also showed improvements in fasting blood glucose, however the study by Song and Kim (2007) showed improvement in glycohemoglobin, but no significant changes in fasting blood glucose. Four studies (Huang et al., 2009; Atak et al., 2009; Song, 2007; Song et al., 2009) evaluated fasting blood glucose only. Two of these studies (Huang et al., 2009; Song & Kim, 2007) showed no changes in fasting blood glucose, but the studies by Gucciardia et al. (2007) and Atak et al. (2009) showed improvements in fasting blood glucose after three months.

Lipids were measured in nine studies. All studies showed positive outcomes except Lee et al. (2006) which showed positive outcomes in total cholesterol and high-density lipoprotein (HDL) but showed an increase in triglycerides. Four studies evaluated at least two measurements of lipids. McLoughney, Khan, and Ahmed (2007) and Krakow and Feulner-krakow (2007) measured total cholesterol and triglycerides; Dyson et al. (2010) measured total cholesterol and low-density lipoproteins (LDL); and Siminerio et al. (2008) measured HDL and LDL. LDL were also evaluated and yielded positive results in studies by King and Wolfe (2009) and Siminerio et al. (2005). Eight studies (Table 3) measured effectiveness by measuring outcomes such as waist circumference, body mass index (BMI) and weight. Six studies showed effective programs by evidence of lower measurements in waist circumference, body mass index and weight post education. However, the study by Adolfsson et al. (2007) also evaluated impact of empowerment education and did not show significant change in the weight from pre and post education

Blood pressure was used as a measurement to evaluate the effectiveness in seven studies. McLoughney et al. (2007) and Krakow and Feulner-krakow (2007) evaluated blood pressure, as well as glycohemoglobin, total cholesterol and triglycerides. Glycohemoglobin and fasting blood sugar were evaluated in addition to blood pressure in studies by Reed et al. (2005) and Conlon (2010), where Conlon also evaluated weight. Deakin and Whitham (2009) evaluated glycohemoglobin, total cholesterol, BMI and waist circumference in addition to blood pressure. LDL was evaluated in studies by Siminerio et al. (2005) and King and Wolfe (2009), where King additionally evaluated glycohemoglobin. Two of these studies focused on education material (Krakow & Feulner-krakow, 2007; Reed et al., 2005), while the remaining studies were focused on delivery by the provider (McLoughney et al., 2007; Deakin & Whitham, 2009; King & Wolfe, 2009; Conlon, 2010; Siminerio et al., 2005).

Seven studies evaluated body mass to establish success of their programs. Body Mass Index (BMI), waist circumference, and weight were evaluated by Deakin and Whitham (2009). Weight and BMI were evaluated by Clarke (2011) and Adolfsson et al. (2007), where BMI showed no significance despite a decrease in weight. Van Sluljsesther et al. (2005) measured waist circumference and weight. Four studies only measured one value. Body Mass Index was evaluated in studies by Krakow & Feulner-krakow (2007); Gucciardi et al. (2009); Conlon (2010); and Kulzer et al. (2007), where Kulzer showed no improvement in BMI and Conlon demonstrated a decrease weight.

**Subjective measurements.** Twenty four studies used subjective measurements that were acquired from the results of tests and questionnaires administered pre and post education (Table 4). Fourteen studies measured diabetes knowledge and all but four studies showed positive results, as evidenced by higher post-test scores. In addition to diabetes knowledge, eleven studies also measured self-efficacy.

Seventeen studies evaluated self-efficacy. Eight studies evaluated self-efficacy only and had positive outcomes. The study by Adolfsson et al., (2007) did not show a significant change in self-efficacy scores, however the measurements pre and post education were evaluated at one year instead of three months. Three other studies (Bell et al., 2006; Dyson et al., 2010; Selea et al., 2011) initially showed positive outcomes, but after three month there were no significant changes.

Quality of life was measured in four studies. Two studies (Adolfsson et al., 2007; Clarke, 2011) were evaluated in diabetes knowledge and self-efficacy, as well as quality of life. Adolfsson et al. (2007) did not show a significant change in quality of life. Krakow and Feulner-krakow (2007) and Yukawa et al. (2010) only measured quality of life and were shown to have positive results.

#### Discussion

Despite showing positive outcomes, the results of educational interventions aimed at patients with type 2 diabetes are difficult to interpret due to differences in the interventions, the study designs and the types of outcomes reported.

The interventions that involved provider led educational programs or that were guideline based appeared to be the most successful. The success of the provider led educational program could be contributed to a rapport that has been built between the provider and the patient. A good rapport often encourages attention to the details and importance of the educational material that is presented and discussed. Relationships that are built between the patient and educator can help introduce interventions that are designed for their specific population, as they are often more consistent with improvement of diabetes knowledge, than those that are strict didactic. The guidelines can provide the educators with an outline of the educational material that is needed but it can allow the educator to modify specific areas so it can be better understood by their audience.

Most of the studies showed an increase in the diabetes knowledge and improvement in self-efficacy. However, the follow-up periods in most of the studies were short (three to six months), and some studies examined diabetes knowledge and self-efficacy without regard to metabolic outcomes. Positive changes in diabetes knowledge, self-efficacy and confidence were also shown in studies that had both intervention and control groups, suggesting cross contamination of the subjects. In these studies there were multiple methods used for education so it is not clear what caused the outcomes.

Some studies measured metabolic outcomes such as glycohemoglobin, cholesterol and blood pressure. Where some studies showed a statistically significant effect of education on these measurements, others did not measure these outcomes or did not show an effect on change.

There were no specific educational guidelines for diet, but some of the studies mentioned outcomes such as weight, body mass index and waist circumference. The effect of interventions on any diet change was not stated clearly.

#### Conclusion

After reviewing the literature, studies concluded that providers must be convinced of the importance of changing their practice and motivated enough to carry it out. Combining patient education with a multi-disciplinary team may lead to improvements in the process of care. Awareness and utilization of resources that may be available to the patient need to be considered when tailoring education and instruction. Structured education that is based on evidence-based guidelines have been shown to improve the outcome measures of patients with diabetes, for that purpose alone we should review these guidelines and anticipated goals with our patients. Incidental encouragement regarding lifestyle behaviors may inadvertently influence diet, smoking and physical exercise, which all lead to better disease management. Diabetes education is not limited to the patient with diabetes. Office staff members, family and other individuals that may be an influence to an individual with diabetes may benefit from diabetes education, allowing them to reinforce positive behaviors that enhance metabolic outcomes and knowledge base of the patient.

#### **Recommendations for Further Research**

There is a need for long-term more rigorous methodology that compares different types of appropriate health education within defined age groups and specific populations.

Delivery of diabetes education in the form of electronic interventions may be an area that could be expanded. Opportunities include interactive programs or continuous reinforcement of core guidelines using emails, notifications and telephone calls. Provider based reinforcement at regular primary care visits would deliver needed support to existing diabetes knowledge. Electronic administration of educational material may also be beneficial in the future, especially with the implementation of the electronic medical record. Linking educational reinforcement messages to current metabolic outcomes by electronic delivery may be something that could be beneficial. This would provide the patient with prompt delivery that is unbiased and strictly delivered by outcomes measures and guidelines. Tracking follow up appointments and subsequent metabolic outcomes and interventions implemented to improve a deficiency would prove to be valuable in future diabetes management.

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Table 1Articles Utilized in Review

Grade	Reference	Design	Intervention	Sample	Setting	Follow Up	Results	Conclusion
Good	Sturt, J.	Cluster	The	245 adults	48 Urban	Outcomes	There was no	The Diabetes
/A	A.,	randomize	intervention	with Type 2	general	were assess at	significant	Manual
	Whitlock,	d,	group was	diabetes	practices in	baseline and	difference in	achieved a
	S., Fox,	controlled	given	with a mean	the West	at 26 weeks	HbA1c,	small
	С.,	trial	immediate	age of 62	Midlands, UK		between the	improvement
		ulai		years old.	with high		intervention	in patient
	Hearnsha		education by		population		group and the	diabetes-
	w, H.,		an educated		deprivation		control group	related distress
	Farmert,		practice		levels.		(08%, 95%	and confidence
	A. J.,		nurse,				CI28, .11).	to self-care
	Wakelin,		consisting of				Diabetes	over 26 weeks,
	M.,Dale,		a 15 minute				related distress	without a
	J. (2008).		face to face				scores were	change in
	Psycholog		consultation				lower in the	glycemic
	ical issues		to introduce				intervention	control.
	and		the 12 week				group	Further study
							compared with	is needed to
	education		diabetes				the control	optimize the
	effects of		Manual				group	intervention
	the		program.				(difference -	and
	diabetes		Phone				4.5, 95% CI -	characterize
	manual		support was				*.1, -1.0). Confidence to	those for whom it is
	1:1		provided in				self-care	
	structured		weeks 1,5				scores were	more clinically
	education		and 11.					and
	in primary		und 11.				11.2 point higher (95%	psychologicall y effective to
			The defensed				CI 4.4, 18.0)	support used in
	care.		The deferred				in the	primary care
	Diabetic		intervention				intervention	primary care
	Medicine,		group had				group	
	25, 722-		routine care				compared with	
	731. UK		and after 26				the control	
			weeks of				group.	
			collecting				Stoup.	
			data, this					
			group was					
			introduced to					
			the Diabetes					
			Manual					
			program					
Good	Deakin,	RCT	Individuals	314 people	Individuals	Baseline, 4	By 14 months	The program
/ <b>B</b>	T., &		were placed	with type 2	living in	months and	the X-PERT	trains health
	Whitham,		into	diabetes	Burnley,	14 months	group	care
	C. (2009).		individual	Intervention	Pendle or		compared with	professionals
	Structured		appointment	-157 with	Rossendale,		the control	to deliver the
	patient		(control) or	149	Lancashire,		group showed	six week
	education:		into	completing	UK and		significant	structured
				program.	receiving		improvements	patient
	The X-		(intervention	Control-157	treatment for diabetes		in the mean $IIb A lo (-60)$	education.
	PERT		) where	with 128	ulabeles		HbA1c (6% vs. +0.1%,	Implementation
	programm		patients	completing the program			· · · · · · · · · · · · · · · · · · ·	n has shown excellent
	e. British		attended six	the program			repeated measures	attendance
	Journal of		2 hour group				anova,	rates,
	Communit		sessions of				P < 0.001). The	improved
	y Nursing,		self-				number	diabetes
	14(9),		management				number needed to treat	control,
	398-403.		education				for preventing	reduced
							diabetes	weight, blood
	UK		(X-PERT				medication	pressure,
	1		Program)				increase was 4	cholesterol and
								Cholesterol and

	1						a :	
							confidence	circumference
							interval) and	and more
							for reducing	confidence in
							diabetes	self-managing
							medication was 7 (95%	diabetes that has impacted
							confidence	positively on
							interval).	quality of life.
							Statistically	quanty of file.
							significant	
							improvements	
							were also	
							shown in the	
							X-PERT	
							patients	
							compared with	
							the control	
							patients for	
							body weight,	
							body mass	
							index, waist	
							circumference,	
							total cholesterol,	
							self-	
							empowerment,	
							diabetes	
							knowledge,	
							physical	
							activity levels,	
							foot care, fruit	
							and vegetable	
							intake,	
							enjoyment of	
							food and	
							treatment	
<i>a</i> 1		DOT		42 1: 4	D: ( ( 1	D 1' 1	satisfaction	A 1 1 C 1 1
Good	Dyson, P.	RCT	All subjects	42 subjects with newly	Direct referral from a	Baseline and 6 months	At 6 months, the	A brief video
/A	A.,		in the study	diagnosed	primary care	o monuis	intervention	intervention increased
	Beatty, S.,		received	type 2	physician,		group showed	diabetes
	&		usual	diabetes	practice nurse		increased	knowledge
	Matthews,		medical care	undottes	or from		knowledge	among those
	D. R.		from their		advertisement		compared to	newly
	(2010).		primary care		placed in		controls	diagnosed with
	An		physician,		General		(74.3% versus	type 2 diabetes
	assessmen		including		Practice		56.4% correct	and may
	t of		education		surgeries in		answers, P≤	comprise and
	lifestyle		about		Oxfordshire.		0.0001).	effective way
	video		lifestyle				although there	of directing
	education		management				were no	education to
	for people		of type 2				significant differences in	such
	newly		diabetes				changes over 6	individuals.
	diagnosed		from a				months	
	with type		practice				between the	
	2 diabetes.		nurse. In				two groups,	
							the	
	Journal of		addition,				intervention	
	Human		subjects				group showed	
	Nutritiona		randomized				improvements	
	l Dietics,		to the video				in A1c (-0.7%,	
	23, 353-		intervention				P=0.024), total	
	359. UK		received the				cholesterol (-	
			three				0.5mmol L,	
			lifestyle				P=0.017), low-	
			videos and				density	
1	1	1			1	1	lipoprotein	

			were requested to watch them in their own time. The subjects in the control group received usual care, including education from a practice nurse and were offered the videos at the end of the six month study.				cholesterol (- 0.5, P=0.018) and increased physical activity measured by pedometer (1266 steps per day, P=0.043) from baseline with no significant changes in the control group	
Good /B	McLough ney, C. R., Khan, A., & Ahmed, A. B. (2007). Effectiven ess of a specialist nurse-led interventi on clinic in the managem ent of cardiovasc ular risk factors in diabetes. <i>European</i> <i>Diabetes</i> <i>Nursing</i> , 4(3), 100- 105. UK	Randomiz ed Prospectiv e Study	Subjects were placed into groups where the focus was learning and controlling the secondary issues of hypertension or hyperlipidem ia by a nurse-led, protocol driven, doctor supervised clinic	94 patients with diagnosis of type 2 diabetes	Patients in clinic between April 2003 and March 2004	Baseline and 1 year	Significant reduction in systolic blood pressure $(167 \pm 12$ versus 132 $\pm 8$ mmHg, p<0.001) and diastolic BP $(85\pm9$ versus $70\pm7$ mmHg, p<0.001). 92% achieved target BP. Those treated for hyperlipidem ia (6.0 $\pm$ 1.2 versus $3.9\pm0.7$ mmol/1, p<0.001) and triglycerides $(4.2\pm0.8$ versus $2.4\pm1.2$ mmo l/1, p<0.001) significantly improved. 91% of patient achieved target lipid levels. The mean HbA1c level also improved $(8.5\pm1.5$	Nurse led clinics can effectively improve CV risk factors, hypertension and hyperlipidem ia levels.

Fair /B	Song, M., Choe, M., Kim, K. S., Yi, M. S., Lee, I., & Kim, J.,Shim, Y. s (2009). An evaluation of web- based education as an alternative to group lectures for diabetes self- managem ent. <i>Nursing</i> and <i>Health</i> <i>Sciences</i> , <i>11</i> , 277- 284. Korea	Quasi experimen tal investigati on with non- equivalent control group, pre test/post test design	Participants in the web group (intervention ) took part in a web-based diabetes self- management education program, while those in the lecture group (control) attended the diabetes education lectures provided by healthcare professionals specializing in diabetes care. They attended 1 hour lectures every week for three consecutive weeks. The lectures in the first, second, and third weeks were provided by	31 participant s. 15 in interventio n group and 16 in control group. Initially 31 interventio n and 29 control but decreased due to drop out	Patient with diabetes treated in the university- affiliated, tertiary care hospital from March to December 2006.	Baseline, 6 weeks and 3 months	versus 7.4 $\pm$ 1.5%, p<0.01) and 45% achieved target glycemic control. The characteristic s of both groups were the same; The level of knowledge increased in both groups in 6 weeks but not 3 months. There was significant diabetic care behavior in 6 weeks, but only in the web-based group at 3 months. There was a significant increase in diabetes care behavior; there were no changes in fasting blood glucose levels.	The study indicated that a web-based diabetes self- management education program has potential as an effective alternative to group lecture education in terms of improving diabetes care knowledge, improve diabetes care behavior and improving physiological variables, HbA1c and FBG
			were					
Good /A	Song, M., & Kim, H. (2007). Effect of the diabetes outpatient intensive managem ent	Pre/post control group design test	The intervention group was provided with Diabetes outpatient intensive management program	25 patients in the interventio n group. 24 patients in the control group.	Participants were recruited from the university affiliated diabetes center of St Vincent's Hospital	Baseline and 3 months	Patients in the intervention group had a mean decrease of 2.3%, which those in the control group having	Diabetes outpatient intensive management can reduce HgA1c in type 2 patients.

					-			1
	programm		(DOIMP),		between		a mean	
	e on		which		September		decrease	
	glycaemic		received		2004 and		0.4% in	
	control for		multidiscipli		January		HgA1c.	
	type 2		nary diabetes		2005.		There was	
	diabetic		education,				no difference	
	patients.		complication				between the	
	Journal of		monitoring				two groups	
	Clinical		and				in FBG and	
	Nursing,		telephone				two hour	
	16, 1367-		counseling				post-	
	1373.		during 12				prandial.	
	Korea		weeks.				The	
	Kolea		Participants					
							proportion of	
			in the control				the patients	
			group				with HgA1c	
			received a				<7% was	
			brief				higher in the	
			conventional				intervention	
			description				group.	
			of diabetes					
			mellitus and					
			were					
			instructed to					
			undertake					
			medical					
			nutrition					
			therapy by a					
			diabetic					
			education					
			nurse.					
			Regular					
			physical					
			activity was					
			recommende					
			d and					
			followed up					
			on an					
			outpatient					
			basis with					
			causal					
			medical care					
			at regular					
	DUT		intervals.	512	T 1	D 11	00	
Good	Bell, J. A.,	Pre/post	Completion	513 users.	Individuals	Baseline	Of non-	The
/ <b>B</b>	Patel, B.,	test	of computer	124 were	were	and 13	nurses, 145	"Brainfood"
	&	analysis	program	nurses	recommend	months	out of 389	program is
	Malasanos		with 15	(APRN=6,	ed by their		took pre-	educationally
	, T.		modules.	LPN=13,	healthcare		tests and 135	sound and
	(2006).		Seven topics	RN=88,	provider,		took post-	effective at
	Knowledg		should be a	unspecifie	advertiseme		tests. Post	delivering
	e		review of	d=17).	nt for		test scores	Type 1
	improvem		general	389 were	nursing		improved	diabetes
	ent with		nursing	non-nurse	continuing		significantly	education to
	web-based		knowledge	users	education on		(P<0.001 by	both
	diabetes		for most	(patients,	the Florida		non-paired t	professionals
	education		nurses, six	family	Department		test). Of	and non-
	program:		modules	members,	of health		nurses, 68 of	professionals
	Brainfood		offered more	teachers,	website,		124 took	. Web access
	. Diabetes		diabetes-	interested	directions		pre-tests and	from non-
·						•		1

	Tasherit		ana aifi -	1000000000	from		$y = t_0 \frac{5}{5} \int f f = -1$	alinia
	Technolog		specific	learners	from Florida's		up to 56 took	clinic
	у & Ть		information	and			post-tests.	settings can
	Therapeut		and two	potential	Diabetes		Post-test	improve
	ics, 8(4),		modules	camp	Camp for		scores	access to
	444-448.		included	counselors	counselor		improved	high-quality
	USA		complex	=98)	orientation		significantly	education for
			diabetes		and those		(P=<0.05 by	learners in
			management		searching		non-paired t	remote or
			information		the web for		test) on 13	underserved
			beyond the		diabetes		modules.	locations.
			scope of		education.		Post-test	
			most nurses		Patients and		scores	
			practicing		families		improved,	
			outside of		referred to		but were not	
			diabetes. Pre		the site by		statistically	
			and post test		the		significant	
			scores were		University		for	
			collected.		of Florida		"Nutrition	
					Pediatric		101", a	
					Diabetes		module	
					Center staff		about very	
					come from		basic	
					all of north		nutrition.	
					central		Nurses had a	
					Florida,		lower margin	
					including		of	
					participants		improvement	
					in a		for most	
					telemedicine		modules as	
					program		they started	
					serving rural Volusia		with a higher	
							base	
					County.		knowledge	
							level. Non-	
							nurses	
							improved	
							significantly	
							on all modules	
							from pre-test	
							to post-test. Post-test	
							scores for	
							the nurses and non-	
							nurses were	
							indistinguish able.	
Fair	New, N.	Quasi	Focus group	20	Participants	Baseline	There were	A co-created
	(2010).	experimen	was used to	participant	were from	and 3	no	teaching
/ 🖪	(2010). Teaching	tal	develop and	s in each	the delta	months	significant	approach
	so they	Pilot	evaluate the	group	region of	monuis	differences	better meets
	hear:	study;	co-created	group	Arkansas,		found	the learning
	Using a	pre/post	diabetes self-		which		between the	needs of
	co-created	interview	management		contains		focus group	adults with
	diabetes	interview	education		seven of		that	type 2
	self-		intervention.		nine		developed	diabetes and
			The		counties		the	results in
	managem ent		intervention		with a		intervention	enhances
	education				diabetes		with	ability to
1	cuucation		phase was a		ulabeles		WILLI	aunity to

	approach. Journal of the American Academy of Nurse Practition ers, 22, 316-325. USA		quasi experimental design with pre and post intervention data collection for diabetes knowledge, self- management activities, and adaptation. The intervention group was compared to a group of adults with diabetes who received the usual DSME education offered by local hospitals.		prevalence of 11%- 12.6%. Forrest City Arkansas was actual site. Diabetes education centers in Jonesboro and west Memphis, Arkansas were the comparison sites.		participants who created the sessions and the control groups with regard to knowledge, adaptation and program satisfaction. Diabetes self-care activities significantly improved (p=.02) for the experimental group.	perform the self-care activities required for successful diabetes control. Better diabetes control reduces visits to monitor and treat complication and the need for repetitive educational sessions that exceed their- party pay limits and extend the time needed for patient encounters.
Good /A	King, A. B., & Wolfe, G. S. (2009). Evaluatio n of diabetes specialist- guided primary care diabetes treatment program. Journal of the American Academy of Nurse Practition ers, (21), 24-30. USA	Pre/post pilot study	Experimenta l site- NPs received a 6 hour instruction in the use of the treatment algorithms based on the ADA guidelines of care, the accompanyin g algorithm guidebook for reference and flow sheets for the chart record in the clinic. The control site had no contact with the individual patients after the chart review and during the 12 month study. After completion	101 Control group 34 Experimen tal group	Board certified family or internal medicine practitioners located within a 100 mile radius of Salinas California	Baseline and 12 months	Mean HbA1c values decreased from baseline by 0.46% in the active treatment group versus 0.06% in the control group; however, reductions in HgA1c did not achieve statistical significance potentially because of the small sample size of the experimental group. Mean SBP values were significantly reduced in both groups; however,	The program provided insights regarding the importance of electronic records and provider notifications, patient adherence, prioritization of provider resources by risk level among patients and access to self- management education

Good /A	Van Sluljsesth er, E. M., Van Poppel, N. M., Twisk, J. W., Paw, M. J., Calfas, K. J., & Van Mechelen, W. (2005). Effect of a tailored physical activity interventi on delivered in general practice settings: Results of a randomize d controlled trial. <i>American</i> <i>Journal of</i> <i>Public</i> <i>Health</i> , <i>95</i> (10), 1825- 1830. Netherlan ds	RCT	of the study, the charts of the same patients were again reviewed and data collected. Patients were invited to speak with their provider at baseline for a 10 minute consultations , irrespective of randomizatio n. In addition to discussing diabetes, the provider offered advice to the patient about becoming more physically active. The provider used the PACE (physician based assessment and counseling for exercise) program.	191 Interventio n 205 Controlled	29 general practices throughout Netherlands. Each general practitioner identified a target population on the basis of the inclusion criteria and the research team randomized them	Baseline, 8 weeks, 6 months and 1 year	LDL-C was only significantly reduced in the control group where more aggressive use of statins may have had an effect. No significant intervention effect over time was observed on physical activity level or stage of change for regular physical activity, and an inverse intervention effect was observed for waist circumferenc e. The study population as a whole exhibited a significant increase in physical activity and borderline significant decrease in body weight at the 1 year follow up.	Positive effects on physical activity level and body weight were observed, but the PACE intervention was not more effective than the standard physical activity advice.
Good /A	Reed, R. L., Revel, A. D., Carter, A. O., Hussein, F. S., & Dunn, E. V. (2005).	Controlled before and after trial	Outcomes and adherence to guidelines were measured over the year before the intervention	738 participant s	9 Primary Health Centers in the United Arab Emirates.	One year prior to intervention and one year after intervention	Three outcomes variables were compared. Total cholesterol measurement s in the	The intervention described in this study demonstrated an improvement in some process of

r	r .	r		r		r		
	A		began and				intervention	care
	controlled		for a second				clinics (-	measures
	before-		one year				12.0mg/dl)	suggesting an
	after trial		period at the				compared	impact of this
	of		end of the				with the	type of
	structured		intervention				control	delivery
	diabetes						clinics (+8.3	model in the
			period.					
	care in						mg/dl). The	environment
	primary		Structured				rate of	
	health		diabetes				measuring	
	centres in		care,				HbA1c was	
	a newly		including the				too low to	
	developed		development				determine	
	country.		of general				whether any	
	Internatio		practice				changes	
	nal		diabetes				were made	
	Journal		clinics, a				in this	
	for		patient				parameter.	
	Quality in		education				Fasting	
	Health		program, a				glucose did	
	Care,		health care				improve in	
	17(4),		professional				the	
	281-286.		education				intervention	
	United		program, and				clinics (-	
	Arab		improved				0.7 mg/dl	
	Emirates		recording of				when	
			clinical				compared	
			information				with the	
			was provided				control	
			for the 33				clinics	
			month time				(+4.8mg/dl)	
			period.				although this	
			periodi				was not	
							statistically	
							significant.	
							Mean blood	
							pressure	
							worsened in	
							the	
							intervention	
							clinics	
							(+2.7mm	
							Hg) when	
							compared	
							with the	
							intervention	
							clinics (-1.4	
							mm Hg) and	
							this	
							difference	
							was	
							statistically	
							significant).	
Good	Vaalaan	DCT	To correct	1100	Outpotients	Decelier		Datiant
	Krakow,	RCT	To compare	1109	Outpatients	Baseline	Type 2 LIP	Patient
/B	D., &		the LINDA	diabetes	in centers	and 1 year	patients	education
	Feulner-		(living,	patients.	with		achieved	had a limited
	krakow,		interactive,	374 type 2	ambulant		lower	effect on
	G. (2007).		new,	non-	treatment		HgA1c mean	knowledge
	LINDA:		distinguished	insulin	only in		of 6.2% and	and self-
	The		, activating)	dependent.	Munich,		a reduction	reported self-
					. ,	•		

-	1. 1	1	1.1	4.40 / *	a		CDMC C	
	diabetes		with a	449 type 2	Germany		of BMI of	management
	self-		standard	insulin			0.8 kg/m2.	behavior but
	managem		education	treated.			The control	a significant
	ent		program.	286 type 1			group	effect on
	training		This	diabetes.			reached a	self-efficacy
	programm		program has				mean HgA1c	in patients
	e for		4 basic				7% and	with type 2
	people		modules				showed an	diabetes
	with type		covering				increase in	
	1 or type		nutrition,				BMI of 0.7	
	2 diabetes.		blood				kg/m2.	
	European		glucose				Mean blood	
	Diabetes		monitoring,				pressure	
	Nursing,		medication,				improved	
	4(3), 106-		hypoglycemi				from 145/85	
	112.		a, HgA1c,				to 134/80in	
	Germany		podiatry,				LIP patients	
			micro and				and 138/79	
			macro				in control	
			vascular long				group.	
			term				Triglyceride	
			consequence,				and	
			hypertension				cholesterol	
			, weight				levels	
			reduction,				decreased in	
			and sports.				both groups.	
			Modules 5				For type 2	
			and 6 pertain				patients,	
			to insulin.				mean HgA1c	
			Module 7 is				fell to	
			gestational				6.8% in the	
			diabetes.				LIP and	
							control	
							group was	
							7.4%. A	
							quality of	
							life	
							questionnair	
							e showed	
							improvement	
							s from 20%	
							to 80% in	
							people who	
							used the LIP	
Good	Atak, N.,	RCT	The test,	80 patients	Diabetes	Baseline	There was	Patient
/B	Gurkan,	using a	including	with type	Center,	and 2 weeks	significant	education
/D	T., &	pre and	sections on	2 diabetes	Department	post	difference	had a limited
	T., & Kose, K.	pre and post-test	patient	2 unabeles	of	education	between the	effect on
	(2009).	design	characteristic		Endocrinolo	cuucation	intervention	knowledge
	(2009). The effect	uesign	, diabetes		gy and		and control	and self-
	of		knowledge,		gy and Metabolism,		groups.	reported self-
	education		self-		Ankara		Improvemen	management
	on		management		University,		ts were	behavior but
	knowledg		behaviors		Turkey.		observed in	a significant
	e, self-		and self-		Turkey.		taking	effect on
			efficacy				regular	self-efficacy
	managem ent		were given				walks	in patients
	behaviors		to all				(p=0.043),	with type 2
	and self-		patients				(p=0.043), recognizing	diabetes
L	una sen-	I	Pullents				Toooginzing	31400105

								1
	efficacy		before				nutrients	
	of patients		education as				with high	
	with type		a pre-test.				caloric	
	2 diabetes.		Subjects				content	
	Australian		participated				(p=0.037),	
	Journal of		in the				recommende	
	Advanced		education				d daily fat	
	Nursing,		program				distribution	
	26(2), 66-		three months				(p=0.024),	
	20(2), 00- 74.		after the				regulating	
	Turkey		initial				blood	
			assessments				glucose	
			were				levels to	
			completed.				avoid	
			The results				complication	
			of routine				s (p=0.002),	
			lab				and in	
			assessments				diabetes self-	
			were				efficacy	
			recorded.				mean scores	
			Two weeks				(p=0.006)	
							(p=0.000)	
			after the					
			initial					
			education					
			program, the					
			test was re-					
			administered					
			to					
			intervention					
			and control					
			groups. The					
			correct					
			answers					
			were					
			explained to					
			the					
			intervention					
			group during					
			education					
			and to each					
			patient in the					
			control					
			group					
			following the					
<u> </u>	<u></u>		post test.	<b>.</b>			<b>D</b>	
Fair	Siminerio,	Pilot	Phase I-	29 patients	University	Baseline	Provider	Implementin
/A	L. M.,	Study	Extensive	Six	of	and 12	adherence to	g systems to
	Piatt, G.,	Pre/post	chart review	primary	Pittsburgh	months	ADA	support
	& Zgibor,	interventio	as the	care	medical		Standards of	decision
	J. C.	n	baseline	providers:	Center		Care	support, self-
	(2005).		measurement	4			increased	management
	Implemen		. Phase II-	physicians			significantly	education,
	ting the		Included	, 1 nurse			across all	and delivery
				, 1 nurse practitione				system
	chronic		provider and				process	-
	care		patient	r, 1			measures.	redesign has
	model for		education	physician'			Patient who	a positive
	improvem		provided by	s assistant			received	influence on
	ents in		CDE. Phase				DSME at	practices and
	diabetes		III-Repeat				point of	patient
	care and		chart review				service in the	outcomes in
		•		1	1	•		

				1		1		
	education		with post-				primary care	outlying rural
	in a rural		intervention				practice	communities.
	primary		measures.				setting	
	care						gained	
	practice.						improvement	
	The						in	
	Diabetes						knowledge,	
	Educator,						empowerme	
	(31), 225-						nt, A1C, and	
	234.							
							high-density	
	USA						lipoprotein	
							cholesterol	
							levels.	
							There was an	
							improvement	
							in A1c >7	
							(40.7% verse	
							39.5%) and	
							LDL >100	
							mg/dL	
							(58.8% verse	
							50%) but a	
							worsening in	
							blood	
							pressure	
							control	
							(75.6% verse	
							•	
							82.1%). All	
							changes in	
							clinical	
							values were	
							non-	
							significant.	
Good	Adolfsson	RCT	Random	101	7 primary	Baseline	At 1 year	The
/A	, E. T.,		assignment	patients	care centers	and 1 year	follow up the	empowermen
	Walker-		to the	42	in Central		level of	t group
	engstrom,		empowerme	interventio	Sweden		confidence	education did
	M. L.,		nt group	n group,			in diabetes	improve
	Smide, B.,		education	46 control			knowledge	patients'
	&		(intervention	group, 13			was	confidence in
	Wikblad,		) or routine	did not			significantly	diabetes
	K. (2007).		diabetes care	complete			higher in the	knowledge
	R. (2007). Patient		(control	complete			intervention	with
	education		group). The				group than in	maintained
							the control	glycemic
	in type 2		empowerme					
	diabetes-a		nt group				group. No	control
	randomize		education				significant	despite the
	d		regarding				differences	progressive
	controlled		diabetes				were found	nature of the
	1-year		knowledge,				in self-	disease
	follow-up		self-efficacy,				efficacy,	
	study.		satisfaction				satisfaction	
	Diabetes		with daily				with daily	
			life, BMI				life, BMI or	
	Research							
1							intervention	
1	Research and		and glycemic				intervention	
	Research and Clinical		and glycemic control				intervention	
	Research and Clinical Practice,		and glycemic control compare				intervention	
	Research and Clinical Practice, 76, 341-		and glycemic control compare with the				intervention	
	Research and Clinical Practice,		and glycemic control compare				intervention	

			diabetes			[	[	[ ]
			care.					
Good /A	Gucciardi a, E., Demelo, M., Lee, R. N., & Grace, S. L. (2007). Assessme nt of two culturally competent diabetes education methods: Individual versus individual plus group education in Canadian Portugues e adults with type 2 diabetes. Ethnicity and Health, 12(2), 163-187. Canada	Prospectiv e analysis, pre and post test	A questionnair e to collect psychosocial and behavioral measures was completed by patients immediately after their first DMC visit. Participants also were asked to have HbA1c performed if one was not available. This was collected pre education and one year post education	268 patients with type 2 diabetes	2 Diabetes Managemen t Centers in Canada	Baseline and 1 year	Multivariabl e negative binomial regression model, the number of contacts over 1 year was greater for those who were female, non- smokers, unemployed, self-referred to DSME, lived close to DMC, had lower BMI, or had diabetes for longer duration	Healthcare providers need to encourage ongoing use of DSME, particularly for individual prone to lower follow up services
Good /B	Siminerio, L. M., Ruppert, K., Emerson, S., Solano, F. X., & Piatt, G. A. (2008). Delivering Diabetes Self- Managem ent Education (DSME) in primary care. Disease Managem ent Health Outcomes, 16(4), 267-272. USA	RCT Pre and post test	A nurse who was a certified diabetes educator was deployed to provide point of service diabetes education (POSE) to four University of Pittsburgh Medical Center Community Medical Center Community Medicine Practices primary care practices. The group of patients who received POSE was compared with patient	Patients with diabetes: Suburban practice (857+2055)=2912. Urban practice (624+1808)=2432.	Four Community Medical primary care practices, 2 urban academic medical center and 2 suburban practices.	Baseline (January 2003) through December 2006	Of the 5344 diabetes patients in the four practices, 784 received point of service diabetes education (POSE). Mean HgA1c values were higher at baseline in those patients who received POSE than those who received usual care. There was a significant decrease in HgA1c and	Providing DSME in primary care is feasible and offers the opportunity to reach patients who may not be receiving DSME services. However, further research is needed to evaluate other methodologie s to increase access to DSME and other factors that my influence improvement in clinical

	1		C 4			1		
			from the				LDL-c levels	outcomes.
			same				in both	
			practices				groups.	
			who were				Although	
			identified as				there was not	
			having				a significant	
			diabetes and				between-	
			who received				group	
			usual care.				difference in	
			The number				HgA1c,	
			of patients				those who	
			was				received	
			computed				POSE had	
			and a				significant	
			percentage				improvement	
			calculated				in LDL-C	
			for				levels	
			comparison				compared	
			against				with the	
			Healthy				usual care	
			People 2010				group.	
			goals. The				<u> </u>	
			HgA1c					
			values of					
			patients were					
			tracked from					
			January 2003					
			through					
			December					
			2006, during					
			the					
			timeframe					
			that POSE					
			was					
E-in	Caulan D	RCT	provided.	10	T anna amh an	Dessline	Th	The dishese
Fair	Conlon, P.	RCI	Patients were	42 patients	Large urban	Baseline	The nurse	The diabetes
/A	(2010).		scheduled by	with type	federally	and 12	practitioner	NP is able to
	Diabetes		the	2 diabetes.	qualified	months	interventions	demonstrate
	outcomes		receptionist	25 in	health		lowered	a high degree
	in primary		with the	physician	center.		HgA1c and	of clinical
	care:		physician or	managed			glucose to a	management
	Evaluatio		NP, based on	group and			greater	expertise
	n of the		the	14 in nurse			degree than	which
	diabetes		availability	practitione			those under	translates
	nurse		of each	r managed			physician	into better
	practitione		practitioner	group			direction.	metabolic
	r		Patient				Weights of	control,
	compared		achievability				the	consistent
	to the		was				physician's	with the
	physician.		measured by				patients were	standard of
	Primary		each				lowered with	care and
	Health		practitioner				relevance to	clinical
	Care,		documenting				noted	practice
	20(5), 26-		patient				hyperglycem	recommendat
	31.		compliance				ia. Blood	ions set by
	USA		with				Pressure	the American
			mutually				remained the	Diabetes
			established				same in both	Association,
			goals and				groups	which in turn
			acceptance				- •	decreases
	•			-		•	-	

			of their					cost
			diabetes					0000
			plan.					
Good	Selea, A.,	RCT	In all	364	From 3	Baseline, 3,	There was a	Education
/A	Sumarac-		patients	patients	regional	6, and 18	significant	with printed
	dumanovi		fasting	with	health	months	improvement	material led
	c, M.,		plasma	diabetes	centers in		in HgA1c	to
	Pesic, M.,		glucose and		Serbia		levels after 3	improvement
	Suluburic,		HgA1c were				months	s in glycemic
	D.,		measured				(8.00 <u>+</u> 1.66%	control and
	Stamenko		and				VS	level of DM
	vic-		subsequently				9.06 <u>+</u> 2.23%,	knowledge in
	pejkovic,		the patients				p<0.01) and	our patients.
	D.,		fulfilled the				after 6	Education
	Cvijovic,		questionnair				months	with printed
	G., &		e. At the end				(7.67 <u>+</u> 1.75%	material may
	Micic, D.		of the visit				VS	be a useful
	(2011). The effects of education		the patients				9.06 <u>+</u> 2.23%,	adjunct to
			were given				p<0.01).	DM
			the printed				There was	treatment and
			material				no further	should be
	with printed		"Healthy lifestyle with				improvement in HgA1c	structured according to
	material		diabetes type				levels after	the treatment
	on		2". The				18 months	modality.
	glycemic		same				$(7.88 \pm 1.46\%)$	modanty.
	control in		procedure				VS	
	patients		was repeated				7.67 <u>+</u> 1.75%)	
	with		after 3,6 and				, p>0.05).	
	diabetes		18 months				There was a	
	type 2		(printed				significant	
	treated		material was				improvement	
	with		only given at				in the	
	different		first office				average test	
	therapeuti		visit). BMI				score after	
	с		was				three months	
	regimens.		obtained.				(64.6% vs	
	Military		Questionnair				55.6%,	
	Medical		es were				p<0.01).	
	&		regarding				There were	
	Pharmace		diabetes				no further	
	utical		knowledge,				statistically	
	Journal of Serbia &		diabetes empowerme				significant changes in	
	Monteneg		nt, and				the general	
	ro, 68(8),		attitude				level of DM	
	676-683.		toward				knowledge	
	Serbia		diabetes.				after 6	
	Derona		undertest				months	
							(65.0 <u>+</u> 32.5%	
							vs	
							64.5 <u>+</u> 33.7%,	
							p>0.005) and	
							after 18	
							months	
							(64.8% <u>+</u> 32.7	
							vs	
ĺ							64.5 <u>+</u> 33.7%,	
ĺ							p>0.005).	
							There was a	

Good /A	Wu, S. V., Lee, M. C., Liang, S. Y., Lu, Y. Y., Wang, T. J., & Tung, H. H. (2011). Effectiven ess of a self- efficacy program for persons with diabetes: A randomize d controlled trial. <i>Nursing</i> and <i>Health</i> <i>Sciences</i> , <i>13</i> , 335- 343. Taiwan	RCT	Participants were pretested to establish a baseline and then post- tests were undertaken 3 and 6 months after the baseline data were collected. The participants in the intervention group received the standard diabetes education program and an additional self-efficacy program (Self- Efficacy Enhancing Intervention Program- SEEIP)	145 patients. 72- interventio n 73-control	Patients were treated at an outpatient clinic of a municipal hospital.	Baseline, 3 and 6 months	significant difference in education intervention response in DM type 2 patients on different therapeutic regimens. The scores for the efficacy expectations, outcome expectations, outcome expectations, and self-care activities had significantly increased in the intervention group at the 3 and 6 months follow-ups, when compared to those of the control group. A smaller proportion of the intervention group had been hospitalized or had visited and emergency room than in the control	This study revealed that a self- efficacy program for diabetes was acceptable and effective in the short term in the self- management of persons with type 2 diabetes.
Eair	Droup A	DOT	To avaluate	155	Tracted of	Deseline	the control group at the 6 month follow-up.	The new
Fair /A	Braun, A. K., Kubiak, T., Kuntsche, J., Meier- hofig, M., Muller, U. A., Feucht, I., & Zeyfang,	RCT	To evaluate the effectiveness of new structured diabetes teaching and treatment program with specific didactical approaches	155 Geriatric patients 83- interventio n 72-control	Treated at outpatient facility in Germany	Baseline, immediatel y after education, and 6 months.	Patients showed improved levels of HgA1c 6 months after the new education, and less acute complication than the	The new structured geriatric diabetes education program, focusing on the learning capabilities and the particular needs of

	A (2000)		and topics				standard	older
	A. (2009). SGS: A		for geriatric				group	persons, is
	structured		patients with				(p<0.009).	effective in
	treatment		DM. Patient				Bothe groups	improving
	and		were				demonstrate	metabolic
	teaching		randomly				d a good	control and
	programm		placed into				capacity for	in
	e for older		educational				diabetes self-	maintaining
	patients		groups				management	auto-
	with		receiving				and	sufficiency in
	diabetes		routine				improvement	geriatric
	mellitus a		DSME vs				in diabetes	patients with
	prospectiv		the new				knowledge	diabetes
	e		program				after the	mellitus.
	randomise						education	
	d						(p<0.01).	
	controlled							
	multi-							
	centre							
	trial. Age							
	and							
	Ageing,							
	38, 390-							
	396. C							
Ca. 1	Germany	DCT	A store t 1	924 - 1 1	207 1	Deest	II-A1.	A stars of 1
Good /A	Davies,	RCT	A structured	824 adults	207 general	Baseline and 12	HgA1c levels at 12	A structured
/ <b>A</b>	M. J., Heller, S.,		group education		practices in 13 primary	and 12 months	months had	group education
	Skinner,		program for		care sites in	monuis	decreased by	program for
	T. C.,		six hours		the United		1.49% in the	patients with
	Campbell,		delivered in		Kingdom		intervention	newly
	M. J.,		the		Kingdolli		group	diagnosed
	Carey, M.		community				compared	type 2
	E., &		by two				with 1.21%	diabetes
	Cradock,		trained				in the control	resulted in
	S.,Khun		healthcare				group. After	greater
	ti, K.		professional				adjusting for	improvement
	(2011).		educators				baseline and	in weight
	Effectiven		compared				cluster, the	loss and
	ess of the		with usual				difference	smoking
	diabetes		care.				was not	cessation and
	education						significant:	positive
	and self-						0.05%	improvement
	managem						(95%CI).	in beliefs
	ent for						The	about illness
	ongoing						intervention	but no
	and newly						group	difference in
	diagnosed						showed a	HgA1c levels
	(DESMO ND)						greater weight loss:	up to 12 months after
	ND) programm						-2.98kg	diagnosis.
	e for						-2.98kg (95%CI)	ulag110515.
	people						compared	
	with						with 1.86kg,	
	newly						p=0.027 at	
	diagnosed						12  months.	
	type 2						The odds of	
	diabetes:						not smoking	
	cluster						were 3.56	
	randomise						(95%CI),	
	1	i	1	i	1	i	(	

	d controlled trial. British Medical Journal, , 1-11. UK						p=0.033high er in the intervention group at 12 months. The intervention group showed significantly greater changes in illness belief scores	
							(p=0.001); directions of change were positive indicating greater understandin g of diabetes. The intervention group had a lower depression	
							score at 12 months: mean difference was50 (95%CI); p=0.032. A positive association was found between change in	
Good /A	Yukawa, K.,	RCT	Evaluation of the	128	Participants were	Baseline, 3 and 6	perceived personal responsibilit y and weight loss at 12 months (p=0.008) The findings indicated	These
	K., Yamazaki , Y., Yonekura, Y., Togari, T., Abbott, F., & Homma, M.,Kaga wa, Y. (2010). Effectiven ess of		of the Chronic Disease Self- management Program by comparing changes in health outcomes. The program is a patient centered educational program for	participant s with diabetes	were recruited from 18 Chronic Disease Self- management Program workshops	and 6 months	indicated statistically significant positive changes in health distress, coping with symptoms, stretching exercises, communicati on with the physician,	finding suggest that the CDSP can be effective for Japanese people with chronic conditions.

r						1		,
	chronic		the self-				and	
	disease		management				satisfaction	
	self-		of chronic				with daily	
	managem		conditions				living. The	
	ent		delivered by				positive	
	program		one of 18				changes	
	in Japan:		workshops.				were	
	Preliminar		The health				especially	
	y report of		outcomes				remarkable	
	a		that were				among the	
	longitudin		measured				groups with	
	al study.		included				diabetes and	
							rheumatic	
	Nursing		health status, self-					
	and						disease.	
	Health		management					
	Sciences,		behaviors,					
	12,456-		utilization of					
	463. Japan		health					
			services,					
			self-efficacy,					
			satisfaction					
			with daily					
			living, and					
			clinical					
			indicators.					
Good	Huang, J.	RCT	The	60	Recruited	Baseline	The	The use of an
/ <b>B</b>	P., Chen,		experimental	participant	from the	and 3	experimental	interactive
	H. H., &		group	s	endocrinolo	months	group	multimedia
	Yeh, M.		received	30-control	gy		showed	device to
	L. (2009).		patient	30-	Outpatient		greater	intervene in
	A		education	interventio	department		improvement	diabetes self-
	Comparis		through	n	at a regional		in	care was
	on of		interactive		hospital in		understandin	effective
	diabetes		multimedia		the south of		g diabetes	only in
	learning		about		Taiwan.		than the	raising the
	with and		diabetes for		1 ai waii.		control	subjects'
	without							
	interactive		3 months, while the				(t=3.29, t=10, 001)	knowledge about the
							p<0.001).	
	multimedi		control				There was	disease.
	a to		group				no	Additionally,
	improve		received a				significant	the subjects
	knowledg		routine 3				difference in	may need
	e, control,		month				control of	more time to
	and self-		patient				blood sugar	implement
	care		education.				levels (t=-	more
	among		Data were				1.72, p=.10)	effective
	people		collected				and self-care	blood sugar
	with		from both				(F=1.03,	control and
	diabetes		groups at				p=.32)	self-care
	in Taiwan.		baseline and					activities
	Public		at the					after
	Health		completion					receiving
	Nursing,		of the patient					instruction.
	26(4),		education.					
	317-328.		Findings					
	Taiwan		were then					
			compared to					
			evaluate the					
			effects of the					
			intervention					
L	1	1		I	l	I	1	1

r	1	1		r	r	1		ı
			on the					
			subjects'					
			knowledge					
			of diabetes,					
			blood sugar					
			control and					
			self-care.					
Good	Sevick,	RCT	Participants	296-	Patients	Baseline, 3	HgA1c was	Two
/B	M. A.,		in both	completed	treated on	and 6	reduced in	behavioral
	Korytkow		groups	3 months.	campus of	months	the	approaches
	ski, M.,		received		university of		intervention	to improving
	Stone, R.		training in	246	Pittsburgh		group by	general
	A.,		use of a	completed	medical		0.5% at 3	lifestyle
	Piraino,		study	6 months.	Center. Self-		months and	management
	B., Ren,		provided	o monuloi	referred		0.6% at 6	in individuals
	D., &		glucose		rerentea		months	with type 2
	Sereika,		meter and				(p<0.001 for	diabetes
	SBurke		sufficient				each), and	mellitus were
	, L. e		supplies to				the control	effective in
	, L. e (2012).		perform >					improving
	(2012). Biophysio		measurement				group by 0.3%	glycemic
								0.
	logic		per day. All				(p<0.001) at 3 months	control, but
	outcomes		participants					no significant
	of the		also were				and $0.2\%$	between
	enhancing adherence		given				(p<0.05) at 6 months; but	group differences
			pedometer				<i>,</i>	
	in type 2		with				between	were
	diabetes		instructions				group	observed.
	(ENHAN		for use and a				differences	
	CE) trial.		target level				were not	
	Journal of		of physical				significant.	
	the		activity of				In those with	
	Academy		10,000 steps				baseline	
	of		per day.				HgA1c_8%	
	Nutrition		Intervention				and	
	and		group was				estimated	
	Dietetics,		exposed to				glomerular	
	112(8),		group				filtration rate	
	1147-		counseling				<u>≥</u> 60 mL/min,	
	1157.		sessions				HgA1c was	
	USA		guided by				reduced in	
			the Social				the	
			Cognitive				intervention	
			Theory and				group by	
			given a palm				1.5% at 3	
			pilot with a				months and	
			dietary self-				1.8% at 6	
			monitoring				months; but	
			program.				between	
			Intervention				group	
			group				differences	
			sessions				were not	
			were held				significant.	
			weekly				In random	
			during				intercept	
			months 1				models, the	
			and 2 and				estimated	
			biweekly				reduction in	
			during				HgA1c of	
			months 3				0.29% was	
	•	•	•		•	•	•	

			and 4 and				not	
			monthly				significant.	
			during					
			months 5					
			and 6.					
Good	Kulzer,	RCT	Didactic	193	Patients	3 and 15	Mean	In middle
/B	В.,		oriented	patient	living in	months	HgA1c and	aged adults
	Hermanns		group	with type	Wurzburg,		FBG were	with type 2
	, N., &		intervention	2 diabetes	Germany		reduced	diabetes, a
	Reinecker		(4-90minute				more in the	group self-
	, H.		sessions)				self-	management
	(2007). A self-		focusing on acquisition				management group than in	approach to patient
	managem		of				the didactic	education
	ent		knowledge,				group, but	was more
	approach		skills, and				the self-	effective than
	to patient		information				management	a group
	education		about				and self-	didactic
	for type 2		treatment of				management	approach.
	diabetes		diabetes;				individual	Providing
	was more		self-				groups did	some of the
	effective		management				not differ.	self-
	than a		oriented				Groups did	management
	didactic		group				not differ for	intervention
	approach.		intervention				improvement	as individual
	Diabetes		(12-				in BMI,	sessions did
	Medicine,		90minute				diabetes	not provide
	24, 415-		sessions)				knowledge,	any
	423.		focusing on				and frequency of	advantage over all
	Germany		emotional, cognitive,				frequency of	
			and				glucose monitoring.	group sessions.
			motivational				The self-	sessions.
			processes of				management	
			behavior				group	
			change; and				showed more	
			self-				improvement	
			management				than the	
			oriented				didactic	
			individual				group in	
			intervention				psychologica	
			(6-individual				1	
			and 6-group				determinants	
			sessions)				of eating,	
			with the				anxiety, and	
			same content				frequency of	
			as the second				exercise; the 2 self-	
			group. The interventions				2 sen- management	
			were				groups did	
			conducted by				not differ for	
			4-trained				these	
			health				outcomes.	
			psychologist.					
Good	Lee, T. I.,	Quasi-	Both	274	Outpatient	3,6,9, and	Standard	The POEM
	Yeh, Y.	experimen	received	participant	visiting the	12 months	Deviations	system can
/A	T., Liu, C.	tal	treatment	s	Metabolism		are listed for	help patients
	Т., &		based on		Center		testing. I:C	control their
	Chen, P.		same	134 in				glucose,
	L. (2006).		guidelines,	interventio			1=1 <sup>st</sup> follow	HbA1c and

	4	1		a and	1
Developm	the	n group		up, $2=2^{nd}$	total
ent and	intervention	(57% male		follow up,	cholesterol
evaluation	group	43%		3=3 <sup>rd</sup> follow	levels to
of a	received	female)		up.	manage their
patient-	access to				diabetes,
oriented	POEM	140 in		Fasting	providing an
education	(patient	control		Blood Sugar-	easy and
system for	oriented	group		U	inexpensive
diabetes	diabetic	(46% male		1-	way to
managem	education	and 54%		47.47:43.46;	extend
ent.	management	female).		2-	hospital-
Internatio		Both		47.67:42.37;	based patient
	system).			47.07.42.37, 3-	
nal	Lab test	received			education
Journal of	results	treatment		45.52;41.44.	services for
Medical	including	based on		HgA1c-1-	community-
Informatic	fasting blood	same		2.16:1.49;2-	based
s, 76(9),	glucose,	guidelines,		2.14:1.49;3-	continuous
655-663.	HbA1c, total	the		2.12:1.65.	education
Taiwan	cholesterol,	interventio			
	triglyceride	n group		Total	
	and HDL	received		Cholesterol-	
	were tested	access to		130.25:37.36	
	from the first	POEM		:	
	visit through	1 0 2001		229.57:39.41	
	each follow			; 3-	
	up at 3,6,9			, 9 29.047:40.59	
	and 12			29.047.40.39 7.	
				7.	
	months			Tui - la sa sui da	
				Triglyceride-	
				1-	
				58.58:64.63;	
				2-	
				58.59:64.65;	
				3-	
				58.50:64.67.	
				HDL-1-	
				14.02:11.82;	
				2-	
				14.07:11.57;	
				14.03:11.66.	
				Follow Up-	
				1-A	
				ignificant	
				difference in	
				fasting blood	
				glucose	
				levels.	
				2-fbg and	
				HgA1c were	
				significantly	
				different.	
				3-Signifcant	
				difference in	
				fasting blood	
				glucose,	
				HgA1c and	
				total	

							cholesterol	
Good/ A	Clarke, A. (2011). Effectiven ess of a communit y orientated diabetes education (CODE) programm e for people with type 2 diabetes. <i>European</i> <i>Diabetes</i> <i>Nursing</i> , 8(3), 94- 99. Ireland	RCT	The healthcare provider delivering Community Oriented Diabetes Education (CODE) had training in motivational interviewing, facilitation skills, problem solving and goal setting along with an accredited diabetes qualification. The CODE curriculum was delivered over 3 successive weeks with a 10 week support telephone call and 26 weeks follow up session. Outcome measures were collected at baseline and 26 weeks.	237 participant s	31 local settings	Baseline and 26 weeks	The empowerme nt scores raised from 3/5 to 4/5 (p=0.047). QOL range decreased from 25 to 21 and the average score had increased (p=0.00). Knowledge had also increased significantly (p=0.01). People lost on average 0.5kg with similar reduction in BMI.	Increasing patients' self- management skills to manage their diabetes is extensively the target of diabetes education. Most education interventions report positive outcomes based on patterns of group level change. There is a need to focus on individual change. This study identified younger age and reported poorer QOL as possible causes of attrition. This group needs to be targeted for more intensive retention strategies and their reasons for attrition identified and addressed.
Good/ A	Gucciardi a, E., Demelo, M., Lee, R. N., & Grace, S. L. (2007). Assessme nt of two culturally competent	RCT	Patients were randomly assigned to receive either diabetes education counseling only (control) or counseling in	61 Patients 36-control 25- interventio n	Patients of Toronto Western hospital Diabetes Education Center	Baseline and 3 months	Attitudes, subjective norms, perceived behavior control, and intentions towards nutrition adherence, self-reported	The study provides preliminary evidence that culturally competent group education in conjunction with individual

diabetes	conjunction		nutrition	counseling
education	with group		adherence	may be more
methods:	education		and glycemic	efficacious in
Individual	(intervention		control	shaping
versus	).		significantly	eating
individual			improved in	behaviors
plus group			both groups,	than
education			over the 3	individual
in			month study	counseling
Canadian			period, yet	alone.
Portugues			those	Larger
e adults			receiving	longitudinal
with type			individual	studies are
2 diabetes.			counseling	needed to
Ethnicity			with group	determine the
and			education	most
				efficacious
Health,			showed	
<i>12</i> (2),			greater	education
163-187.			improvement	method to
Canada			in all	sustain long-
			measures	term
			with the	nutrition
			exception of	adherence
			glycemic	and glycemic
			control,	control.
			where no	
			significant	
			difference	
			was found	
			between the	
			two groups	
			at 3 months.	
			at 5 monuis.	

Table 2 Delivery Methods

Delivery Methods
Electronic Delivery
Dyson, Beatty & Matthews; 2010
Bell, Patel, & Malasanos; 2006
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009
Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
Song, Choe, Kim, Yi, Lee, Kim, Lee, et al., 2009
Provider Delivery
McLoughney, Khan, Ahmed; 2007
Song, Choe, Kim, Yi, Lee, Kim, Lee, et al., 2009
Deakin, Whitham ; 2009;
King, A.B., & Wolfe, G.S.; 2009
Conlon,P.; 2010
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009
Stuart, Whitlock, Fox, Hearnshaw, Farmer, Wakelin, et al., 2008
Van Sluljsesther, E. M., Van Poppel, N. M., Twisk, J. W., Paw, M. J., Calfas, K.
J., & Van Mechelen, W.,2005
Siminerio, L. M., Piatt, G., & Zgibor, J. C., 2005
Song, Kim; 2007
Siminerio, L. M., Ruppert, K., Emerson, S., Solano, F. X., & Piatt, G. A., 2008
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Gucciardi, DeMelo, Booth, Tomlinson, and Stewart; 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Davies, M. J., Heller, S., Skinner, T. C., Campbell, M. J., Carey, M. E., &
Cradock, S.,Khunti, K., 2011
Lecture/Written Delivery
New; 2010
Krakow, D., & Feulner-krakow, G.; 2007
Clarke, A., 2011
Gucciardia, E., Demelo, M., Lee, R. N., & Grace, S. L., 2007
Atak, Gurkan, Kose; 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Selea, A., Sumarac-dumanovic, M., Pesic, M., Suluburic, D., Stamenkovic-
pejkovic, D., Cvijovic, G., & Micic, D. (2011).
Reed, R.L., Revel, A.D., Carter, A.O., Hussein, F.S., & Dunn, E.V.; 2005
Braun, A. K., Kubiak, T., Kuntsche, J., Meier-hofig, M., Muller, U. A., Feucht, I.,
& Zeyfang, A. (2009).
Yukawa, K., Yamazaki, Y., Yonekura, Y., Togari, T., Abbott, F., & Homma,
M.,Kagawa, Y. (2010)
Sevick, M. A., Korytkowski, M., Stone, R. A., Piraino, B., Ren, D., & Sereika,
S.,Burke, L. e (2012).
Wu, S. V., Lee, M. C., Liang, S. Y., Lu, Y. Y., Wang, T. J., & Tung, H. H., 2011

Table 3

Measuring	<i>Obiective</i>	<b>Ouality</b>	Indicators
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Measuring Objective Quality Indicators
BLOOD SUGAR
Glycohemoglobin
Song, Kim; 2007
Siminerio, Ruppert, Emerson, Solano & Piatt; 2008
McLoughney, Khan, Ahmed; 2007
Gucciardi, DeMelo, Booth, Tomlinson, and Stewart; 2009
Dyson, Beatty & Matthews; 2010
Deakin, Whitham; 2009;
Stuart, Whitlock, Fox, Hearnshaw, Farmer, Wakelin, et al., 2008
King, A.B., & Wolfe, G.S.; 2009
Conlon,P.; 2010
Davies, M. J., Heller, S., Skinner, T. C., Campbell, M. J., Carey, M. E., &
Cradock, S.,Khunti, K., 2011
Reed, R.L., Revel, A.D., Carter, A.O., Hussein, F.S., & Dunn, E.V.; 2005
Krakow, D., & Feulner-krakow, G.; 2007
Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Selea, A., Sumarac-dumanovic, M., Pesic, M., Suluburic, D., Stamenkovic-
pejkovic, D., Cvijovic, G., & Micic, D. (2011).
Sevick, M. A., Korytkowski, M., Stone, R. A., Piraino, B., Ren, D., & Sereika,
S.,Burke, L. e (2012)
Braun, A. K., Kubiak, T., Kuntsche, J., Meier-hofig, M., Muller, U. A., Feucht, I.
& Zeyfang, A. (2009)
Fasting Blood Sugar
Song, Kim; 2007
Conlon,P.; 2010
Gucciardia, E., Demelo, M., Lee, R. N., & Grace, S. L., 2007
Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009
Atak, Gurkan, Kose; 2009
Reed, R.L., Revel, A.D., Carter, A.O., Hussein, F.S., & Dunn, E.V.; 2005
Song, Choe, Kim, Yi, Lee, Kim, Lee, et al., 2009
LIPID
Total Cholesterol
McLoughney, Khan, Ahmed; 2007
Dyson, Beatty & Matthews; 2010
Deakin, Whitham ; 2009
Reed, R.L., Revel, A.D., Carter, A.O., Hussein, F.S., & Dunn, E.V.; 2005
Krakow, D., & Feulner-krakow, G.; 2007
Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
HDL
Siminaria Dynast Emanan Salana & Diatty 2008

Siminerio,	Ruppert,	Emerson,	Solano	& Piatt;	2008

Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
LDL
Siminerio, Ruppert, Emerson, Solano & Piatt; 2008
Dyson, Beatty & Matthews; 2010
King, A.B., & Wolfe, G.S.; 2009
Siminerio, L. M., Piatt, G., & Zgibor, J. C., 2005
TRIGLYCERIDES
Krakow, D., & Feulner-krakow, G.; 2007
Lee, T. I., Yeh, Y. T., Liu, C. T., & Chen, P. L., 2006
McLoughney, Khan, Ahmed; 2007
BODY MASS
BMI
Krakow, D., & Feulner-krakow, G.; 2007
Gucciardi, DeMelo, Booth, Tomlinson, and Stewart; 2009
Deakin, Whitham ; 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Clarke, A., 2011
Waist
Deakin, Whitham ; 2009
Van Sluljsesther, E. M., Van Poppel, N. M., Twisk, J. W., Paw, M. J., Calfas, K.
J., & Van Mechelen, W.,2005
Weight
Clarke, A., 2011
Deakin, Whitham ; 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Conlon,P.; 2010
Davies, M. J., Heller, S., Skinner, T. C., Campbell, M. J., Carey, M. E., &
Cradock, S.,Khunti, K., 2011
Van Sluljsesther, E. M., Van Poppel, N. M., Twisk, J. W., Paw, M. J., Calfas, K.
J., & Van Mechelen, W.,2005
BLOOD PRESSURE
McLoughney, Khan, Ahmed; 2007
Deakin, Whitham ; 2009
King, A.B., & Wolfe, G.S.; 2009
Conlon,P.; 2010
Krakow, D., & Feulner-krakow, G.; 2007
Siminerio, L. M., Piatt, G., & Zgibor, J. C., 2005
Reed, R.L., Revel, A.D., Carter, A.O., Hussein, F.S., & Dunn, E.V.; 2005

Table 4

Measuring Subjective Quality Indicators
Diabetes Knowledge
Siminerio, Piatt & Zgibor; 2005
New; 2010
Bell, Patel, & Malasanos; 2006
Dyson, Beatty & Matthews; 2010
Clarke, A., 2011
Atak, Gurkan, Kose; 2009
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Davies, M. J., Heller, S., Skinner, T. C., Campbell, M. J., Carey, M. E., &
Cradock, S.,Khunti, K., 2011
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009
Braun, A. K., Kubiak, T., Kuntsche, J., Meier-hofig, M., Muller, U. A., Feucht, I.,
& Zeyfang, A. (2009)
Selea, A., Sumarac-dumanovic, M., Pesic, M., Suluburic, D., Stamenkovic-
pejkovic, D., Cvijovic, G., & Micic, D. (2011)
Song, Choe, Kim, Yi, Lee, Kim, Lee, et al., 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Self-Efficacy
Siminerio, Piatt & Zgibor; 2005
Deakin, Whitham ; 2009
Clarke, A., 2011
Gucciardia, E., Demelo, M., Lee, R. N., & Grace, S. L., 2007
Wu, S. V., Lee, M. C., Liang, S. Y., Lu, Y. Y., Wang, T. J., & Tung, H. H.,2011
Song, Choe, Kim, Yi, Lee, Kim, Lee, et al., 2009
Braun, A. K., Kubiak, T., Kuntsche, J., Meier-hofig, M., Muller, U. A., Feucht, I.,
& Zeyfang, A.,2009
Kulzer, B., Hermanns, N., & Reinecker, H., 2007
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009
Yukawa, K., Yamazaki, Y., Yonekura, Y., Togari, T., Abbott, F., & Homma,
M.,Kagawa, Y.,2010
Sturt, Whitlock, Fox, Hearnshaw, Farmer, Wakelin, et al., 2008
New; 2010
Atak, Gurkan, Kose; 2009
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Dyson, Beatty & Matthews; 2010
Van Sluljsesther, E. M., Van Poppel, N. M., Twisk, J. W., Paw, M. J., Calfas, K.
J., & Van Mechelen, W., 2005
Quality of Life
Krakow, D., & Feulner-krakow, G.; 2007
Adolfsson, E.T., Walker-engstrom, M.L., Smide, B., & Wikblad, K; 2007
Clarke, A., 2011
Yukawa, K., Yamazaki, Y., Yonekura, Y., Togari, T., Abbott, F., & Homma,
M.,Kagawa, Y.,2010

Review of Diabetes Education Delivered with Technology

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College of Nursing

### **Review of Diabetes Education Delivered with Technology**

Diabetes is a chronic, life threatening disease that presents serious personal and economic costs to the community. The National Institutes of Health (2008) report that the total direct and indirect costs of diabetes were around \$174 billion in 2008.

Changes in healthcare, which include reimbursement based on patient safety and quality outcome measures have brought attention to patient education. Patient education has become an important component of many disease management programs. Due to increased pressure to provide more informative and interactive educational resources to patients at a lower cost, healthcare providers are beginning to realize the benefits of using computer technology to help educate patients.

Activities to educate, monitor and manage patients with diabetes must be encouraged (Adolfsson, Walker-engstrom, Smide, & Wikblad, 2007; Baradaran, Shams-hosseini, Noori-hekmat, Tehrani-banaihashemi, & Khmseh, 2010; Barnes, Ziemer, Miller, & Doyle, 2004). However, the time and cost of implementing educational interventions can be substantial and may place an unreasonable burden on healthcare professionals (Cranney, Warren, Barton, Gardner, & Walley, 2001). In today's healthcare environment of increasing costs and decreasing reimbursements, many healthcare professionals lack the resources necessary to adequately address patient education as part of the standard office visit (Cranney et al., 2001; Haggerty, Pineault, & Beaulieu, 2007; & Legare, Ratte, Gravel, & Graham, 2008).

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Technology has presented various populations with opportunities for education. Electronic means have been used to educate both patients and medical personnel. These interventions are cost effective and do not require substantial time commitments from the healthcare professionals (Cranney, Warren, Barton, Gardner, & Walley, 2001); as a result, researchers are investigating the possibility of using computers to deliver patient education(Keulers, Welters, Spauwen, & Houpt, 2007).

#### **Purpose of Review**

The purpose of this review is to explore the ways that diabetes education has been delivered using electronic technology, identify different quality indicators that have been used to measure the success of a program, and the length of time that these indicators were followed.

### Methods

**Search methods.** The EBSCO host electronic database was used to search for articles published from 2000 to 2012, with most articles being published in the last five years. The search used the electronic databases of CINAHL with full text, Education Full Text, ERIC, MEDLINE, and PsychINFO. The EPOC search strategy was used "diabetes education," "computer based intervention," "technology," "informatics," and "consumer health information," as well as combinations of these terms. .

**Study selection.** A total of 844 titles and abstracts were screened for eligibility. Studies included in this review discussed various ways that diabetes education has been electronically delivered to individuals with diabetes and studies focused on the healthcare providers who work with them. Studies

included also identified different quality indicators that have been explored to measure the success of a program, such as measurements of diabetes self-care, diabetes knowledge or bio-demographics (glycohemoglobin, lipids and blood pressure) and the length of time that these indicators were followed. Studies were included if they met the following criteria: 1) randomized or quasi-randomized trials randomized by patient, healthcare professional, or practice; and 2) nonrandomized studies controlled at a second site with data before and after the intervention. Studies not published in English, available only as abstracts or that did not include evaluation of quality indicators were excluded.

## Results

**Search Results.** Sixteen articles were identified that included diabetes quality indicators, computer based diabetes teaching, web-based teaching, online education, and multi-media diabetes education. These articles are identified in the table with the accompanying citation and level of evidence grade, utilizing the grading system recommended by the U.S. Preventive Services Task Force (2003).

# **Characteristics of Included Studies**

**Participants**. Each study consisted of 12 to 513 participants with diabetes, with a total of 1818 participants in all. These studies were conducted in four different countries, with over half occurring in the USA (67%). Participants in all studies except one were over 18; in the study by Franklin, Waller, Pagliari, and Greene (2006), 126 participants were aged 8-18.

Fourteen of sixteen articles discussed individuals with diabetes and the electronic delivery of diabetes education. Two articles (Bell, Patel, & Malasanos,

2006; Halkoaho, Kavilo, & Pietila, 2007) discussed mixed groups of participants that included patients as well as nursing professionals that were educated using programs delivered electronically. Bell et al.(2006) used the "Brainfood" educational website and Franklin et al. (2006) used self-care system software to see if it would increase knowledge in the patient and healthcare provider, as well as enhance the existing knowledge of the healthcare provider and evaluate the programs' usefulness.

**Site selection.** All studies were designed specifically to evaluate outpatient diabetes education delivered by electronic means. This review used sixteen articles that explored twenty-seven locations related to primary care. While most articles included only one location, two articles (Gerber et al., 2005; Noh et al., 2010) used information from five different locations; one study used three locations (Jennings, Powell, Armstrong, Stuart, & Dale, 2009), and the article by McIlhenny, Guzic, Knee, Demuth, and Roberts (2011) used two locations.

Interventions. All studies were designed specifically to evaluate electronic delivery of diabetes education (Table 2). The study by Franklin, Waller, Pagliari, & Greene (2006) used texting to send supportive messages with goal specific prompts and messages to the participants. Two studies (Zyskind, Jones, Pomerantz, & Barker, 2009; Song et al., 2009) used websites that utilized educational videos or programs that were designed strictly to deliver information. Thirteen studies used interactive programs and conferencing. Dyson, Beatty, and Matthews (2010) used video conferencing with the ability to interact with the healthcare professional. Yielding highly effective results, the twelve other studies used programs or websites to educate patients and gave them the opportunity to interact with healthcare professionals so that they might receive care that was tailored specifically to them.

## **Outcomes Studied**

Quality indicators are often used to evaluate the success of an educational program. These indicators can be objective (Table 3), which may include biodemographic values such as glucose, lipids, blood pressure and weight, as well as subjective indicators (Table 4) which rely on results from tests and questionnaires.

**Objective measurements.** Twelve studies tracked blood glucose as a quality indicator. Glycohemoglobin, which is an average measurement of blood glucose over a three-month time period, was used in twelve studies that used objective measurements, but fasting blood sugar results were also included in the study by Lee, Yeh, Liu, and Chen (2007).

Lipid levels were monitored in four studies. Four different types of lipid measurements were evaluated in at least two different studies: total cholesterol (Lee, et al., 2007; Dyson et al., 2010), HDL (Lee et al., 2007; McMahon et al., 2005), LDL (Zyskind, Jones, Pomerantz, & Barker, 2009; Dyson et al., 2010), and triglycerides (Lee et al., 2007; McMahon et al., 2005).

Three studies used blood pressure as a quality indicator. Gerber et al. (2005) and Khan et al. (2011) used blood pressure measurements and glycohemoglobin measurements for their studies that evaluated interactive multimedia. McMahon et al. (2005) combined glycohemoglobin, HDL and triglycerides with blood pressure measurements to evaluate the web-based care study.

**Subjective measurements.** Eight studies measured a change in participants' knowledge of diabetes by comparing results from pre and post study tests and questionnaires. Franklin, Waller, Pagliari, and Greene (2006) and Song et al. (2009) measured diabetes knowledge and self-efficacy, as well as the objective measurement of glycohemoglobin when evaluating a web-based program and the Sweet Talk texting program that utilized informative and encouraging text messages. Glycohemoglobin, total cholesterol, and LDL accompanied measurements of diabetes knowledge to evaluate the effects of the three lifestyle videos in the study by Dyson, Beatty, and Matthews (2010). McIlhenny, Guzic, Knee, Demuth, and Roberts (2011) and Balamurugan et al. (2009) evaluated the measurement of diabetes knowledge in addition to other subjective measures such as self-efficacy and quality of life, after receiving diabetes education by electronic delivery. Multiple measurements of subjective and objective values were evaluated by Gerber et al. (2005) in a study that evaluated supplemental computer multimedia use. Bell, Patel, and Malasanos (2006) only evaluated diabetes knowledge.

Self-efficacy and self-care behaviors were measured in ten studies. Increases in self-efficacy and diabetes knowledge were noted in studies by McIlhenny, Guzic, Knee, Demuth, and Roberts (2011) and Balamurugan et al. (2009). The study by Huang, Chen, and Yeh (2009) showed increased diabetes knowledge, but no change in self-efficacy. There were no changes found regarding self-efficacy in three studies (Khan et al., 2011; Jennings, Powell, Armstrong, Stuart, & Dale, 2009; Gerber et al., 2005). There were increases in self-efficacy in the studies by Song et al. (2009), Halkoaho et al. (2007), and Izquierdo et al. (2003), as well as the only study that included participants less than 18 years of age (Franklin et al., 2006). Self-reported increases in exercises were reported in studies by Khan et al. (2011) and Lee, Yeh, Liu, and Chen (2007). No changes were noted in quality of life (McIlhenny, Guzic, Knee, Demuth, & Roberts, 2011; Jennings, Powell, Armstrong, Stuart, & Dale, 2009).

## Discussion

Overall, the results of education delivery using technology were very diverse regarding study design, interventions and outcomes reported.

The content of the educational material should be evidence-based, and the material may be more accurate if specific guidelines are used. If the content of the material is not in the original format then the source should be clearly indicated within the material to verify accuracy.

Most sites used in these articles were technically advanced in respect to design of navigation, but were shown to have poor interactivity. Most educational sites could benefit from items such as easier mechanisms of feedback, more accessible chat and discussion groups, and ability to tailor the content and alerts to a specific patient or group of patients.

Geographic specificity was not mentioned in many of the studies. Educational material can often be especially effective when cultural content is tailored to a particular population. Since the studies were not conducted regarding a specific population, studies that are focused on populations such as Appalachia may be useful.

Individuals in a particular geographic area may choose not to participate in an educational opportunity due to the stigma that may be related to the disease, such as being labeled "broken", "lazy", or "unhealthy". Areas populated by individuals with low literacy may choose not to participate if the material is not supplied with audio or delivered at a lower literacy level.

Educational material that is accompanied by audio may aid in recruiting subjects with lower literacy. Individuals who have time constraints such as commuting may find audio components beneficial to initiate or continue a particular educational program.

There were no alternative means mentioned in these studies regarding access to the electronic material if immediate access was not available. Access to electronic education material may be difficult in some geographical locations due to availability of a device to view the material on, availability of service to transmit the program, or the cost to power the device. Establishment of a centralized location to allow a participant to access electronic media may support the recruitment of subjects to participate in a program or encourage a participant to complete an existing electronic diabetes education program.

Standard recruitment protocols were not consistent. There were no incentives for the healthcare providers to refer individuals to participate in or complete the studies. Individuals who participated in the studies did not have specific incentives to encourage them to participate in or complete the studies. Sample sizes used in the studies were not consistent and ranged from 12 participants to 513 participants.

There were six different time spans that were followed (Table 5). The study by Song et al. (2009) had the earliest recorded results at baseline to 6 weeks showing significant increase in glycohemoglobin and diabetes knowledge, but the final results of this study regarding web-based education were recorded at three months. Four studies (Huang, Chen, & Yeh, 2009; Khan et al., 2011; Izquierdo et al., 2003; Balamurugan et al., 2009) only used results from baseline to 3 months. Lee, Yeh, Liu, and Chen (2007) and McMahon et al. (2005) followed results at baseline, 3 months, 6 months, 9 months and one year. Zyskind, Jones, Pomerantz, and Barker (2009) only used measurements from baseline to 9 months. Measurements from baseline to 6 months were evaluated in studies by Dyson, Beatty, and Matthews (2010), Jennings, Powell, Armstrong, Stuart, and Dale (2009) and Noh et al. (2010). Gerber et al. (2005), Franklin, Waller, Pagliari, and Greene (2006) and Bell, Patel, and Malasanos (2006) extended their studies from baseline to one year, while Halkoaho, Kavilo, and Pietila (2007) only listed pre and post-test measurements with no designated timeframe.

Although it appears that electronic delivery and computer-based education is an effective and efficient way to teach skills and provide information to patients, this may be questionable as evidence based practice evolves and guidelines change. If knowledge diminishes over time, the overall value of technologybased education would be greatly reduced, thus adding support for the need for customized information that is flexible enough to adapt to the nature of the patients' ongoing informational needs and changes to their health and social circumstances.

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# Conclusion

The results of this review support use and delivery of technology based educational material. Diabetes education, based on the patients' own goals, values and motivation will help resolve daily problems, as well as encourage individuals with diabetes to accept responsibility for making choices that affect their healthcare.

Technology based material can support the formation of patient and provider relationships, improve the balance of self-efficacy versus provider responsibility, and create new educational opportunities with the transfer of applicable data.

To capitalize on the advantages of this technology, we need to broaden our understanding of how people learn best using technology and examine the impact of this knowledge on healthcare over time. This can only be accomplished through further research. Cost-benefit analysis and cost-effectiveness would be useful in establishing the effectiveness of these interventions. This may identify areas where we may need to encourage more time or emphasis on a particular area of study.

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Table 1Articles Utilized in Review

Grade	Reference	Design	Intervention	Sample	Setting	Follow Up	Results	Conclusion
Good/	Bell, J. A.,	CBA	Delivery of	513	University	13 months	Non-nurse	Brainfood is
А	Patel, B.,		educational	participant	Outpatient		post scores	educationally
	&	Pre and	material	S	Setting		improved	sound and
	Malasanos	post tests	"Brainfood"	124			significantly	effective at
	, T.		via	Nurses			(p<0.001).	delivering
	(2006).		educational	389 Non-			Nurse post	Type 1
	Knowledg		website	nurse			scores	diabetes
	e						improved	education to
	improvem						significantly	both
	ent with						(p<0.05).	professional
	web-based						Post scores	and non-
	diabetes						improved,	professionals
	education						but not	. Web access
	program:						statistically	from non-
	Brainfood						significant	clinic
	. Diabetes						for basic	settings can
	Technolog						nutrition.	improve
	у &						Web-based	access to
	Therapeut						education	high-quality
	<i>ics</i> , 8(4),						about Type 1	education for
	444-448.						diabetes	learners in
	USA						improved the	remote or
							knowledge	underserved
							of all users.	locations
							Nurses had	
							lower margin	
							of	
							improvement	
							for most	
							modules	
							since they	
							had higher	
							base	
<u>a</u> 1/			<b>D</b> 1	274		2.60.1	knowledge.	
Good/	Lee, T. I.,	Quasi-	Both	274	Outpatient	3,6,9, and	Standard	The POEM
А	Yeh, Y.	experimen	received	participant	visiting the	12 months	Deviations	system can
	T., Liu, C.	tal	treatment	S 124	Metabolism		are listed for	help patients
	T., &		based on	134 in	Center		testing. I:C 1=1 <sup>st</sup> follow	control their
	Chen, P.		same	interventio				glucose,
	L. (2007).		guidelines,	n group			up, $2=2^{nd}$	HbA1c and
	Developm		the	(57% male			follow up, $3=3^{rd}$ follow	total
	ent and		intervention	43%				cholesterol
	evaluation		group	female)			up. Eastin a	levels to
	of a		received	140 in			Fasting	manage their diabetes,
	patient-		access to	control			Blood Sugar- 1-	
	oriented education		POEM (patient	group			47.47:43.46;	providing an easy and
	system for		(patient oriented	(46% male and 54%			47.47:43.46; 2-	inexpensive
	diabetes		diabetic	female)			47.67:42.37;	way to
			education	Both			47.07:42.37;	extend
	managem			received			-	hospital-
	ent.		management	treatment			45.52;41.44.	
	Internatio nal		system)	based on			HgA1c-	based patient education
			Lab test results				1-2.16:1.49;	
	Journal of Medical			same			2-2.14:1.49;	services for
	Meancal		including	guidelines,		1	3-2.12:1.65.	community-
	Informatic		fasting blood	the				based

		r		· · ·	r	r	-	· · ·
	s, 76, 655-		glucose,	interventio			Total	continuous
	663.		HbA1c, total	n group			Cholesterol-	education
	Taiwan		cholesterol,	received			1-	
			triglyceride	access to			30.25:37.36;	
			and HDL	POEM			2-	
			were tested				29.57:39.41;	
			from the first				3-	
			visit through				29.047:40.59	
			each follow				7.	
			up at 3,6,9				Triglyceride-	
			and 12				1-	
			months				58.58:64.63;	
							2-	
							58.59:64.65;	
							3-	
							58.50:64.67.	
							HDL-	
							1-	
							14.02:11.82;	
							2-	
							14.07:11.57;	
							14.03:11.66.	
							Follow Up-	
							1-A	
							significant	
							difference in	
							fasting blood	
							glucose	
							levels.	
							2 <sup>nd</sup> -fbg and	
							HgA1c were	
							significantly	
							different.	
							3-Significant	
							difference in	
							fasting blood	
							glucose,	
							HgA1c and	
							total	
							cholesterol	
Fair/A	Zyskind,	RCT	Both	108	Large urban	3,6 and 9	The	The study
	A., Jones,		received	participant	community	months	intervention	allowed
	K. C.,		standard of	S	health center		group had a	patients with
	Pomerantz		care diabetes	58 in	with		small decline	low-literacy
	, K. L., &		treatment.	interventio	Spanish		in HgA1c	levels to
	Barker, A.		The	n group	speaking		(-0.3%) and	receive
	L. (2009).		intervention	50 in the	patients.		LDL	health
	Exploring		group	control	1		(-9.9mg/dl).	information
	the use of		received	group			The control	targeted for
	computer		additional	6 - r			group had a	their
	based		computer				small	comprehensi
	patient		based				increase in	on. The
	education		diabetes				HgA1c	study found a
	resources		education in				(+0.1%) and	downward
	to enable		either				LDL	trend in both
	diabetic		English or				(+0.5mg/dl)	HgA1c and
	patients		Spanish from				(10.5mg/ul)	LDL. Due to
	from		the Medline-					small size the
	underserv		Plus.gov					differences
L	underser v	1	- 100.501	1	1	1	1	311101011005

	ed population s to self- manage		website					were not statistically significant. This study
	their disease. Informatio n Services & Use,							supports the theory that computer based patient education
	29, 29- 43.USA							can positively impact clinical outcomes.
Good/ A	Huang, J. P., Chen, H. H., & Yeh, M. L. (2009). A compariso n of diabetes learning with and without interactive multimedi a to improve knowledg e, control, and self- care among people with diabetes in Taiwan. <i>Public</i> <i>Health</i> <i>Nursing</i> , 26(4), 317-328. Taiwan	RCT	The control group used routine 3- month patient education and intervention group received education through interactive multimedia about diabetes for 3 months.	60 subjects with diabetes 30 in interventio n group 30 in control group	Endocrinolo gy outpatient department at a regional hospital in the south of Taiwan	Base and 3 month	The experimental group showed greater improvement in understandin g diabetes than the control (p<.001). There was no significant difference in control of blood sugar levels (p=.10) and self-care (p=.32)	The use of an interactive multimedia device to intervene in diabetes self- care was effective only in raising the subjects' knowledge about the disease. Additionally, the subjects may need more time to implement more effective blood sugar control and self-care activities after receiving instruction
Good/ B	Song, M., Choe, M. A., Kim, K. S., Yi, M. S., Lee, I.,	RCT	The intervention group participated in the web- based	31 participant s 15 in interventio n group	Outpatient group affiliated with the College of Nursing and	Base, 6 weeks and 3 months	From base line to 6 weeks the HbA1c and knowledge improved	The results of this study indicate that a web-based diabetes self- management
	Kim, J.,Shim, Y. s (2009). An		diabetes self- management program as an alternative to	16 in the control group	the endocrine department of a university-		significantly in the web- based group, as well as diabetes care	education program has potential as an effective alternative to
	evaluation of web- based education		attending 3 hours of group lectures		affiliated, tertiary care hospital in Seoul,		behavior continuously improved from base to	group lecture education for diabetes self- management,

				1	77	-		
	as an alternative to group lectures for diabetes self- managem ent. <i>Nursing</i> and <i>Health</i> <i>Sciences</i> , 11, 277- 284. Korea		provided by health care professional specializing in diabetes care.		Korea		6 weeks to 3 months. Diabetes care knowledge and behavior improved significantly in the lecture group from base to 6 weeks, but the HgA1c did not change at all	in terms of improving diabetes care knowledge, improving diabetes care behavior, and improving the physiological variables, HgA1c and FBS
Good/ A	Notea Dyson, P. A., Beatty, S., & Matthews, D. R. (2010). An assessmen t of lifestyle video education for people newly diagnosed with type 2 diabetes. <i>Journal of</i> <i>Human</i> <i>Nutrition</i> <i>and</i> <i>Dietetics</i> , 23, 353- 359. UK	RCT	All subjects in the study received usual medical care from their primary care physician, including education about lifestyle management of type 2 diabetes from a practice nurse. In addition, subjects randomized to the video intervention received the three lifestyle videos and were requested to watch them in their own time. The control group was offered the videos at the end of the 6 month study period	42 newly diagnosed diabetic Patients 21 controlled group 21 interventio n group	Direct referral from primary care physician, practice nurse or from ads	Base and 6 months	The intervention group showed increased knowledge compared to controls ( $p <= 0.0001$ ). There were no significant differences in changes over 6 months in either group, however the intervention group showed improvement s in HgA1c ( $p=0.024$ ), total cholesterol ( $p=0.017$ ), LDL cholesterol ( $p=0.018$ ) and increased physical activity measured by pedometer ( $p=0.043$ ) from baseline, with no significant changes in control	A brief video intervention increased diabetes knowledge amongst those newly diagnosed with type 2 diabetes and may comprise an effective way of directing education to such individuals.

							group.	
Good/	Khan, M.	RCT	Participants	129	Patients at a	Base and 3	There was an	Multimedia
В	A., Shah,		either	uninsured,	county	months	increase in	users
	S.,		viewed a	primarily	clinic in		the number	received a
	Grudzien,		computer	ethnic	Chicago,		of oral	greater
	A.,		multimedia	minority	Illinois		diabetes	intensificatio
	Onyejekw		education	adults with			medications	n of diabetes
	e, N.,		program	type 2			prescribed	therapy, but
	Banskota,		(intervention	diabetes			over 3	demonstrated
	P., Karim,		) or read an	67			months to	no difference
	S.,Gerbe		educational	interventio			multimedia	in self-
	r, B. s		brochure	n group			users	management
	(2011). A		(control)	62 control			compared	in
	diabetes		while in the	group			with those in	comparison
	education		waiting room	0			the control	with those
	multimedi		U				group	receiving
	a program						(p=0.017).	educational
	in the						HgA1c	brochures.
	waiting						declined by	The
	room						1.5 in the	availability
	setting.						multimedia	of a
	Diabetes						group versus	computer
	Therapy,						0.8 in the	multimedia
	2(3), 178-						control	program in
	188.						group	the waiting
	USA						(p=0.06).	room appears
							There were	to be a novel
							no difference	and
							between	acceptable
							groups in	approach in
							changes in	providing
							blood	diabetes
							pressure	education for
							levels, self-	underserved
							efficacy, and	populations
							most	r · r · · · · · · · · · · · ·
							diabetes	
							related	
							behaviors.	
							Self-reported	
							exercise	
							increased in	
							the control	
							group	
							compared	
							with the	
							multimedia	
							group	
							(p=0.016)	
		<b>GT</b> 4						
Fair/B	Jennings,	CBA	These	17	Outpatients	Base and 6	Participants	An internet-
	А.,		patients used	patients,	from three	months	found the	based system
	Powell, J.,		a virtual	convenien	UK		virtual clinic	to aid the
	Armstron		clinic system	ce sample	hospitals in		easy to use	management
	g, N.,		that allowed		the West		and	of diabetes
	Stuart, J.,		communicati		and East		positively	appears
	& Dale, J.		on with		Midland		rated its	feasible and
	(2009). A		health				design. Peer	well accepted
	virtual		professionals				support was	by patients.
	clinic for		; interact				the most	The pilot
	diabetes	1	with peers		1	1	valued	study did not

10		1		( 1	· 1
self-		and access		aspect and	identify
manage		information.		the	evidence of
ent: Pil	ot			discussion	an impact on
study.				boards the	improving
Journal				most used	quality of life
Medica	l			component.	or self-
Internet				All	efficacy in
Researc	ch,			participants	patient who
11(1), 1				highly rated	used insulin
UK				the virtual	pump
				clinic in	therapy
				terms of	
				improving	
				communicati	
				on with	
				peers, but	
				few agreed it	
				had	
				improved	
				communicati	
				on with	
				health care	
				professionals	
				. No	
				significant	
				improvement	
				s in	
				physiologica	
				l and	
				psychologica	
				1	
				measurement	
				s were	
				found.	
				Regarding	
				HgA1c	
				measurement	
				s, there was	
				no	
				significant	
				difference	
				found	
				between the	
				pre and post	
				test results	
				(p=0.53).	
				Mean	
				ADDQoL	
				scores at	
				base were -	
				2.1	
				compared to $2.0$ post test	
				-2.0 post test	
				(p=.62).	
				Patient's	
				confidence	
				in their	
				ability to	
				perform self-	
				care tasks	

							was found to	
							be	
							significantly	
							reduced from	
							base to	
							follow up	
E : /A		DOT	T .1	00	Dition	D 2 1	(p=0.45)	D'L
Fair/A	McIlhenn y, C. V.,	RCT	In the intervention	98 patients 48	Patients at two rural	Base, 3 and 6 months	Disease knowledge	Diabetes knowledge
	y, C. v., Guzic, B.		group that	40 interventio	medical	0 monuis	and self-	and self-
	L., Knee,		received	n group	clinics		blood	blood
	D. R.,		regularly	50 control	chines		glucose	glucose
	Demuth,		scheduled;	group			monitoring	monitoring
	B. R., &		one-on-one	0 1			improved	improved
	Roberts, J.		individualize				with one-on-	with one-on-
	B. (2011).		d diabetes				one	one
	Using		related				education.	education.
	technolog		health				Demographi	High attrition
	y to		education				c and	and a short
	deliver healthcare		and hands on				baseline	study period
	education		instruction how to use				scores were similar	were limitations of
	to rural		an internet				between	this study.
	patients.		portal by a				groups. At 6	The
	Rural and		nurse				months, the	researchers
	Remote		educator.				intervention	speculate that
	Health,		Control				group	the age of the
	<i>11</i> (1798),		patients in				showed	participants
	1-11.		the second				significant	and low
	USA		clinic were				increase in	internet
			given				disease	penetration affected
			pamphlet describing				knowledge and self-	satisfaction
			how to				blood	scores.
			access the				glucose	300103.
			portal.				monitoring	
			All				behavior.	
			participants				There were	
			completed				no	
			baseline and				differences	
			post studies.				in QOL	
			Disease				between the	
			knowledge and problem				groups at 6 months.	
			areas in				Participants	
			diabetes				in the	
			were				intervention	
			measured.				group were	
			All				highly	
			participants				satisfied with	
			completed a				the educator,	
			behavior				but not the	
			modification				internet as a	
			s survey post				resource	
			study. A					
			satisfaction					
			survey was					
			completed.					
			Serum					

			glucose,					
			HgA1c, and					
			lipids were					
			reviewed					
Good/ B	Gerber, B. S., Bordsky, I. G., Lawless, K. A., Smolin, L. I., Arozullah, A. M., Smith, E. V.,Eiser, A. r (2005). Implemen tation and evaluation of a low- literacy diabetes education computer multimedi a applicatio n. <i>Diabetes</i> <i>Care</i> , 28(7), 1574- 1580.	RCT	•	244 patients started study with 183 completin g the study	Patients from 5 public clinics in Chicago, Illinois	Base and 1 year	Only 183 subjects completed the study. There were no significant differences in change in A1c, weight, blood pressure, knowledge, self-efficacy or self- reported medical care between the intervention and control groups. There was an increase in perceived susceptibility to diabetes complication s in the intervention group. Lower	Access to multimedia lessons resulted in an increase in perceived susceptibility to diabetes complication s, particularly in subjects with lower health literacy. Despite measures to improve informational access for individuals with lower health literacy, there was relatively less use of the computer among these participants.
Fair/A	USA USA USA Noh, J. H., Cho, Y. J., Nam, H. W., Kim, J. H., Kim, D. J., Yoo, H. S.,Woo, M. h (2010). Web- based	RCT	Evaluate the effect of a web-based comprehensi ve information system, consisting of Internet and cellular phone use, on blood glucose monitoring	40 patients Age 18- 80; type 2 diabetes and A1c between 7- 10 with stable control. Randomly assigned to interventio	Outpatient department from 5 hospitals	Base and 6 months	literacy patients reported this higher. Time on the computer was increased in the intervention group. Significant decrease in A1c in intervention group but not in the control group. There was a relationship between the change in A1C and frequency of	Significant HgA1c was improved by a web-based intervention not only via computer but also via cellular phone at 6 months post initiation in patients with type 2

	comprehe nsive informatio n system for self- managem ent of diabetes mellitus. <i>Diabetes</i> <i>Technolog</i> <i>y &amp;</i> <i>Therapeut</i> <i>ics</i> , 12(5), 333-337. Korea		Intervention patients received training in eMOD usage and logged into the system whenever it was convenient for them. The control group received diabetes educational books with similar contents	n group (20) or Control group (20).			access to the eMOD system by computer and cellular phone	diabetes. These results indicate that the use of a convenient web-based education system could be more effective for glycemic control than traditional education for diabetes patients.
Fair/A	Halkoaho, A., Kavilo, M., & Pietila, A. M. (2007). Informatio n technolog y supporting diabetes self-care: A pilot study. <i>European</i> <i>Diabetes</i> <i>Nursing</i> , 4(1), 14- 17. UK	СВА	Data collected by questionnair e and interview. People with diabetes were sent a questionnair e and the nurses were interviewed	9 individuals with diabetes 3 diabetes nurses	9 patients from outpatient program, the nurses worked with those patients	Post interview questionnair es	The results suggest that the Self-Care system software supports and motivates diabetes self- care. The nurses felt that the application was useful when changes were introduced. Both groups disliked the mechanical nature of the software	The results suggest that the Self-Care system software supports and motivates diabetes self- care. The nurse felt that the application was useful when changes, such as starting insulin treatment, were introduced. The application was further described as effective and motivating in short-term intensive diabetes education and monitoring; however, both nurses and patients disliked the mechanical nature of the software

Good/	McMahon	RCT	All	104	Patients	Baseline, 3,	Patients	Web-based
B	, G. T.,	KC1	participants	patients	with	6, 9 and 12	receiving	care
D	Gomes,		completed a	52 in	diabetes and	months	web-based	management
	Н. Е.,		diabetes	Control	HgA1c	montins	care	may be a
	Hickson-		education	group	>=9.0%		management	useful
	Hohne, S.,		class and	52  in	who		had lower	adjunct in the
	Hu, T. M.,		were	interventio	received		Alc over 12	care of
	Levine, B.		randomized	n group	their care at		months when	patients with
	A., &		to continue	ngroup	a		compared	poorly
	Conlin, P.		with their		Department		with	controlled
	A. (2005).		usual care or		of Veterans		education	diabetes
	Web-		receive web-		Affairs		and usual	
	based care		based care		medical		care.	
	managem		management.		center were		Persistent	
	ent in		The web-		recruited.		website users	
	patients		based group				had greater	
	with		received a				improvement	
	poorly		notebook				in A1c when	
	controlled		computer,				compared	
	diabetes.		glucose and				with	
	Diabetes		blood				intermittent	
	Care,		pressure				users or	
	28(7),		monitoring				education	
	1624-		devices, and				and usual	
	1629.		access to a				care. A	
	USA		care				larger	
			management				number of	
			website. The				website data	
			website				uploads was	
			provided				associated	
			educational				with a larger	
			modules,				decline in	
			accepted				Alc.	
			uploads from				Hypertensive	
			monitoring				participants	
			devices, and				in the web-	
			had an internal				based group	
							had a greater reduction in	
			messaging system for				systolic	
			patients to				blood	
			communicat				pressure.	
			e with the				HDL	
			care manager				cholesterol	
			- a c manager				rose and	
							triglycerides	
							fell in the	
							web-based	
							group	
Good/	Izquierdo,	RCT	Determine	56 adults	Patients at	Baseline	Patient	Diabetes
А	R. E.,		whether	with	the Joslin	and 3	satisfaction	education via
	Knudson,		diabetes	diabetes	Diabetes	months	was high in	telemedicine
	P. E.,		education	28 control	Center at		the	and in person
	Meyer, S.,		can be	group	SUNY		telemedicine	was equally
	Kearns, J.,		provided as	28	Upstate		group.	effective in
	Ploutz-		effectively	interventio	medical		Problem	improving
	snyder,		through	n group	University		Areas in	glycemic
	R., &		telemedicine		in Syracuse,		Diabetes	control, and
	Weinstock		technology		New York		scale scores	both methods
	, R. S.		as through				improved	were well
	,	1	as anough	1	1	1	mprovou	

(2003). A		in-person				significantly	accepted by
compariso		encounters				with diabetes	patients.
n of		with diabetes				education,	Reduced
diabetes		nurse and				and the	diabetes-
education		nutrition				attainment of	related stress
administer		educators.				behavior	was observed
ed		Randomized				change goals	in both
through		to receive				did not differ	groups.
telemedici		diabetes				between	These data
ne versus		education in				groups.	suggest that
in person.		person				With	telemedicine
Diabetes		(control				diabetes	can be
Care.		group) or via				education,	successfully
,		telemedicine				,	used to
26(4), 1002-		(telemedicin				HgA1c	provide
1002-1007.		<b>C</b>				improved from 8.6 +/-	diabetes
USA		e group). The				1.8% at	education to
USA		education				baseline to	
		consisted of				$7.8 \pm 7.8$	patients
		three				3 months	
		consultative				after the	
		visits with diabetes				third educational	
		nurse and				visit, with	
						· ·	
		nutrition educators.				similar	
						changes	
		The in-				observed in the	
		person and					
		telemedicine				telemedicine	
		groups were				and in-	
		compared				person	
		using				groups.	
		measures of					
		glycemic					
		control and					
		questionnair					
		es to assess					
		patient					
		satisfaction					
		and					
		psychosocial					
		functioning					
		as related to					
	DOT	diabetes.	126	D	D 110	TTL A 1 1' 1	0 ( 77 1)
Good/ Franklin,	RCT	To assess	126	Patients	Base and 12	HbA1c did	Sweet Talk
A V.L.,		Sweet Talk,	patients,	with type 1	months	not change	was
Waller,		a test	28	diabetes for		in patients	associated
A., Declieri		messaging	convention	> 1 year, on		on conventional	with
Pagliari,		support	al therapy	conventiona		conventional	improved
C., &		system	33	l insulin		therapy	self-efficacy
Greene, S.		designed to	convention	therapy,		without or	and
A (2006).		enhance self-	al therapy	aged 8-		with Sweet	adherence;
A		efficacy,	and Sweet	18years		Talk, but	engaging a
randomize		facilitate	Talk	attending		improved in	classically
d		uptake of	31 Internetion	outpatient		patients	difficulty to
controlled		intensive	Intensive	clinics in		randomized	reach group
trial of		insulin thereasy and	insulin thereavy	Tayside,		to intensive	of young
Sweet		therapy and	therapy	Scotland.		therapy and	people.
Talk, a							
text-		improve glycaemic	and Sweet Talk			Sweet Talk. Sweet Talk	While Sweet Talk alone

гт							
mess syste suppy youn peop with diabe <i>Diab</i> <i>Medi</i> 23, 1 1338 UK	ort g le etes. <i>eetic</i> <i>icine</i> , 332-	control in pediatric patients with type 1 diabetes. Goal-setting at clinic visits was reinforced by daily text- messages from the Sweet Talk software system, containing				was associated with improvement in diabetes self-efficacy and self- reported adherence. When surveyed, 82% of patients felt that Sweet Talk had improved	did not improve glycaemic control, it may have had a role in supporting the introduction of intensive insulin therapy. Scheduled, tailored text messaging offers an
Blevi M. A Brecl Philli M., & Holle E.,l e, K. (2009 pilot of diabe educa via telem ne in rural unde ed comr y- oppo ies ar challe . The Diab Educa 35, 1	A., bow, J., ins	goal-specific prompts and messages tailored to patients' age, sex and insulin regimen. Participant knowledge, self-efficacy, and self-care practices were assessed before participants began the education program and after they had completed it. Also, select clinical measures were collected	38 participant s started 25 completed program	People with diabetes in underserved rural communitie s supported by the University of Arkansas	Base and 3 months	management and 90% wanted to continue receiving message 66% of participants completed the DSME-T program. A significantly greater proportion of participants demonstrate d improved knowledge, endorsed greater self- efficacy, and reported more frequent self- care practices to manage their diabetes at the conclusion of the study period.	means of supporting adolescents with diabetes and could be adapted for other health- care settings and chronic disease. The results of this pilot study suggest that DSME-T may offer opportunities for DSME among rural residents with diabetes. Plans are in place to explore the possibility of sustaining and expanding the program to other underserved rural communities.

Type of Delivery of Educat	tion
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Web-based information				
Lee, Ting-I, Yeh, Yu-ting, Liu, Chien-tsai, Chen, Ping-ling, 2007				
Zyskind, A., Jones, K. C., Pomerantz, K. L., & Barker, A. L., 2009				
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009				
Song, M., Choe, M. A., Kim, K. S., Yi, M. S., Lee, I., Kim, J.,Shim, Y., 2009				
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005				
Izquierdo, Knudson, Meyer, Kearns, Ploutz-snyder & Weinstock, 2003				
Bell, J. A., Patel, B., & Malasanos, T., 2006				
Interactive				
Huang, J. P., Chen, H. H., & Yeh, M. L., 2009				
Khan et al., 2011				
Jennings, A., Powell, J., Armstrong, N., Stuart, J., & Dale, J., 2009				
Mcilhenny, C. V., Guzic, B. L., Knee, D. R., Demuth, B. R., & Roberts, J. B	••,			
2011				
Gerber et al., 2005				
Noh, J. H., Cho, Y. J., Nam, H. W., Kim, J. H., Kim, D. J., Yoo, H. S.,Woo, M.	1.			
h, 2010				
Halkoaho, A., Kavilo, M., & Pietila, A. M., 2007				
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005				
Izquierdo, Knudson, Meyer, Kearns, Ploutz-snyder & Weinstock, 2003				
Balamurugan, Hall-barrow, Blevins, Brech, Phillips, Holley & Bittle, 2009				
Bell, J. A., Patel, B., & Malasanos, T.,2006				
Lee, Ting-i, Yeh, Yu-ting, Liu, Chien-tsai, Chen, Ping-ling, 2007				
Dyson, P. A., Beatty, S., & Matthews, D. R., 2010				
Telephone				
Franklin, Waller, Pagliari & Greene, 2006				

Articles L	Jsing (	<i>Objective</i>	Quality	Indicators
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	S Using Objective Quality Indicators
	D SUGAR
	emoglobin
	Lee, Yeh, Liu, & Chen, 2007
	Zysknd, Jones, Pomerantz, & Barker, 2009
	Song et al., 2009
	Khan et al., 2011
	Jennings, Powell, Armstrong, Stuart, & Dale, 2009
	Gerber et al., 2005
	Noh et al., 2010
	Dyson, Beatty, & Matthews, 2010
	Franklin, Waller, Pagliari & Greene, 2006
	McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
	Izquierdo, Knudson, Meyer, Kearns, Ploutz-Snyder & Weinstock, 2003
	Huang, Chen, & Yeh, 2009
Fasting	g Blood Sugar
	Lee, Yeh, Liu, & Chen, 2007
LIPID	
Total C	Cholesterol
	Lee, Yeh, Liu, & Chen, 2007
	Dyson, Beatty, & Matthews, 2010
HDL	
	Lee, Yeh, Liu, & Chen, 2007
	McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
LDL	
	Zysknd, Jones, Pomerantz, & Barker, 2009
	Dyson, Beatty, & Matthews, 2010
Trigly	cerides
	Lee, Yeh, Liu, & Chen, 2007
	McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
BLOO	D PRESSURE
	Gerber et al., 2005.
	McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
	Khan et al., 2011

Articles Using Subjective Quality Indicators
Diabetes Knowledge
Huang, Chen, & Yeh, 2009
Song et al., 2009
Dyson, Beatty, & Matthews, 2010
McIlhenny, Guzic, Knee, Demuth, & Roberts, 2011
Gerber et al., 2005

Franklin, Waller, Pagliari & Greene, 2006 Balamurugan, Hall-barrow, Blevins, Brech, Phillips, Holley & Bittle, 2009

Bell, J. A., Patel, B., & Malasanos, T., 2006

### Self-Efficacy

Sen-Encacy
Song et al., 2009
Khan et al., 2011
Jennings, Powell, Armstrong, Stuart, & Dale, 2009
Gerber et al., 2005
Franklin, Waller, Pagliari & Greene, 2006
Izquierdo, Knudson, Meyer, Kearns, Ploutz-snyder & Weinstock, 2003
Balamurugan, Hall-barrow, Blevins, Brech, Phillips, Holley & Bittle, 2009
Huang, Chen, & Yeh, 2009
McIlhenny, Guzic, Knee, Demuth, & Roberts, 2011
Halkoaho & Pietila, 2007
Khan et al., 2011
Lee, Yeh, Liu, & Chen, 2007
Quality of Life
McIlhenny, Guzic, Knee, Demuth, & Roberts, 2011
Jennings, Powell, Armstrong, Stuart, & Dale, 2009

Length of Study
Baseline to 6 weeks
Song et al., 2009
Baseline to 3 month
Lee, Yeh, Liu, & Chen, 2007
Zyskind, Jones, Pomerantz, & Barker, 2009
Huang, Chen, & Yeh, 2009
Song et al., 2009
Khan et al., 2011
Mcilhenny, Guzic, Knee, Demuth, & Roberts, 2011
Izquierdo, Knudson, Meyer, Kearns, Ploutz-snyder & Weinstock, 2003
Balamurugan, Hall-barrow, Blevins, Brech, Phillips, Holley & Bittle, 2009
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
Baseline to 6 months
Lee, Yeh, Liu, & Chen, 2007
Dyson, Beatty, & Matthews, 2010
Jennings, Powell, Armstrong, Stuart, & Dale, 2009
McIlhenny, Guzic, Knee, Demuth, & Roberts, 2011
Noh et al., 2010
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
Zyskind, Jones, Pomerantz, & Barker, 2009
Baseline to 9 months
Lee, Yeh, Liu, & Chen, 2007
Zyskind, A., Jones, K. C., Pomerantz, K. L., & Barker, A. L., 2009
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
Baseline to 1 year
Lee, Yeh, Liu, & Chen, 2007
Gerber et al., 2005
Franklin, Waller, Pagliari & Greene, 2006
McMahon, Gomes, Hickson Hohne, Hu, Levine & Conlin, 2005
Bell, J. A., Patel, B., & Malasanos, T.,2006
Generalized pre and post study
Halkoaho, A., Kavilo, M., & Pietila, A. M., 2007

## Do Educational Materials and Brief Counseling Improve Diabetes Knowledge and Self-

Efficacy?

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University of Kentucky

College of Nursing

#### Abstract

Purpose: The purpose of this study was to see if education and counseling of the Appalachian individual with diabetes and a family member/friend would improve knowledge of the disease and self-efficacy of the patient in regard to their diabetes care.Setting: The setting was one of eight primary care offices of Our Lady of Bellefonte Hospital, Bon Secours, located in the Ashland, Kentucky.

**Design:** A pilot study of descriptive, comparative design was used.

**Subjects:** Data were collected from a convenience sample of patients with type 2 diabetes (n=15) that were established at the primary care office and their family members/friends (n=15).

**Measurements:** The Diabetes Knowledge Tests (DKT), the Diabetes Empowerment Tests (DES-SF) and the Thai Family Function Tests were used to assess the subjective variables of interest. A chart review of the standard office visit was reviewed and objective metabolic outcomes, such as weight, blood pressure (systolic and diastolic), lipids (total cholesterol and triglycerides), pulse, and glycohemoglobin were extracted and recorded. All measurements were evaluated pre-education and post-education. Demographic and clinical characteristics were obtained from all participants. **Results:** Thirty participants, consisting of patients with type 2 diabetes (n=15) and family members/friends (n=15), completed the study with pre-education and three month post-education results. Increases in diabetes knowledge, improvement in self-efficacy and increased family function were noted; however, there was no indication that a higher

family function score would relate to a higher level of diabetes knowledge, a greater

improvement of self-efficacy or improvement in metabolic outcomes. Although the test regarding self-efficacy (p=0.188) was not statistically significant p-value >0.05, it was clinically significant as evidenced by the results of the metabolic testing. The family function score (p=0.016) and diabetes knowledge (p=0.035) were statistically significant p-value <0.05 as well as clinically significant as evidenced by the test scores and results of the metabolic testing. The mean glycohemoglobin dropped by 0.32 percentage points. Decreases were also seen in systolic blood pressure, pulse, weight, and triglycerides. There were, however, increases in diastolic blood pressure and total cholesterol. **Conclusions:** Results of the pilot study indicated positive changes in diabetes knowledge, self-efficacy and family function, as well as the majority of metabolic outcomes. Families with higher family functioning scores did not appear to have higher scores measuring diabetes knowledge or self-efficacy at the initiation of the study. Those families with higher family functioning scores showed no greater improvement in diabetes knowledge or self-efficacy scores than those families with lower family functioning scores at the conclusion of the study. This pilot study did not support inclusion of family in the educational process or disease management, but will support the use of a structured diabetes educational plan in the family practice setting to promote patient collaboration and outcomes. This study offers patients and their family members/friends education on maintenance and preventive measures, encouraging them to lead a healthy lifestyle, maintain their current health and prevent expensive complications, therefore reducing healthcare costs.

#### Educational Materials and Brief Counseling Improve Diabetes Knowledge and Self-

#### Efficacy

Diabetes is one of the most common and serious chronic diseases in the United States. According to the Centers for Disease Control and Prevention (2008), over 25 million Americans (8.3% of the population) have diabetes, and more than 1.9 million are newly diagnosed each year. Seven million individuals do not know they have diabetes and do not receive appropriate early intervention, which increases the long-term complications associated with diabetes (Centers for Disease Control and Prevention, 2011).

In order to attain successful management of diabetes, adequate patient education and social support are needed, both of which require substantial time and money. According to the National Institutes of Health (2008), the total direct and indirect costs of diabetes were a staggering \$174 billion. This total included the direct medical cost of \$116 billion and indirect costs (e.g., disability, work loss and premature mortality) of \$58 billion. Increasing access to adequate education and counseling could be considered in an effort to reduce these costs. Activities to educate, monitor and manage patients with diabetes must be encouraged (Adolfsson, Walker-engstrom, Smide, & Wikblad, 2007; Baradaran, Shams-hosseini, Noori-ekmat, Tehrani-banaihashemi, & Khmseh, 2010; Barnes, Ziemer, Miller, & Doyle, 2004).

#### **Educational Materials and Counseling**

Patient education is a critical component of caring for patients with chronic diseases such as diabetes. A person with diabetes needs knowledge about the disease, how it affects the body, and the ways in which lifestyle choices minimize the effects of the disease process (Barnes et al., 2004; American Association of Diabetes Educators, 2008; American Diabetes Association, 2008). Patient education strategies can take various forms. The most traditional methods are classroom-based group sessions, one-on-one education and patient education handouts (Bell, Patel, & Malasanos, 2006).

Traditional methods are often all that are available to individuals in rural areas. Resources such as Certified Diabetes Educators, Endocrinologist, educational material and diabetes support groups are not always easily accessible. In the Appalachian region, it is estimated that 42% of the area is rural and an estimated 23 million individuals inhabit the area (Center for Disease Control, 2011). Increasing access and availability of educational resources would make a significant difference in regard to the number of individuals that this could involve.

#### **Appalachian Population and Family Involvement**

Successful management of type 2 diabetes requires individuals to make a commitment to lifestyle changes such as healthy diet, physical activity and preventive care in order to adhere to recommended guidelines (American Diabetes Association, 2008; American Association of Diabetes Educators, 2008). In regard to Appalachia, these necessary changes can affect family members, which can circle back to the individual, as most family members are interdependent. Family plays a critical role in the health of each member (Allender, Rector, & Warner, 2010), because health habits are often developed directly and indirectly within the context of the family (Campbell, 2006).

Within the last decade, family dynamics have been examined to see if

interaction between family members could play a role in health care behaviors (Dedaic, 2001; Sarangi, 2006; Tannen, Kendall, & Gordon, 2007). The daily habits of individuals that are in a position of influence often set the pace for the rest of the family, depending on the dynamics of the family, this may influence health care behavior in a positive or negative way (Sarangi, 2006). With this in mind, individuals from Appalachia may benefit from a family centered approach to education because their culture values family relationships.

#### **Diabetes Knowledge**

In support of the family centered approach, it was found that healthcare providers from the same cultural backgrounds have shown the most impact on disease management (Early, Shultz, & Corbett, 2009; Keogh et al., 2007). Tessaro, Smith, and Rye (2005) reported that more than 70% of patients in their study of rural Appalachians engaged in self-treatment, and two thirds had initially sought advice from family or friends before seeking professional help. Family influence is supported by culture and ethnicity and is the basis for how patients and family members understand, respond to and manage chronic disease over time, even though self-care behavior often takes place elsewhere, such as work (Gordon, 2009).

#### Self-Efficacy

Teaching techniques are often more successful if modified to the individuals that need educated. Information regarding how the Appalachian population may influence their family simulates that the most common influences are areas of task related behavior. In regard to the concept of self-efficacy, Bandura (1997) believed that perceived self-efficacy was task specific and not only determined the amount of effort and perseverance one expended on a given endeavor, but also shaped the outcomes one expected from one's actions.

Self-empowerment helps the individual to select achievable goals and derive satisfaction from meeting those goals. Outcome expectancies represent beliefs that behavior will lead to desired and expected consequences and behavior is best predicted by knowledge of both efficacy and outcome expectations (Bandura, 1986; Iannotti et al., 2006). Persons with higher diabetes self-efficacy were more satisfied with their quality of life, coped more successfully with their diabetes and had lower levels of depression than those with lower ratings of self-efficacy (Holmes et al., 2005). Self-efficacy has also been associated with diabetes selfcare in the areas of diet, exercise and glucose monitoring (Johnston-brooks, Lewis, & Garg, 2002; Williams & Bond, 2002).

The purpose of this project was to evaluate whether structured diabetes education, using material from the *Diabetes: A Family Matter* program and counseling in the family practice setting would improve patients' diabetes knowledge and self-efficacy, and guide family members to promote healthy behavior and family function by assigning the family member a task.

#### Methods

**Design.** This descriptive pilot study was used to: 1) Evaluate if there were improvements in the scores measuring diabetes knowledge and self-efficacy after administration of structured education and counseling; 2) Evaluate if there were improvements in metabolic outcomes in patients with type 2 diabetes after

administration of structured education and counseling; 3) Evaluate if families with higher family functioning scores have greater knowledge about diabetes and/or self-efficacy after administration of structured education and counseling.

**Setting.** The setting was one of eight primary care offices of Our Lady of Bellefonte Hospital, Bon Secours, located in the Ashland, Kentucky. The sample size was statistically determined by evaluating the number of persons with diabetes treated per month in this clinic. Protocols for participant recruitment, consent to participate, confidentiality and anonymity were conducted according to procedures approved by the Institutional Review Board (IRB) of Bon Secours and the University of Kentucky.

**Sample.** Data were collected from a convenience sample of patients with type 2 diabetes who had been diagnosed within the last two years and have a treatment relationship with the investigator (n=15) and their family members/friends (n=15). All 30 participants completed the program, complete with baseline and three month assessments. The mean age group of patients was 51-60 (46.7%). Participants were predominantly female, 12 patients (80%) and nine family members/friends (60%). The largest group of patients participating was college educated (47%) and the largest group of family members/friends was primarily those with a high school education (60%). The majority of the patients were on oral medications (53%). Nine (60%) of the family members/friends knew the specific type of diabetes that the patient had. None of the participants had ever received previous diabetes education or seen an endocrinologist.

#### Instruments

**Family function.** The Thai Family Functioning Scale (TFFS) (Appendix A) was a modified version of the Thai Family Health Routine Scale (TFHR) based on the structural domains of Denham's Family Health Model (Kanjanawetang, Yunibhand, Chaiyawat, Wu, & Denham, 2009). The 30-item test used a fourpoint scale (0 =Never, 1 =Sometimes, 2 =Usually, 3 =Always) to assess the experiences family members have had over the last three months. A higher score indicates a greater likelihood of a healthy family function. It was reported to have an alpha  $\geq 0.70$ , which provided reliability of the test.

**Diabetes knowledge.** The Diabetes Knowledge Test (DKT) (Appendix B) developed by the Michigan Diabetes Research Training Center (MDRTC) (1998) measured general diabetes knowledge. This test consists of 23 items to test general knowledge of diabetes. The first 14 items are appropriate for people who do not use insulin. This 14-item multiple-choice test was reported to have an alpha of .71, which provided reliability of the test.

**Self-efficacy.** The Diabetes Empowerment Scale-Short Form (DES-SF) (Appendix C) developed by the Michigan Diabetes Research Training Center (MDRTC) (1998) was used to measure the psychosocial self-efficacy of people with diabetes, and a modified version was used for the family members/friends (Appendix D). The Diabetes Empowerment Scale (DES) was originally created with 37 items representing eight conceptual dimensions (e.g., assessing the need for change; developing a plan; overcoming barriers; asking for support; supporting oneself; coping with emotion; motivating oneself; and making diabetes care choices appropriate for one's priorities and circumstances) and three subscales: (a) managing the psychosocial aspects of diabetes

with nine items, alpha= 0.93; (b) assessing dissatisfaction and readiness to change with nine items alpha = 0.81; and (c) setting and achieving goals with ten items, alpha = 0.91. The items with the highest item to subscale correlation from each of the original eight conceptual domains were used to develop the eight item short form (DES-SF) that was used in this project. The DES-SF was reported to have an alpha of 0.84.

**Educational material.** The educational material used in this project consisted of the diabetes self-management pamphlets from the program *Diabetes: A Family Matter* developed by Dr. Sharon Denham (Diabetes: A Family Matter, 2011). This program was created using the guidelines set by the American Association of Diabetes Educators, the CDC, and the American Diabetes Association and included the seven key areas of diabetes education. The educational pamphlets (Appendix D) used in this project were: (1) *Healthy Living: Family Routines Count;* (2) *Your Family's Genes Count;* (3) *Sharing Healthy Family Routines;* and (4) *Depression and Diabetes*.

#### Interventions

**Initial contact and baseline data collection.** Initial face-to-face contact between investigator and participants consisted of administration of the Diabetes Knowledge Test (DKT), Self-Empowerment Scale (DES-SF), and Family Functional Assessment (TFFS), as well as informed consent and demographic information were obtained (Table 1). The material from Dr. Denham's *Diabetes: A Family Matter* was introduced and content was briefly reviewed. For the purpose of this study, four pamphlets were reviewed in detail: (a.) *Healthy Living: Family Routines Count;* (b.) *Your Family Genes Count;* (c.) *Sharing* 

*Healthy Family Routines; and* (d.) *Depression and Diabetes.* The modifiable factors related to each area were reviewed and the investigator asked participants to identify a goal related to each topic, as well as identify a role that their family member/friend would play in reaching the goal. If the participant was unable to immediately identify a goal, the investigator assisted the participants in the identification of an achievable goal and development of an action plan. Participants were asked to rate their confidence in their ability to complete the goal or action plan, on a scale from zero (not confident) to ten (very confident). The behavior change model was used for those participants with a score less than seven and they were assisted in identifying smaller steps to help them reach their goal. The participants' confidence scores, as well as the success of the action plans, were critical elements of the intervention and its evaluation.

Four and eight weeks after initial visit. The participant was contacted by phone, using semi-structured interview. How participants and their families used *Diabetes: A Family Matter* material was assessed and progress with their most recent action plan and role of the family member/friend was evaluated. Information was reviewed in order to sustain or create new or additional action plans. The participants were assisted in identifying and finding solutions to overcome self-management barriers that hindered completion of their action plans.

Twelve weeks after initial visit. During a routine three-month follow up office visit, the educational material was reviewed, and time was offered to answer questions or discuss comments. The current results of the standard metabolic outcomes, recommended by the ADA (2008) and AADE (2008); i.e., weight, blood pressure, and glycohemoglobin, were reviewed and recorded. Information to sustain or create new or

additional action plans was reviewed. An exit interview was performed, which included post-tests and evaluated materials and interventions.

#### Analysis

All analyses were conducted using SPSS software, version 15.0. Descriptive statistics were generated for the demographic and health-related characteristics of the sample. The differences among various measurements before and after the education were analyzed with paired t-tests. Any measurements with a p value less than 0.05 were considered statistically significant.

Comparisons of self-reported diabetes knowledge, self-efficacy, and family function are summarized in Table 2. Increases in diabetes knowledge, improvement in selfefficacy and increased family function were noted; however, there was no indication that a higher family function score would relate to a higher level of diabetes knowledge, a greater improvement of self-efficacy or improvement in metabolic outcomes. Although the test regarding self-efficacy (p=0.188) was not statistically significant (p-value >0.05), it was clinically significant as evidenced by the results of the metabolic testing. The Thai family function (p=0.016) and diabetes knowledge (p=0.035) were statistically significant (p-value <0.05) as well as clinically significant as evidenced by the test scores and results of the metabolic testing.

Changes in metabolic outcomes are summarized in Table 2. The mean glycohemoglobin dropped by 0.32 percentage points. Decreases were also seen in systolic blood pressure, pulse, weight, and triglycerides. There were, however, increases in diastolic blood pressure and total cholesterol.

#### Discussion

Material from Dr. Denham's *Diabetes: A Family Matter* and brief counseling appear to show improvement in the majority of the areas observed in this study. To the best of the author's knowledge, this is the first study evaluating the use of material from Diabetes: A Family Matter and brief counseling in the primary care setting. There were some challenges encountered during the course of the program. The interaction at four and eight weeks was tedious to manage since these were not completed at a routine office visit, as were the baseline and post education. The initial sample size was small, only including 30 participants, and it would have been interesting to include all individuals that met the inclusion criteria at the primary care clinic. Inclusion of staff and other health care professionals in the education and follow up sessions may present greater opportunities for interaction regarding the disease process and the patients' current regimen. Expanding the focus of the education to include the full *Diabetes: A Family Matter* toolkit may encourage the patient and their family member/friend to incorporate other aspects of their daily activities or allow them to relate to similar situations addressed in the material. Ongoing support may assist individuals to develop personal strategies to address psychosocial issues, and to promote and sustain ongoing behaviors to maintain their condition. This may be achieved by implementing the patient centered medical home concept that would include a nurse navigator that could maintain close communication with these patients and review any barriers regarding their health care goals and help determine a means to complete them.

There were some great opportunities, despite the challenges. Denham's *Diabetes: A Family Matter* (Denham, 2011) is available via the Internet, and is appropriate for those with low literacy skills, allowing the opportunity to expand their knowledge and include other family members/friends in the educational process, encouraging change not only for the patient, but also for other family members/friends. Having the patient and family member/friend on site during the primary and three month follow up made the sessions more personal than they otherwise might have been. The personal contact by the provider was enhanced by the monthly interaction with the patient. The inclusion of an opportunity to interact via email may also help to further initiate behavior change and adaption to healthy lifestyle. The interaction with the patient as well as the family member/friend may help the provider better understand the patient and the individual needs of the patient, allowing the provider to further tailor the education to suit their needs. Feedback upon completion of the program from the patient and the family member/friend indicated that they felt comfortable with the interaction with the provider and found that the pamphlets allowed them to further relate to some of the common situations that were presented in the program.

#### Implications

Results of the pilot study indicated positive changes in diabetes knowledge, self-efficacy and family function, as well as the majority of metabolic outcomes in this group of patients. Families with higher family functioning scores did not appear to have higher scores measuring diabetes knowledge or self-efficacy at the initiation of the study. Those families with higher family functioning scores showed no greater improvement in diabetes knowledge or self-efficacy scores than those families with lower family functioning scores at the conclusion of the study. This pilot study did not support inclusion of family in the educational process or disease management, but does support the use of a structured diabetes

educational plan in the family practice setting to promote patient collaboration and outcomes.

The integration of clinical expertise, evidence based practice, and collaborative planning with the patient and their family member/friend is an example how nurses have committed to promote quality healthcare and preventative maintenance. Documentation and accessibility of educational material suggests that nurses use information technology for the improvement and transformation of health (American Association of Colleges of Nursing, 2006). This study offers patients and their family members/friends education on maintenance and preventative measures, encouraging them to lead a healthy lifestyle, maintain their current health and prevent expensive complications, therefore reducing healthcare costs.

Denham's *Diabetes: A Family Matter* and counseling may be an effective strategy for teaching diabetes self-management skills in the primary care setting. Since the materials were designed for the Appalachian population, clinics caring for this population may find them particularly useful. This process of using patient-centered materials and planning may also translate to other chronic conditions requiring patient self-care.

# Frequency Table

Descriptive Char	racteristic	Pat	ient (n=15)	Fri	end/Family (n=15)	Combined (n=30)
Gender	Male	3	(20%)	4	(26.7%)	7 (23.3%)
	Female	12	(80%)	11	(73.3%)	23 (76.3)
	20.40	0	(0.0/)	4	(2(70))	4 (12.20()
Age	30-40	0	(0%)	4	(26.7%)	4 (13.3%)
	41-50	6 7	(40 %)	25	(13.3%)	8 (26.7%) 12 (40%)
	51-60		(46.7%)	-	(33.3%)	
	61-70	2	(13.3%)	4	(26.7%)	6 (20%)
Marital Stats	Single	1	(6.7%)	1	(6.7%)	2 (7%)
Marital Stats	Married	1 7	(46.7%)	11	(73.3%)	18 (60%)
	Divorced	7	. ,	3		· · ·
	Divoiced	/	(46.7%)	3	(20%)	10 (33%)
Education	GED	3	(20%)	1	(6.7%)	4 (13.3%)
	High School	5	(33.3%)	9	(60%)	14 (46.7%)
	College	7	(46.7%)	5	(33.3%)	12 (40%)
					,	
Knows Type of	Does	13	(86.7%)	9	(60%)	22 (73%)
Diabetes	Does Not	2	(13.3%)	6	(40%)	8 (27%)
Time Since	New	3	(20%)			
Diagnosed	0-1 year	6	(40%)			
	1-2 years	6	(40%)			
			(			
Type of	Neurologic	3	(20%)			
Complication	Cardiac	1	(6.7%)			
	None	11	(73.3%)			
Type of	Diet	1	(6.7%)			
Treatment	Diet/Ex	2	(13.3%)			
	Oral Med	8	(53.3%)			
	Insulin	4	(26.7%)			
-						
Type of	Medicare	3	(20%)			
Insurance	Medicaid	2	(13.3%)			
	Commercial	8	(53.3%)			
	Self-Pay	2	(13.3%)			

## Paired Sample Test

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Descriptive Characteristic		Patient (n=15)	Friend/Family (n=15)	Combined (n=30)	
After $38.47 \pm 1.41$ $38.2 \pm 2.34$ $38.34 \pm 1.90$ Difference $+3.47 \pm 3.89$ $+3.33 \pm 3.11$ $+3.41 \pm 3.41$ P-value       .004       .014       .188         DKT Measurement       Before       15.8 $\pm 3.49$ 15.4 $\pm 3.42$ 15.6 $\pm 3.40$ DKT Measurement       Before       16.73 $\pm 3.35$ 16.4 $\pm 2.87$ 16.56 $\pm 3.07$ Difference $+.93 \pm 1.28$ $+1 \pm 1.69$ $+0.96 \pm 1.47$ P-value       .001       .038       .035         Thai Measurement       Before       60.27 $\pm 10.95$ $63.2 \pm 10.10$ $61.7 \pm 0.46$ After       0.00       .001       .038       .035         Thai Measurement       Before $60.27 \pm 10.95$ $63.2 \pm 10.10$ $61.7 \pm 0.46$ After       0.00       .001       .038       .035         Thai Measurement       Before $62.53 \pm 11.43$ $66.13 \pm 9.57$ $64.33 \pm 10.52$ P-value       .000       .001       .001       .016       .001         Systolic Blood       P-value       .703	DFS Measurement	Before	35 +4.87	34.87 +4.93	34.93 +4.81	
Difference $43.47 \pm 3.89$ $43.33 \pm 3.11$ $43.41 \pm 3.41 \pm 3.41$ P-value         .004         .014         .188           DKT Measurement         Before         15.8 $\pm 3.49$ 15.4 $\pm 3.42$ 15.6 $\pm 3.07$ Difference $4.93 \pm 1.28$ $+1 \pm 1.69$ $+0.96 \pm 1.47$ P-value         .001         .038         .035           Thai Measurement         Before $60.27 \pm 10.95$ $63.2 \pm 10.10$ $61.7 \pm 10.46$ After $62.53 \pm 11.43$ $66.13 \pm 9.57$ $64.33\pm 10.52$ $64.33\pm 10.52$ Difference $+2.27 \pm 6.34$ $+2.93 \pm 4.86$ $+2.60\pm 5.56$ P-value         .000         .001         .016           Systolic Blood         Before $120.8 \pm 12.28$ Image: 10.28 \pm 10.28           Pressure         After $119.86 \pm 13.76$ Image: 10.28           Diastolic Blood         Before $76 \pm 7.45$ Image: 10.28           P-value         .730         Image: 10.28         Image: 10.28           P-value         .581         Image: 10.28         Image: 10.28           P-value         .581         Image: 10.28         Image	DLb Wiedsurement					
P-value         .004         .014         .188           DKT Measurement         Before         15.8 $\pm 3.49$ 15.4 $\pm 3.42$ 15.6 $\pm 3.40$ After         16.73 $\pm 3.35$ 16.4 $\pm 2.87$ 16.56 $\pm 3.07$ Difference $\pm 9.3$ $\pm 1.28$ $\pm 1$ $\pm 1.69$ $\pm 0.96$ $\pm 1.47$ P-value         .001         .038         .035         .035           Thai Measurement         Before         60.27 $\pm 10.95$ 63.2 $\pm 10.10$ 61.7 $\pm 0.433\pm 10.52$ Difference $\pm 2.27$ $\pm 6.34$ $\pm 2.93$ $\pm 4.86$ $\pm 2.60\pm 5.56$ P-value         .000         .001         .001         .016         .016           Systolic Blood         Before         120.8 $\pm 12.28$				-	—	
DKT Measurement         Before         15.8 $\pm 3.49$ 15.4 $\pm 3.42$ 15.6 $\pm 3.40$ After         16.73 $\pm 3.35$ 16.4 $\pm 2.87$ 16.56 $\pm 3.07$ Difference $+.93$ $\pm 1.28$ $+1$ $\pm 1.69$ $+0.96$ $\pm 1.47$ P-value         .001         .038         .035         .035           Thai Measurement         Before         60.27 $\pm 10.95$ $63.2$ $\pm 10.10$ $61.7$ $\pm 10.46$ After         62.53 $\pm 11.43$ $66.13$ $\pm 9.57$ $64.33\pm 10.52$ Difference $\pm 2.27$ $\pm 6.34$ $\pm 2.93$ $\pm 4.86$ $\pm 2.60\pm 5.56$ P-value         .000         .001         .016         .016         .016           Systolic Blood         Before         120.8 $\pm 12.28$			—			
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P-value         .611			—			
Weight Measurement         Before         239.2 ±60.49		Difference	-1 <u>+</u> 7.45			
After 237.8 <u>+</u> 59.33		P-value	.611			
After 237.8 <u>+</u> 59.33						
	Weight Measurement	Before	239.2 <u>+</u> 60.49			
		After	237.8 <u>+</u> 59.33			
Difference $-1.4 \pm 9.63$		Difference	-1.4 <u>+</u> 9.63			
P-value .582		P-value	.582			
HgA1c MeasurementBefore $7.21 \pm 1.18$	HgA1c Measurement		7.21 <u>+</u> 1.18			
After 6.89 <u>+</u> 0.78		After	6.89 <u>+</u> 0.78			

	Difference	-0.32 <u>+</u> 1.03	
	P-value	.248	
Total Cholesterol	Before	179.47 <u>+</u> 34.72	
Measurement	After	182.4 <u>+</u> 35.80	
	Difference	+2.2 <u>+</u> 28.28	
	P-value	.673	
Triglyceride	Before	229.27 <u>+</u> 233.42	
Measurement	After	181.47 <u>+</u> 66.97	
	Difference	-47.8 <u>+</u> 199.16	
	P-value	.368	

\*\*Mean and standard deviation are reported in specific before (education) and after (education) fields.

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### Appendix A: Thai Family Functioning Scale (TFFS)

[INTERVIEWER READ: "This group of questions is to assess the experiences families have. Please indicate **how often** you have experienced in your family **in the past 3 months** for the following statement. There is no right or wrong answer for each question. Please feel free to give the truth without consulting other family members. Your responses will be kept confidential"]

- 0 = Never
- 1 =Sometimes
- 2 = Usually
- 3 = Always
- 1. My family was able to solve most daily problem(s) that occur in household 0 1 23
- 2. Family members confided in each other 0 1 2 3
- 3. Family members were obedient to seniors 0 1 2 3
- 4. Family members hardly expressed their love and care 0 1 2 3
- 5. In times of crisis family members turned to each other for support  $0\ 1\ 2\ 3$
- 6. My family solved problem(s) by having agreement  $0 \ 1 \ 2 \ 3$
- 7. Senior members were kind and merciful to younger persons in my family 0 1 2 3
- 8. Family members could not talk to each other about the sadness one feels 0123
- 9. Family members had kindness to help each other 0 1 2 3
- 10. My family had plans to handle emergency situation 0 1 2 3
- 11. My family followed religious sayings 0 1 2 3
- 12. I could not tell what my family members felt by the words they spoke 0 1 2 3
- 13. My family tried to find ways to solve problem(s) 0 1 2 3
- 14. Family members were good role models for each other 0 1 2 3

15. Family members avoided discussing feelings of fears and concerns that they may have had 0 1 2 3

16. My family was able to make decisions about how to solve problem(s) 0 1 2 3

17. My family had time for each other 0 1 2 3

18. When family members got mad or angry with others, they did not talk to each other 0 1 2 3

19. After my family was able to solve a problem, we always discussed the effectiveness of strategy 0  $1 \ 2 \ 3$ 

20. Family members shared love and unity 0 1 2 3

- 21. My family discussed responsibilities of each member 0 1 2 3
- 22. My family was reluctant to express love to each other 0 1 2 3

23. My family used reasoning to solve problem(s) 0 1 2 3

24. My family valued gratitude to parents or other persons who gave support 0 1 2 3

- 25. My family encountered mood problem(s) 0 1 2 3
- 26. There were lots of bad feelings in my family 0 1 2 3

27. My family was able to solve most of problem(s) that were irritable to other members 0 1 2 3

28. Family members talked politely to each other 0 1 2 3

- 29. Family members cared for each other 0 1 2 3
- 30. Often times, family members could not talk to other members as they wanted to 0 1 2 3

### Appendix B: Michigan Diabetes Research and Training Center DKT

1.	The diabetes diet is:	9. For a person in good control, what effect does	17. If you have taken intermediate
	a. the way most American people eat	exercise have on blood glucose?	acting insulin (NPH or Lente), you
	b. a healthy diet for most people	a. Lowers it	are most likely to have an insulin
	c. too high in carbohydrate for most people	b. Raises it	reaction in:
	d. too high in protein for most people	c. Has no effect	a. 1-3 hours
			b. 6-12 hours
2	Which of the following is highest in	10. Infection is likely to cause:	c. 12-15 hours
2.	carbohydrate?	a. an increase in blood glucose	d. more than 15 hours
		b. a decrease in blood glucose	d. more than 15 hours
	· · · · · · · · · · · · · · · · · · ·		19 You realize just hefore lunch
	b. Swiss cheese	c. no change in blood glucose	18. You realize just before lunch
	c. Baked potato	11. The best much take and a farmer fact is to	time that you forgot to take your
	d. Peanut butter	11. The best way to take care of your feet is to:	insulin before breakfast. What
2		a. look at and wash them each day	should you do now?
3.	Which of the following is highest in fat?	b. massage them with alcohol each day	a. Skip lunch to lower your
	a. Low fat milk	c. soak them for one hour each day	blood glucose
	b. Orange juice	d. buy shoes a size larger than usual	b. Take the insulin that you
	c. Corn		Usually take at breakfast
	d. Honey	12. Eating foods lower in fat decreases your risk	c. Take twice as much insulin
		for:	as you usually take at
4.	Which of the following is a "free food"?	a. nerve disease	breakfast
	a Any unsweetened food	<li>b. kidney disease</li>	d. Check your blood glucose
	b. Any dietetic food	c. heart disease	level to decide how much
	c. Any food that says "sugar free" on the	d. eye disease	insulin to take
	label		
	d. Any food that has less than 20 calories per	13. Numbness and tingling may be symptoms of:	19. If you are beginning to have an
	serving	a. kidney disease	Insulin reaction, you should:
	our mg	b. nerve disease	a. exercise
5	Glycosylated hemoglobin (hemoglobin A1) is	c. eye disease	b. lie down and rest
5.	a test that is a measure of your average	d. liver disease	c. drink some juice
	blood glucose level for the past:	d. Invertuisease	d. take regular insulin
		14. Which of the following is usually not	u. take regular hisuhii
	a. day b. week	associated with diabetes:	20. Low blood glucose may be
			· ·
			caused by:
	d. 6 months	b. kidney problems	a. too much insulin
~	<b>XX71 * 1 * 1 1 * 1 1 6 * * * * * * * *</b>	c. nerve problems	b. too little insulin
6.	Which is the best method for testing blood	d. lung problems	c. too much food
	glucose?		d. too little exercise
	a. Urine testing	15. Signs of ketoacidosis include:	
	b. Blood testing	a. shakiness	21. If you take your morning insulin
	c. Both are equally good	b. sweating	but skip breakfast your blood
		c. vomiting	glucose level will usually:
7.	What effect does unsweetened fruit juice	d. low blood glucose	a. increase
	have on blood glucose?		b. decrease
	a. Lowers it	16. If you are sick with the flu, which of the	c. remain the same
	b. Raises it	following changes should you make?	
	c. Has no effect	a. Take less insulin	22. High blood glucose may be
		<li>b. Drink less liquids</li>	caused by:
8.	Which should not be used to treat low blood	c. Eat more proteins	a. not enough insulin
	glucose?	d. Test for glucose and ketones more often	b. skipping meals
	a. 3 hard candies	-	c. delaying your snack
	b. 1/2 cup orange juice		d. large ketones in your urine
	c. 1 cup diet soft drink		
	d. 1 cup skim milk		23. Which one of the following
			will most likely cause an
			insulin reaction:
			a. heavy exercise
			b. infection
			c. overeating
			d. not taking your insulin
			u. not taking your insuffi

### Appendix C: Michigan Diabetes Research and Training Center Diabetes Empowerment Scale-Short Form (DES-SF)

The 8 items below constitute the DES-SF. The scale is scored by averaging the scores of all completed items (Strongly Disagree =1, Strongly Agree = 5)

Check the box that gives the best answer for you. In general, I believe that I:

<ol> <li>know what part(s) of taking care of my diabetes that I am dissatisfied with.</li> </ol>	☐ 1 Strongly Disagree	□ <sub>2</sub> Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	☐₅ Strongly Agree
<ol> <li>am able to turn my diabetes goals into a workable plan.</li> </ol>	□1 Strongly Disagree	□ <sub>2</sub> Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>can try out different ways of overcoming barriers to my diabetes goals.</li> </ol>	□1 Strongly Disagree	□2 Somewhat Disagree	□ <sub>3</sub> Neutral	□₄ Somewhat Agree	☐₅ Strongly Agree
<ol> <li>can find ways to feel better about having diabetes.</li> </ol>	□1 Strongly Disagree	□2 Somewhat Disagree	□ <sub>3</sub> Neutral	□₄ Somewhat Agree	☐₅ Strongly Agree
5know the positive ways I cope with		_	_	_	_
diabetes-related stress.	Strongly Disagree	□₂ Somewhat Disagree	∐ <sub>3</sub> Neutral	☐₄ Somewhat Agree	∐₅ Strongly Agree
	Strongly	Somewhat		Somewhat	Strongly
diabetes-related stress. 6can ask for support for having and caring	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

### Appendix D: Diabetes Empowerment Scale-Short Form (DES-SF) For the Family Member

The 8 items below constitute the DES-SF. The scale is scored by averaging the scores of all completed items (Strongly Disagree =1, Strongly Agree = 5)

Check the box that gives the best answer for you.

In general, I believe that I can support my friend or family member to:

<ol> <li>identify what part(s) of taking care of their diabetes that they are dissatisfied with.</li> </ol>	Strongly Disagree	□ 2 Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
2. become able to turn their diabetes goals into a workable plan.	□ 1 Strongly Disagree	□² Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>try out different ways of overcoming barriers to their diabetes goals.</li> </ol>	□ 1 Strongly Disagree	□² Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>find ways to feel better about having diabetes.</li> </ol>	□ 1 Strongly Disagree	□² Somewhat Disagree	□ ₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>know the positive ways they cope with diabetes-related stress.</li> </ol>	□ 1 Strongly Disagree	□² Somewhat Disagree	□ ₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li> ask for support for having and caring for their diabetes when they need it.</li> </ol>	□ 1 Strongly Disagree	□² Somewhat Disagree	□ ₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>know what helps them stay motivated to care for their diabetes.</li> </ol>	□ 1 Strongly Disagree	□₂ Somewhat Disagree	□ ₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
<ol> <li>know enough about themselves as a person to make diabetes care choices that are right for them.</li> </ol>	☐ 1 Strongly Disagree	□2 Somewhat Disagree	□ <sub>3</sub> Neutral	□₄ Somewhat Agree	□₅ Strongly Agree



Appendix E: Educational Material From "Diabetes: A Family Matter"

close. He leaned over and kissed her on the cheek. "Where's Dad?" He asked, as he began to peer into the grocery bags. "What's up?" joined in Josh hardly looking up from his task. years-old were peering inside the refrigerator. Dark-haired Josh was pulling out the makings for their "Hey packages of ham slices, and bologna in both arms. She knew that he would be reaching for the cookies as soon as "That's all right, Morn. We're just "Josh," Evelyn said sternly as she placed her hand over the chips. "Leave those chips be... Put the rest of those skilfully balancing honey mustard, cheese slices, pickles, lettuce, Mom!" and reached for the bag of chips. "Something else to eat with our "Cool!" said Josh as he peered "He's outside getting the other sacks from our shopping trip," Evelyn he placed everything on the counter. to face her, she could see that he was piped in as he placed the soda pop on having sandwiches for dinner," Jerrod famous sandwiches," he said. "Thanks into one sack placed on the table looked as he heard the back door soda pop that they bought on the way lerrod held four sandwiches. As Josh turned around famous super-duper triple-decker bags on the counter beside the sink. Josh, 15 years-old, and Jerrod, 12 Forming Family Routines create a healthy legacy for your family. Find ways to include family in healthy habits. hings back. I'll have a real dinner velyn walked into the kitchen and placed the two heavy grocery Mom," Jerrod said as he 20-ounce bottles of table and have a family dinner. We're going to have to make some changes," said Evelyn with a strained voice. "We need you bogs to help" "San we make those changes after we've eaten the Josh. "We do this all the time, what's the problem?" Both boys groaned as they slowly picked up the sandwich makings and put them back in the makings and put them back in the this evening," said Jerry, the boys' father, as he came through the back door, "I could use a little help here," he shouted as he tried to steady Jerrod reached over and grabbed a sack. "We're going to sit down at the the counter. "And put that pop in the refrigerator," she scolded. as she was using that 'don't tangle Like I said, dinner will be ready soon. We're going to begin some new ways around here. You boys need some to the food they had dumped on the counter and said, "Put it all back now! sandwiches?" pleaded Josh innocently Evelyn shook her head and pointed fridge. He knew arguing would not help "But this is our thing, Morn," said several grocery bags in each hand. "You're not having those sandwiches oy himself. We to change some fur bad habits so twe can help hi 'Boys, we've got to r Dad!"she ed. "He can't jokingly. "It's not a laughing matter, son," said Jeny. He walked over to Josh and placed his hands on the boy's shoulders. "Sugar diabetes isn't triple-decker. "That means that the sugar in my blood is way too high. I have not been doing right! My blood pressure was really high today too, and Dr. Clark said that if I kept on doctor today and we got some news that's going to change some things around here real quick. First thing we are going to do is start some new change his eating style. In fact, he was the one who taught the boys about the have it too." Folding his arms, Jerry it bad. Aunt Dee and Uncle Buzz, they caused by eating too many sweets. It runs in the family. Your Aunt Helen has finally got you, Dad!" said Josh him get healthy." "Looks like that sweet tooth has by himself. We have to change some of our bad habits so that we can help "Boys, we've got to help your Dad!" Evelyn exclaimed. "He can't do this trouble. like I am, I'd be headed for great big thought everything was fine and had not altered his habits. He refused to not changed many of his ways. He Jerry had been diagnosed with sugar diabetes a year ago, but he had canned goods in the cupboards. as he emptied the bags and placed of control," said Jerry in a soft voice eating habits and eat at the table like said. "Your father and I went to the "It used to be your thing," Evelyn a family for dinner." "Boys, my sugar diabetes is way out glucose monitor! I have to use these lancets to stok my finger and put a drop of lood on this stup. Then It goes in the machine here and in seconds twill know my blood sugar." "Wow, said verous familing." "By second calculator," Jeny nodded and seconds and calculator," Jeny nodded and dad do right. We're all going to change our bad habits into better ores." The boys saw that she was not joking and stood quiety as they heard here words. With a little fear in his eyes, Jerrod are all over-weight and out of shape! We've got to change some of our ways," said Evelyn as she turned on a stove burnet." We have to help your paper bag out of one of the larger sacks, Jerry said with as much I'm setting you boys in charge to remind me 'bout checking my blood sugars, taking my medicine, and watching get even more serious, if I don't watch my blood sugar levels. That's why excitement as he could muster, "Check this out! said, "It's not too serious, right Dad? You don't look sick! You seem to be okay most of the time." Squeezing to check my sugar before I eat meals it is serious and it could said, "And the doctor warned us that you boys could be next." said, "So you guys need to remind me The doctor gave it to me. A blood what I eat." said, "You know, Jerrod, Jerrod's shoulder, Jerry Grabbing a small "Look at us," snapped Evelyn, ₩ said eating healthy and being more d active can help prevent many bad things from happening. So...\* it's gonna hurtl: "Nah," answered Jerry, "We Thompsons are brave, I can do this," he laughed. "Great! Lucky for you I am good at math. I can help you figure your dose," said Jerrod gleefully "I sure hope not," Jerry said, as he placed the monitor back into the bag "Diabetes can be serious and it can have trouble with her eyes and the doctor was worried about her kidneys. That's not going to happen to you, is it "Can't you see this is serious! Remember Aunt Dee had to go to the hospital last month because of sugar cause other problems. But the doctor "Ouch!" replied Jerrod, "Looks like on his face. complications? She was starting to Dad," Josh asked with a worried look "Quit it, Jerrod!" Josh shouted, He kept the group in suspense as 1 him the new basketball. "So, Dad is this going to be our new thing?" he asked. "If you want it to be," Jerry replied. "We can shoot out by the he turned and ran out the door to the car. In a few minutes he returned a bit winded with a basketball in his hand. "So boys, I think it's about time spring?" to cook foods we like, but make them healthier. Let's talk about ideas at dinner. We must stick together, that's finish putting these groceries away. Then, go wash up! We're starting a new chapter. My job is to find ways shots and you can help me lower my blood sugar." but we can do this!" what families do. It will not be easy, some hoop action too" hang there. We can do this together. I need to get more active. Looking at garage. I got an old rim that I can started to help you with your jump Josh's face lit up as his father tossed "Maybe, we can go hiking this washed some fresh greens for the salad she was fixing, "I'll do what it takes to be sure you're with this family for a long time. Count me in! Let's a great ideal" exclaimed Jerry, "That can be one of our goals. We will need to get in shape first. Maybe we can talk your morn into joining 37" Josh asked. He had been talking about walking the Appalachian Trall and Es. "You know what, son? That's sweating," Evelyn said as she "As much as I hate

> some ways or bad ways. Choosing healthy routines is not al-The things we pick to do can impact health in good carb counting, and being ines. Make healthy snacks ways easy, but it is worth it uctive a family matter. time every day. Take medicines at the same Choose smaller size portions together often. Set times to eat meals more healthy ways. Try foods you like fixed in Make a list, shop together, of time. Talk about meal plans ahead Get the facts you need to can help: make healthy choices Learn as much as you can Family share many roumake smart choices. about dia betes. Here are family

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# Diabetes: A Family Matter

# epression and Diabetes

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For more information, piece wait, www.diabeitediamityme1



### Tips for healthy family routines

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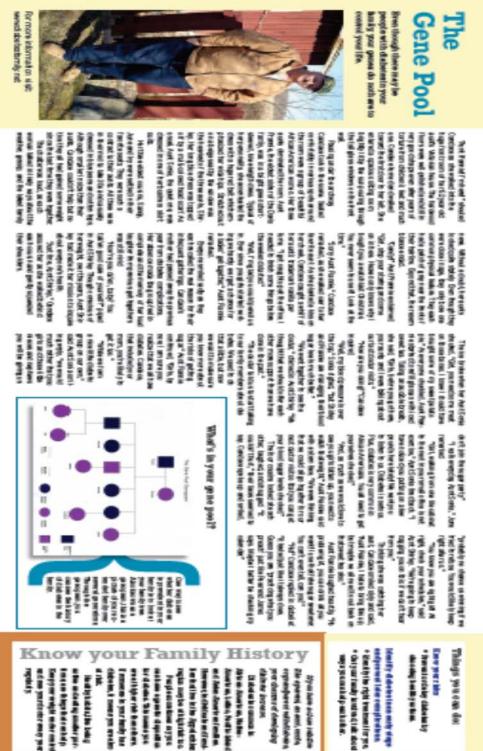


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Conclusion to Final DNP Capstone Report

Tamara Wellman

University of Kentucky

College of Nursing

The intent of the author was to review diabetes education delivery methods, explore accessibility of educational material via electronic means and combine strengths found with delivery and implementation and incorporate them into an educational program that could be used for the Appalachian population in a family care setting.

In summary, this study suggests that a population specific program based on guidelines suggested by the ADA and AADE and led by a healthcare provider would increase patients' diabetes knowledge, improve self-efficacy and improve results of metabolic outcomes. The availability of educational resources is a very important detail. Information regarding diabetes, how it effects the individuals, and measures to maintain good control or improve complications are imperative to healthy lifestyle behaviors. Health care providers should consider materials that may be available by handouts or electronic means when collaborating with the patient

The relationship between the healthcare provider and the patient may assist in modifying the education to be patient specific. This would allow the patient to identify goals that include task specific behaviors that may motivate them to achieve their goals and incidentally give them greater satisfaction. In Appalachia, inclusion of the family in collaborative care suggests greater improvements in maintenance and preventive care regarding diabetes. Further studies implementing these processes may prove beneficial not only to diabetes, but also other chronic diseases.

### Appendix A: Patient Demographic

1.	Patient Name:
2.	Date of Birth:
3.	Gender: (circle one) Male Female
4.	Marital Status: (circle one)
	Married Single Divorced Widowed Separated
5.	Highest Level of Education: (circle one)
	Elementary High School GED College Graduate
	Doctoral
6.	What City/State do you live in?
7.	What type of Diabetes do you have? (circle one)
	Type II Don't Know
8.	How many years have you had diabetes? (circle one)
	Newly Diagnosed 0-1year over 1 year-2years
9.	Do you have any complications from your diabetes? (circle one) Yes
	No
	If yes, what? (circle all that apply)
	Retinopathy Neuropathy Nephropathy Heart Disease Stroke
	Other:
10	What type of treatment do you follow for your diabetes?
	(circle all that apply) Diet Diet/Exercise Oral Medications Insulin
11	Do you have any biological family members with diabetes?

(circle one) Yes No

If yes, what relationship are they? \_\_\_\_\_

(example: daughter, mother, uncle, cousin)

12. Does anyone help you with your diabetes care regimen, such as diet,

medications or blood glucose checks? (circle one) Yes No

If yes, what relationship are they? \_\_\_\_\_

(example: spouse, daughter, mother, friend, cousin, significant other)

### 13. Have you ever had any previous formal diabetes education?

(circle one) Yes No

If yes, briefly describe when and what you learned:

14. D	o you see an endocrinologist?	(circle one)	Yes	No
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If so, who? \_\_\_\_\_

**15.** Do you have insurance? (circle one)

Medicare Medicaid Commercial Insurance Self-Pay

### Appendix B: Friend/Family Member Demographic

### 1. Friend/Family Member Name: 2. Date of Birth: **3. Gender:** (circle one) Male Female 4. Marital Status: (circle one) Married Single Divorced Widowed Separated 5. Relationship to the Patient: (circle one) Spouse Child Parent Friend Significant Other Other Relative 6. Highest Level of Education: (circle one) Elementary High School College Graduate Doctoral 7. What City/State do you live in? \_\_\_\_\_ 8. Do you know what type of diabetes your friend/family member has? No or Yes If yes (circle one) Type I Type II Don't Know 9. Do they have any complications from their diabetes? (circle one) Yes or No If yes, what? (circle all that apply) Retinopathy Neuropathy Nephropathy Heart Disease Stroke Other: 10. What type of treatment do they follow for their diabetes? Diet Diet/Exercise Oral Medications Insulin (circle all that apply)

### 11. Do you have any biological family members with diabetes?

(circle one) Yes No

If yes, what relationship are they? \_\_\_\_\_

(example: daughter, mother, uncle, cousin)

12. Do you assist with the diabetes care regimen of your friend/family

member? Such as diet, medications or blood glucose checks?

(circle one) Yes No

If yes:

What do you assist them with? \_\_\_\_\_

What relationship are they? \_\_\_\_\_

(example: spouse, daughter, mother, friend, cousin, significant other)

13. Have you ever been involved in any previous formal diabetes

education? (circle one) Yes No

If yes:

When did this occur?

What did you learn?\_\_\_\_\_

### Patient Consent to Participate in a Research Study

### DOES EDUCATIONAL MATERIALS AND BRIEF COUNSELING IMPROVE DIABETES

### KNOWLEDGE AND SELF-EFFICACY

### WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about the evaluation of educational materials and brief counseling regarding diabetes knowledge and self-efficacy using education material from "Diabetes: A Family Matter", in the primary care setting. A family member/friend may be invited to join the study, if they are available. You are being invited to take part in this research study because you have the diagnosis of type 2 diabetes, you are between the ages of 35-70, you have the ability to provide written consent and you speak English. If you volunteer to take part in this study, you will be one of about 20 people to do so (10 patients in the study group).

### WHO IS DOING THE STUDY?

The person in charge of this study is Tamara Wellman APRN, FNP-BC, CDE of University of Kentucky, College of Nursing. She is being guided in this research by Karen Stefaniak, PhD [Advisor].

### WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of the study is to learn how to help people increase their knowledge of diabetes and how to manage diabetes.

By doing this study, we hope to learn if the educational material and counseling help individuals with diabetes and their family/friends learn about their disease and what they can do help themselves.

### ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

You should not take part in the study if you are not a person with type 2 diabetes, are less than 35 years of age or over 70, are not able to provide written consent or not able to speak English, or do not have the ability to read at a 6<sup>th</sup> grade level.

### WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The study will be conducted at Bon Secour Health System in Ashland, Kentucky (Cannonsburg Primary Care). The study will be initiated at your routine office visit and concluded in a routine three-month follow up visit. You will have monthly contact, in person or by phone, to track your progress on your action plan. This project will last over the next three months. The total amount of time you are being asked to volunteer is approximately three hours over the next three months.

### WHAT WILL YOU BE ASKED TO DO?

At your first visit, you will be asked for your personal information and written permission to participate in this study. Your initial metabolic outcomes (i.e., weight, blood pressure, and glycohemoglobin) will be recorded. You will be asked to complete three questionnaires: Diabetes Knowledge Test, Self-Empowerment Scale, and a Family Functional Assessment. The material from Dr. Denham's "Diabetes: A Family Matter" will be given to you and briefly reviewed. Four pamphlets from the material will be reviewed in detail: (a.) Healthy Living: Family Routines Count; (b.) Your Family Genes Count; (c.) Sharing Healthy Family Routines; and (d.) Depression and Diabetes.

Your daily routine and activities will be discussed. You will be asked to identify a behavior that you can improve on in order to reach a goal that you will set, as well as identify what your family member/friend could do to help you reach that goal. If you have difficulty identifying a goal, the investigator will assist you to identify some things that you could consider. Your confidence scores, as well as the success of the action plans, will be very important in the evaluation of the study.

Four and Eight weeks after start of study: You will be contacted, by phone or in person, to check on your progress in reaching your goal.

Twelve weeks after start of study: During a routine 3-month follow up office visit, you will be asked if you have met your goal. If you have not met your goal, you may be assisted in making a plan to help you reach your goal. An exit interview will be performed, where you may ask any questions or make any comments that you may have. You will be asked to complete post-tests, which are similar to the questionnaires that were given to you at the start of the program, and be asked to evaluate the educational materials and the interventions that were used during this study. Your metabolic outcomes (i.e., weight, blood pressure, and glycohemoglobin) will be obtained and compared to the initial results.

Initial Visit (Routine OV)	<i>4 and 8 Week Follow Up</i>	3 Month Follow Up (Routine OV)
Patient AND Friend/Family -Obtain Demographic Info -Obtain Consent - Obtain Metabolic Outcomes	Patient Follow Up (Phone or In Person)	Obtain/Compare Metabolic Outcomes (Weight, Blood Pressure, Glycohemoglobin) <i>Patient</i> <i>Only</i>
(Weight, Blood Pressure, Glycohemoglobin) <i>Patient</i> <i>Only</i> - Complete Pre-test		Exit Interview (Patient and Friend/ Family Member) -Comments/Questions

### **STUDY TIMELINE**

Questionnaires (DES-SF, DKT, Family Function) - Obtain/Review "Diabetes: A Family Matter" Material Review the 4 Specific Pamphlets (Listed Above)	How/If Educational Material Was Used	-Complete/Compare Post- test Questionnaires (DES-SF, DKT, Family Function) -Evaluate: Program, Intervention,Materials
Set Goal Regarding Each Pamphlet	Problems/Concerns Role of Patient and Friend/Family Member?	Goal Met?
Make Action Plan for Each (See Action Plan Example, Step I and II)	Follow up on Action Plan (Step III)	Follow up on Action Plan (Step III)-Offer to Continue Plan at Completion of Study
Have Confidence Level >7 for Each Action Plan (Step II)	Follow Up Confidence Level (Step II)	Follow Up Confidence Level (Step II)
Schedule Routine Follow Up	Offer Follow Up Appt	Schedule Routine Follow Up -Offer Further Educational/Endocrinology Referral

### WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no risks or discomforts involved in participating in this study.

### WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

There is no guarantee that you will get any benefit from taking part in this study. You may increase your knowledge about diabetes and learn what you can do to improve your health or what your friend/family member can do to help improve your health. You may also experience improved metabolic outcomes, such as weight loss, lower blood pressure and lower glycohemoglobin. Your participation in this study may, in the future, help providers better understand and/or treat others who have your condition.

### DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights that you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If you decide not to take part in this study, your decision will have no effect on the quality of medical care you receive.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to take part in the study, there are other choices such as formal diabetes education offered by Bon Secours Diabetes Center or surrounding health care facilities.

### WHAT WILL IT COST YOU TO PARTICIPATE?

There are no costs to you or your family member/friend for receiving this information individually, or participating in this project. Any fees associated with a routine office visit and laboratory tests will be billed, as usual, to you and/or your insurance company. These are costs that are considered medically reasonable and necessary and will be part of the care you receive if you do not take part in this study.

Therefore, these costs will be your responsibility or may be paid by your insurer if you are insured by a health insurance company (you should ask your insurer if you have any questions regarding your insurer's willingness to pay these costs); **or** may be paid by Medicare or Medicaid if you are covered by Medicare, or Medicaid, (if you have any questions regarding Medicare/Medicaid coverage you should contact Medicare by calling 1-800-Medicare (1-800-633-4227) or Medicaid at 1-800-635-2570.

A co-payment/deductible from you may be required by your insurer or Medicare/Medicaid even if your insurer or Medicare/Medicaid has agreed to pay the costs. The amount of this co-payment/deductible may be substantial.

### WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will make every effort to keep private all of your information private.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be personally identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. The information will be kept in a locked cabinet in the principal investigator's office, as well as on a password protected computer. Officials from the University of Kentucky may look at, or copy pertinent portions of the records that identify you.

### CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study.

### ARE YOU PARTICIPATING OR CAN YOU PARTICIPATE IN ANOTHER RESEARCH STUDY AT THE SAME TIME AS PARTICIPATING IN THIS ONE?

You may take part in this study if you are currently involved in another research study.

### WHAT HAPPENS IF YOU GET HURT OR SICK DURING THE STUDY?

This study uses informational material only, so if you get sick or hurt during this study, it would not be related to the study. If you believe you are hurt or if you get sick during this study please inform the investigator (for documentation purposes only).

### WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any rewards or payment for taking part in the study.

### WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS, CONCERNS, OR COMPLAINTS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Tamara Wellman APRN, FNP-BC, CDE at 606-928-1881. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428. We will give you a signed copy of this consent form to take with you.

### WHAT IF NEW INFORMATION IS LEARNED DURING THE STUDY THAT MIGHT AFFECT YOUR DECISION TO PARTICIPATE?

If the researcher learns of new information in regards to this study, and it might change your willingness to stay in this study, the information will be provided to you. You may be asked to sign a new informed consent form if the information is provided to you after you have joined the study.

### WHAT ELSE DO YOU NEED TO KNOW?

Your patient records will be accessed to obtain the metabolic outcomes, such as weight, blood pressure and glycohemoglobin.

Signature of person agreeing to take part in the study	Date
Printed name of person agreeing to take part in the study	
Name of [authorized] person obtaining informed consent	Date

Signature of Investigator

Appendix D: Friend/Family Member Consent

Family Member/Friend Consent to Participate in a Research Study

### DOES EDUCATIONAL MATERIALS AND BRIEF COUNSELING IMPROVE DIABETES KNOWLEDGE AND SELF-EFFICACY

### WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about the evaluation of educational materials and brief counseling regarding diabetes knowledge and self-efficacy using education material from "Diabetes: A Family Matter". You are a friend/family member of an individual that has the following: diagnosis of type 2 diabetes, between the ages of 35-70, has the ability to provide written consent and speaks English, and can read at a 6<sup>th</sup> grade level. If you volunteer to take part in this study, you will be one of about 20 people to do so (10 family members/friends in the study group).

### WHO IS DOING THE STUDY?

The person in charge of this study is Tamara Wellman APRN, FNP-BC, CDE of University of Kentucky, College of Nursing. She is being guided in this research by Karen Stefaniak, PhD [Advisor].

### WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of the study is to learn how to help people increase their knowledge of diabetes and how to manage diabetes.

By doing this study, we hope to learn if the educational material and counseling help individuals with diabetes and their family/friends learn about their disease and what they can do help themselves.

### ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

You should not take part in the study if you are not a family member/friend of someone in this study, who has type 2 diabetes.

### WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted at Bon Secour Health System in Ashland, Kentucky. You will need to come to the office once at the beginning of the study (today) and again at the conclusion (in three months). These visits will be routine office visits for the patient, who is your friend/family member. The total amount of time that you will be asked to volunteer is approximately three hours over the next three months.

### WHAT WILL YOU BE ASKED TO DO?

At your first visit, you will be asked for your personal information and written permission to participate in this study. You will be asked to complete three questionnaires: Diabetes Knowledge Test (DKT), Self-Empowerment Scale for the Family Member (DES-SF), and a Family Functional Assessment. The material from Dr. Denham's "Diabetes: A Family Matter" will be given to you and briefly reviewed. Four pamphlets from the material will be reviewed in detail: (a.) Healthy Living: Family Routines Count; (b.) Your Family Genes Count; (c.) Sharing Healthy Family Routines; and (d.) Depression and Diabetes.

Daily routines and activities will be discussed and the patient will be asked to identify something that they could do to improve their health care behavior. The patient will set a goal and state how they think you may help them reach that goal.

Twelve weeks after start of study: You will accompany the patient to their routine 3month follow up office visit. The action plan will be evaluated. An exit interview will be performed, where you may ask any questions or make any comments that you may have. You will be asked to complete post-tests, which are similar to the questionnaires that were given to you at the start of the program, and be asked to evaluate the educational materials and the interventions that were used during this study.

Initial Visit (Routine OV)	<i>4 and 8 Week Follow Up</i>	<i>3 Month Follow Up (Routine OV)</i>
Patient AND Friend/Family -Obtain Demographic Info -Obtain Consent - Obtain Metabolic Outcomes (Weight, Blood Pressure, Glycohemoglobin) <i>Patient Only</i> - Complete Pre-test Questionnaires (DES-SF, DKT, Family Function) - Obtain/Review "Diabetes: A Family Matter" Material		Obtain/Compare Metabolic Outcomes (Weight, Blood Pressure, Glycohemoglobin) <i>Patient Only</i> Exit Interview (Patient and Friend/ Family Member) -Comments/Questions -Complete/Compare Post-test Questionnaires (DES-SF, DKT, Family Function) -Evaluate: Program, Intervention,Materials
Review the 4 Specific Pamphlets (Listed Above)		
Set Goal Regarding Each		Goal Met?

### STUDY TIMELINE

Pamphlet	
Make Action Plan for Each	Follow up on Action
(See Action Plan Example, Step	Plan (Step III)-Offer to Continue
I and II)	Plan at Completion of Study
Have Confidence Level >7 for	Follow Up Confidence
Each Action Plan (Step II)	Level (Step II)
Schedule Routine Follow Up	Schedule Routine Follow Up
	-Offer Further
	Educational/Endocrinology
	Referral

### WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no risks or discomforts involved in participating in this study.

### WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

There is no guarantee that you will get any benefit from taking part in this study. You may increase your knowledge about diabetes and learn what you can do to help improve the health of a family member/friend. Your participation in this study may, in the future, help providers better understand and/or treat individuals with diabetes.

### DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights that you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If you decide not to take part in this study, your decision will have no effect on the quality of medical care your friend/family member will receive.

### IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to take part in the study, there are other choices such as formal diabetes education offered by Bon Secours Diabetes Center or surrounding health care facilities.

### WHAT WILL IT COST YOU TO PARTICIPATE?

There are no costs to you or your family member/friend for receiving this information, or participating in this project. Any fees associated with a routine office visit and laboratory tests will be billed, as usual, to the patient and/or their insurance company. Travel costs for you to return to the clinic with patient is not reimbursed. These costs are considered medically reasonable and necessary and will be part of the care you receive if you do not take part in this study.

Therefore, these costs will be their responsibility or may be paid by their insurer if they are insured by a health insurance company (they should ask their insurer if they have any questions regarding their insurer's willingness to pay these costs); **or** may be paid by Medicare or Medicaid if they are covered by Medicare, or Medicaid, (if they have any questions regarding Medicare/Medicaid coverage they should contact Medicare by calling 1-800-Medicare (1-800-633-4227) or Medicaid at 1-800-635-2570.

A co-payment/deductible from them may be required by their insurer or Medicare/Medicaid even if their insurer or Medicare/Medicaid has agreed to pay the costs. The amount of this co-payment/deductible may be substantial.

### WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will make every effort to keep private all of your information private.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be personally identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. The information will be kept in a locked cabinet in the principal investigator's office, as well as on a password-protected computer. Officials from the University of Kentucky may look at or copy pertinent portions of records that identify you.

### CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to take part in the study, you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study.

### ARE YOU PARTICIPATING OR CAN YOU PARTICIPATE IN ANOTHER RESEARCH STUDY AT THE SAME TIME AS PARTICIPATING IN THIS ONE?

You may take part in this study if you are currently involved in another research study.

### WHAT HAPPENS IF YOU GET HURT OR SICK DURING THE STUDY?

This study uses informational material only, so if you get sick or hurt during this study, it would not be related to the study. If you believe you are hurt or if you get sick during this study please inform the investigator (for documentation purposes only).

### WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any rewards for taking part in this study?

### WHAT IF NEW INFORMATION IS LEARNED DURING THE STUDY THAT MIGHT AFFECT YOUR DECISION TO PARTICIPATE?

If the researcher learns of new information in regards to this study, and it might change your willingness to stay in this study, the information will be provided to you. You may be asked to sign a new informed consent form if the information is provided to you after you have joined the study.

### WHAT ELSE DO YOU NEED TO KNOW?

No further personal information will be gathered, other than what you supply in the demographic form.

Signature of person agreeing to take part in the study

Date

Printed name of person agreeing to take part in the study

Name of [authorized] person obtaining informed consent

Date

Signature of Investigator

Appendix E: Data Collection Legend

Legend for Diabetes Educational Material and Counseling Data Sheet **PARTICIPANT:** 

A: Patient

B: Family Member/Friend

### **DATA COLLECTED:**

### PATIENT/FAMILY MEMBER/FRIEND

- 1. Score of Diabetes Knowledge Test Before Education
- 2. Score of Diabetes Knowledge Test After Education
- 3. Difference in Scores
- 4. Score of Diabetes Empowerment Test Before Education
- 5. Score of Diabetes Empowerment Test After Education
- 6. Difference in Scores
- 7. Score of Thai Family Function Scale Before Education
- 8. Score of Thai Family Function Scale After Education
- 9. Difference in Scores

### PATIENT ONLY

- 10. Glycohemoglobin Before Education
- 11. Glycohemoglobin Weight After Education
- 12. Difference in Glycohemoglobin
- 13. Weight Before Education
- 14. Weight After Education
- 15. Difference in Weight
- 16. Systolic Blood Pressure Before Education
- 17. Systolic Blood Pressure After Education
- 18. Difference in Systolic Blood Pressure
- 19. Diastolic Blood Pressure Before Education
- 20. Diastolic Blood Pressure After Education
- 21. Difference in Diastolic Blood Pressure

Appen	dix F: Data Co DES-SF	ollection Tool	l	DKT		DKT
	PRIOR	AFTER	DIFF	PRIOR	AFTER	DIFF
1A	31	37	-6	18	18	0
1B	35	38	-3	18	18	0
2A	36	37	-1	18	18	0
2B	38	40	-2	17	16	1
3A	37	39	-2	14	14	0
3B	35	40	-5	15	16	-1
4A	34	40	-6	16	16	0
4B	40	40	0	15	16	-1
5A	35	38	-3	20	20	0
5C	32	38	-6	21	20	1
6A	21	36	-15	14	14	0
6B	26	33	-7	14	13	1
7A	33	39	-6	16	17	-1
7B	38	39	-1	17	18	-1
8A	40	40	0	19	20	-1
8B	34	39	-5	12	13	-1
9A	40	40	0	20	20	0
9B	32	38	-6	17	17	0
10A	35	38	-3	20	22	-2
10B	35	39	-4	22	22	0
11A	34	37	-3	11	13	-2
11B	34	35	-1	15	17	-2
12A	38	39	-1	14	17	-3
12B	40	40	0	12	13	-1
13A	40	40	0	8	9	-1
13B	40	40	0	10	13	-3
14A	32	37	-5	15	15	0
14B	24	34	-10	11	14	-3
15A	39	40	-1	14	18	-4
15B	40	40	0	15	20	-5

		ΔΕΤΕΡ		DIFE		COMMENT	
1A 1B	39 60	AFTER	39 60	DIFF 0 0	22 25	NO NO	NO NO
2A 2B	59 50		57 53	2 -3	24 25	NO NO	NO NO
3A 3B	45 40		45 42	0 -2	25 25	NO NO	NO NO
4A 4B	65 73		64 73	1 0	25 25	NO NO	NO NO
5A 5C	57 78		58 79	-1 -1	25 25	NO NO	NO NO
6A 6B	66 68		69 71	-3 -3	23 23	NO NO	NO NO
7A 7B	52 72		52 72	0 0	23 24	NO NO	NO NO
8A 8B	78 57		78 58	0 -1	23 22	NO NO	NO NO
9A 9B	70 61		73 61	-3 0	25 22	NO NO	NO NO
10A 10B	56 57		53 68	3 -11	22 22	NO NO	NO NO
11A 11B	71 75		73 70	-2 5	24 24	NO NO	NO NO
12A 12B	68 70		65 70	3 0	24 22	NO NO	NO NO
13A 13B	69 66		73 71	-4 -5	25 25	NO NO	NO NO
14A 14B	47 61		70 72	-23 -11	22 20	NO NO	NO NO
15A 15B	62 60		69 72	-7 -12	25 25	NO NO	NO NO

PATIENT	SBP Baseline DBP Baseline	SBP 3 month DBP 3 month	SBP Diff DBP Diff	Pulse Baseline	Pulse 3 months	Pulse Diff
1	128 82	146 96	-18 -14	68	68	0
2	132 80	130 80	2 0	78	74	4
3	100 62	110 68	-10 -6	94	96	-2
4	114 80	118 80	-4 0	78	93	-15
5	114 86	120 80	-6 6	98	94	4
6	122 82	124 90	-2 -8	74	60	14
7	134 80	132 80	2 0	85	82	3
8	118 74	98 70	20 4	89	96	-7
9	110 72	98 62	12 10	84	84	0
10	112 64	112 68	0 -4	76	80	-4
11	138 68	140 80	-2 -12	72	64	8
13	104 68	108 67	-4 1	77	73	4
14	122 80	124 80	-2 0	60	50	10
15	142	122	20	83	91	-8
	82	74	8			

PATIENT	Wt Baseline	Wt 3month	Wt Diff	HgA1c Baseline	HgA1c 3months	HgA1c Diff
1	257	266	-9	6.5	6.8	-0.3
2	434	428	6	5.4	7.1	-1.7
3	215	216	-1	7.5	7.4	0.1
4	221	242	-21	7.1	7.5	-0.4
5	231	218	13	8.3	6.8	1.5
6	225	216	9	6.6	6	0.6
7	266	256	10	6.6	6.4	0.2
8	174	174	0	9.3	8.5	0.8
9	209	209	0	7.7	5.7	2
10	276	277	-1	9.5	7.3	2.2
11	186	186	0	5.6	6	-0.4
13	209	210	-1	7	7.6	-0.6
14	244	224	20	6.8	6.1	0.7
15	217	217	0	7.8	7.6	0.2

PATIENT	Chol Baseline	Chol 3months	Chol Diff	Trig Baseline	Trig 3month	Trig Dif
1	162	174	-12	200	171	29
2	152	159	-7	149	228	-79
3	196	186	10	98	169	-71
4	193	185	8	1034	291	743
5	152	156	- 4	126	121	5
6	216	222	-6	114	121	-7
7	116	116	0	136	136	0
8	182	187	-5	221	138	83
9	175	236	-61	255	215	40
10	122	118	4	128	145	-17
11	220	169	51	82	145	-63
13	205	187	18	346	364	-18
14	201	204	-3	189	106	83
15	234	213	21	232	186	46

# Appendix G: ACTION PLANS

*Healthy Living: Family Routines Count* Construct Action Plan (What, How Much, When, How many times) I.

		Friend's Role in Action Plan
If	7 or below:	0 1 2 3 4 5 6 7 8 9 10 What is the
		Identify steps to overcome barrier:
		Review/Re-evaluate revised plan (New Confidence 0 1 2 3 4 5 6 7 8 9 10
III. Go W		NOT MET ier?
	Identify steps	s to overcome barrier:
	Review/Re-e	valuate revised plan (New Confidence #): 0 1 2 3 4 5 6 7 8 9 10
Yo	our Family's Ge	enes Count
	Construct Ac	tion Plan (What, How Much, When, How many times)
I.		

Check Confidence: 012345678910 II.

If 7 or below: What is the barrier?

Identify steps to overcome barrier: \_\_\_\_\_

Review/Re-evaluate revised plan (New Confidence #): 0 1 2 3 4 5 6 7 8 9 10

III. Goal: MET NOT MET What is the barrier?\_\_\_\_\_

Identify steps to overcome barrier: \_\_\_\_\_

Review/Re-evaluate revised plan (New Confidence #): 0 1 2 3 4 5 6 7 8 9 10

\_\_\_\_\_

## Sharing Healthy Family Routines

I. Construct Action Plan (What, How Much, When, How many times)

Family Member/Friend's Role in Action Plan

II. Check Confidence: 012345678910 If 7 or below: What is the barrier?

Identify steps to overcome barrier: \_\_\_\_\_

Review/Re-evaluate revised plan (New Confidence #): 0 1 2 3 4 5 6 7 8 9 10

III. Goal: MET NOT MET What is the barrier?\_\_\_\_\_

Identify steps to overcome barrier: \_\_\_\_\_

Review/Re-evaluate revised plan (New Confidence #): 0 1 2 3 4 5 6 7 8 9 10

*Depression and Diabetes* I. Construct Action Plan (What, How Much, When, How many times)

Family Me	mber/Friend's Role in Action Plan
II. Check Confide	ence: 0 1 2 3 4 5 6 7 8 9 10
If 7 or belo	ow: What is the
barrier?	
Identify st	eps to overcome barrier:
Review/R	e-evaluate revised plan (New Confidence #):
·	012345678910
III. Goal:	MET NOT MET
What is t	he barrier?
Identif	y steps to overcome barrier:
Review	v/Re-evaluate revised plan (New Confidence #):
	0 1 2 3 4 5 6 7 8 9 10

1	Name: (voluntary)					
	Survey Upon Completion of	f Project:				
1.	I think that the information that I verbally received is beneficial in managing my diabetes.	☐ 1 Strongly Disagree	□₂ Somewhat Disagree	□ <sub>3</sub> Neutral	☐ 4 Somewhat Agree	□₅ Strongly Agree
2.	I think that the information from "Diabetes: A Family Matter" is beneficial in managing my diabetes.	Strongly Disagree	□ <sub>2</sub> Somewhat Disagree	□3 Neutral	☐ <sub>4</sub> Somewhat Agree	□₅ Strongly Agree
3.	I think that the information, if shared with other family members, would benefit them in better understanding diabetes	☐ 1 Strongly Disagree	□ <sub>2</sub> Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
4.	The pamphlets administered were easy to read.	□ 1 Strongly Disagree	□2 Somewhat Disagree	□₃ Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
5.	The follow up phone calls were beneficial to me	□ 1 Strongly Disagree	□2 Somewhat Disagree	□ <sub>3</sub> Neutral	□₄ Somewhat Agree	□₅ Strongly Agree
	Do you have any suggestions oven? Yes	-		terial that y	you were	
0	If so, what?					

## Appendix H: CAPSTONE COMPLETION SURVEY

7. Would this information be better shared during a group class or informal group setting? Yes No

\_\_\_\_\_

8. Additional comments or suggestions?

\_\_\_\_\_

### Bibliography

Grade	Reference	Design	Intervention	Sample	Setting	Follow Up	Results	Conclusion
Good/	Atak, N.,	RCT	The test,	80 patients	Diabetes	Baseline	There was	Patient
В	Gurkan,	using a	including	with type 2	Center,	and 2	significant	education had
	Т., &	pre and	sections on	diabetes	Departmen	weeks post	difference	a limited
	Kose, K.	post-test	patient		t of	education	between the	effect on
	(2009).	design	characteristic,		Endocrinol		intervention	knowledge
	The effect	0	diabetes		ogy and		and control	and self-
	of		knowledge,		Metabolis		groups.	reported self-
	education		self-		m, Ankara		Improvement	management
	on		management		University,		s were	behavior but
	knowledg		behaviors and		Turkey.		observed in	a significant
	e, self-		self-efficacy		Turkey.		taking	effect on self-
							regular walks	efficacy in
	managem		were given to					
	ent		all patients				(p=0.043),	patients with
	behaviors		before				recognizing	type 2
	and self-		education as a				nutrients	diabetes
	efficacy		pre-test.				with high	
	of patients		Subjects				caloric	
	with type		participated				content	
	2 diabetes.		in the				(p=0.037),	
	Australian		education				recommende	
	Journal of		program three				d daily fat	
	Advanced		months after				distribution	
	Nursing,		the initial				(p=0.024),	
	26(2), 66-		assessments				regulating	
	74.		were				blood	
	Turkey		completed.				glucose	
			The results of				levels to	
			routine lab				avoid	
			assessments				complication	
			were				s (p=0.002),	
			recorded.				and in $(p=0.002)$ ,	
			Two weeks				diabetes self-	
			after the				efficacy	
			initial				mean scores	
			education				(p=0.006)	
			program, the					
			test was re-					
			administered					
			to					
			intervention					
			and control					
			groups. The					
			correct					
			answers were					
			explained to					
			the					
			intervention					
			group during					
			education and					
			to each					
			patient in the					
			control group					
			following the					
			post test.					
air/A	Balamuru	CBA	Participant	38	People	Base and 3	66% of	The results of
	gan, A.,		knowledge,	participants	with	months	participants	this pilot
	Hall-		self-efficacy,	started	diabetes in	1	completed	study suggest

		1	1 1 2			1	1	1 D.C
	barrow, J.,		and self-care	25	underserve		the DSME-T	that DSME-T
	Blevins,		practices	completed	d rural		program. A	may offer
	M. A.,		were assessed	program	communiti		significantly	opportunities
	Brech, D.,		before		es		greater	for DSME
	Phillips,		participants		supported		proportion of	among rural
	M., &		began the		by the		participants	residents with
	Holley,		education		University		demonstrated	diabetes.
	E.,Brittl		program and		of		improved	Plans are in
	e, K.		after they had		Arkansas		knowledge,	place to
	(2009). A		completed it.				endorsed	explore the
	pilot study		Also, select				greater self-	possibility of
	of		clinical				efficacy, and	sustaining
	diabetes		measures				reported	and
	education		were				more	expanding the
	via		collected				frequent self-	program to
	telemedici						care practices	other
	ne in a						to manage	underserved
	rural						their diabetes	rural
	underserv						at the	communities.
	ed						conclusion of	
	communit						the study	
	у-						period.	
	opportunit							
	ies and							
	challenges							
	. The							
	Diabetes							
	Educator,							
	35, 147-							
	154.							
	USA							
Good/	Bell, J. A.,	Pre/post	Completion	513 users.	Individuals	Baseline	Of non-	The
Α	Patel, B.,	test	of computer	124 were	were	and 13	nurses, 145	"Brainfood"
	&	analysis	program with	nurses	recommen	months	out of 389	program is
	Malasanos		15 modules.	(APRN=6,	ded by		took pre-tests	educationally
	, T.		Seven topics	LPN=13,	their		and 135 took	sound and
	(2006).		should be a	RN=88,	healthcare		post-tests.	effective at
	Knowledg		review of	unspecified=	provider,		Post test	delivering
	e		general	17).	advertisem		scores	Type 1
	improvem		nursing	389 were	ent for		improved	diabetes
	ent with		knowledge	non-nurse	nursing		significantly	education to
	web-based		for most	users	continuing		(P<0.001 by	both
	diabetes		nurses, six	(patients,	education		non-paired t	professionals
	education		modules	family	on the		test). Of	and non-
	program:		offered more	members,	Florida		nurses, 68 of	professionals.
	Brainfood		diabetes-	teachers,	Departmen		124 took pre-	Web access
	. Diabetes		specific	interested	t of health		tests and up	from non-
	Technolog		information	learners and	website,		to 56 took	clinic settings
	y &		and two	potential	directions		post-tests.	can improve
	Therapeut		modules	camp	from		Post-test	access to
	<i>ics</i> , 8(4),		included	counselors=	Florida's		scores	high-quality
	444-448.		complex	98)	Diabetes		improved	education for
	USA		diabetes		Camp for		significantly	learners in
			management		counselor		(P=<0.05 by	remote or
			information		orientation		non-paired t	underserved
			beyond the		and those		test) on 13	locations.
						1		
			scope of most		searching		modules.	
			nurses		searching the web for		Post-test	
			nurses					
					the web for		Post-test	

· · · ·								ı
			diabetes. Pre		Patients		but were not	
			and post test		and		statistically	
			scores were		families		significant	
			collected.		referred to		for	
					the site by		"Nutrition	
					the		101", a	
					University		module about	
					of Florida		very basic	
					Pediatric		nutrition.	
					Diabetes		Nurses had a	
					Center		lower margin	
					staff come		of	
					from all of		improvement	
					north		for most	
					central		modules as	
					Florida,		they started	
					including		with a higher	
					participant		base	
					s in a		knowledge	
					telemedici		level. Non-	
					ne program		nurses	
					serving		improved	
					rural		significantly	
					Volusia		on all	
					County.		modules	
							from pre-test	
							to post-test.	
							Post-test	
							scores for the	
							nurses and	
							non-nurses	
							were	
							indistinguish	
							able.	
Fair/A	Braun, A.	RCT	To evaluate	155	Treated at	Baseline,	Patients	The new
Fall/A		KC1	the	Geriatric				
	K.,				outpatient	immediatel	showed	structured
	Kubiak,		effectiveness	patients	facility in	y after	improved	geriatric
	Т.,		of new		Germany	education,	levels of	diabetes
	Kuntsche,		structured	83-		and 6	HgA1c 6	education
	J., Meier-		diabetes	intervention		months.	months after	program,
	hofig, M.,		teaching and	72-control			the new	focusing on
	Muller, U.		treatment				education,	the learning
	A.,		program with				and less	capabilities
	Feucht, I.,		specific				acute	and the
	&		didactical				complication	particular
	Zeyfang,		approaches				than the	needs of older
	A. (2009).		and topics for				standard	persons, is
	SGS: A		geriatric				group	effective in
	structured		patients with				(p<0.009).	improving
	treatment		DM. Patient				Bothe groups	metabolic
	and		were				demonstrated	control and in
	teaching		randomly				a good	maintaining
	programm		placed into				capacity for	auto-
	e for older		educational				diabetes self-	sufficiency in
	patients		groups				management	geriatric
	with		receiving				and	patients with
			routine				improvement	diabetes
	diabatas		rouulle					
	diabetes		DSME us the				in diabatas	mollitur
	mellitus a		DSME vs the				in diabetes	mellitus.
			DSME vs the new program				in diabetes knowledge after the	mellitus.

Good/ A	randomise d controlled multi- centre trial. Age and Ageing, 38, 390- 396. Germany Clarke, A. (2011). Effectiven ess of a communit y orientated diabetes education (CODE) programm e for people	RCT	The healthcare provider delivering Community Oriented Diabetes Education (CODE) had training in motivational interviewing, facilitation	237 participants	31 local settings	Baseline and 26 weeks	education ( $p<0.01$ ). The empowermen t scores raised from 3/5 to $4/5(p=0.047).QOL rangedecreasedfrom 25 to 21and theaverage scorehad increased(p=0.00).$	Increasing patients' self- management skills to manage their diabetes is extensively the target of diabetes education. Most education interventions
	with type 2 diabetes. <i>European</i> <i>Diabetes</i> <i>Nursing</i> , 8(3), 94- 99. Ireland		skills, problem solving and goal setting along with an accredited diabetes qualification. The CODE curriculum was delivered over 3 successive weeks with a 10 week support telephone call and 26 weeks follow up session. Outcome measures were collected at baseline and 26 weeks.				Knowledge had also increased significantly (p=0.01). People lost on average 0.5kg with similar reduction in BMI.	report positive outcomes based on patterns of group level change. There is a need to focus on individual change. This study identified younger age and reported poorer QOL as possible causes of attrition. This group needs to be targeted for more intensive retention strategies and their reasons for attrition identified and addressed.
Fair/A	Conlon, P. (2010). Diabetes outcomes in primary care:	RCT	Patients were scheduled by the receptionist with the physician or	42 patients with type 2 diabetes. 25 in physician managed	Large urban federally qualified health center.	Baseline and 12 months	The nurse practitioner interventions lowered HgA1c and glucose to a	The diabetes NP is able to demonstrate a high degree of clinical management

r	El		ND ba			1		
	Evaluatio		NP, based on	group and			greater	expertise
	n of the		the	14 in nurse			degree than	which
	diabetes		availability of	practitioner			those under	translates into
	nurse		each	managed			physician	better
	practitione		practitioner	group			direction.	metabolic
	r		Patient				Weights of	control,
	compared		achievability				the	consistent
	to the		was measured				physician's	with the
	physician.		by each				patients were	standard of
	Primary		practitioner				lowered with	care and
	Health		documenting				relevance to	clinical
	Care,		patient				noted	practice
	20(5), 26-		compliance				hyperglycem	recommendat
	31.		with mutually				ia. Blood	ions set by
	USA		established				Pressure	the American
	CDIT		goals and				remained the	Diabetes
			acceptance of				same in both	Association,
			their diabetes					which in turn
			plan.				groups	decreases cost
Good/	Davies,	RCT		824 adults	207	Baseline	Hg A 1 c laval-	uccicases cost
		KUI	A structured	024 adults			HgA1c levels at 12 months	
А	M. J.,		group		general	and 12		
	Heller, S.,		education		practices in	months	had	
	Skinner,		program for		13 primary		decreased by	
	T. C.,		six hours		care sites		1.49% in the	
	Campbell,		delivered in		in the		intervention	
	M. J.,		the		United		group	
	Carey, M.		community		Kingdom		compared	
	E., &		by two				with 1.21%	
	Cradock,		trained				in the control	
	S.,Khun		healthcare				group. After	
	ti, K.		professional				adjusting for	
	(2011).		educators				baseline and	
	Effectiven		compared				cluster, the	
	ess of the		with usual				difference	
	diabetes		care.				was not	
	education						significant:	
	and self-						0.05%	
	managem						(95%CI).	
	ent for						The	
	ongoing						intervention	
	and newly						group	
	diagnosed						showed a	
	(DESMO						greater	
	(DESMO ND)						weight loss: -	
	programm						2.98kg	
	e for						(95%CI)	
	people						(95%CI) compared	
	with						with 1.86kg,	
	newly						p=0.027 at	
	diagnosed						12 months.	
	type 2						The odds of	
	diabetes:						not smoking	
	cluster						were 3.56	
	randomise						(95%CI),	
	d						p=0.033high	
	controlled						er in the	
	trial.						intervention	
	British						group at 12	
	Medical						months. The	
	Journal, ,						intervention	

		1		1	1			1
	1-11.						group	
	UK						showed	
							significantly	
							greater	
							changes in	
							illness belief	
							scores	
							(p=0.001);	
							directions of	
							change were	
							positive	
							indicating	
							greater	
							understandin	
							g of diabetes.	
							The	
							intervention	
							group had a	
							lower	
							depression	
							score at 12	
							months:	
							mean	
							difference	
							was50	
							(95%CI);	
							p=0.032. A	
							positive	
							association	
							was found	
							between	
							change in	
							perceived	
							personal	
							responsibility	
							and weight	
							loss at 12	
							months	
G 1/	<b>D</b> 1.	DOT	<b>T</b> 11 1 1	014			(p=0.008)	
Good/	Deakin,	RCT	Individuals	314 people	Individuals	Baseline, 4	By 14	The program
В	T., &		were placed	with type 2	living in	months	months the	trains health
	Whitham,		into	diabetes	Burnley,	and 14	X-PERT	care
	C. (2009).		individual	Intervention	Pendle or	months	group	professionals
	Structured		appointment	-157 with	Rossendale		compared	to deliver the
	patient		(control) or	149	, Lancashire		with the	six week structured
	education:		into (intervention)	completing			control group	
	The X-		(intervention)	program.	, UK and		showed	patient education.
	PERT		where	Control-157	receiving		significant	
	programm		patients	with 128	treatment		improvement	Implementati
	e. British		attended six 2	completing	for		s in the mean $IIb A lo (-6)$	on has shown
	Journal of		hour group	the program	diabetes		HbA1c $(6\%)$	excellent
	Communit		sessions of				vs. +0.1%,	attendance
	y Nursing,		self-				repeated	rates,
	<i>14</i> (9), 208, 402		management				measures	improved
	398-403.		education (X-				anova,	diabetes
	UK		PERT				P<0.001).	control,
			Program)				The number	reduced
							needed to	weight, blood
							treat for	pressure,
	1	1	1	1	1		preventing	cholesterol

							diabetes	and waist
							medication	circumferenc
							increase was	e and more
							4 (95%	confidence in
							confidence	self-
							interval) and	managing
							for reducing	diabetes that
							diabetes	has impacted
							medication	positively on
							was 7 (95%	quality of life.
							confidence	
							interval).	
							Statistically	
							significant	
							improvement	
							s were also	
							shown in the	
							X-PERT	
							patients	
							compared with the	
							control	
							patients for	
							body weight,	
							body mass	
							index, waist	
							circumferenc	
							e, total	
							cholesterol,	
							self-	
							empowermen	
							t, diabetes	
							knowledge,	
							physical	
							activity	
							levels, foot	
							care, fruit and	
							vegetable	
							intake,	
							enjoyment of	
							food and	
							treatment	
							satisfaction	
Good/	Dyson, P.	RCT	All subjects	42 newly	Direct	Base and 6	The	A brief video
А	A.,		in the study	diagnosed	referral	months	intervention	intervention
	Beatty, S.,		received	diabetic	from		group	increased
	&		usual medical	Patients	primary		showed	diabetes
	Matthews,		care from	21	care		increased	knowledge
	D. R.		their primary	controlled	physician,		knowledge	amongst
	(2010).		care	group	practice		compared to	those newly
	An		physician,	21 intervention	nurse or		controls (p $\leq$ = 0.0001)	diagnosed
	assessmen t of		including	intervention	from ads		0.0001). There were	with type 2 diabetes and
			education about	group				diabetes and may comprise
	lifestyle video		lifestyle				no significant differences in	an effective
	education		management				changes over	way of
	for people		of type 2				6 months in	directing
	newly		diabetes from				either group,	education to
	diagnosed		a practice				however the	such
I			r	1	1	1		

with typenurse. Ininterventionindi2 diabetes.addition,groupshowedJournal ofsubjectsshowedimprovementHumanrandomizedintervention(p=0.024),Nutritionto the videototaltotalandintervention(p=0.024),totalDietetics,received thetotal23, 353-three lifestylecholesterol359.videos and(p=0.017),UKwereLDLrequested towatch them intheir ownand increasedtime. Thecontrol groupwas offeredthe videos atthe videos atthe videos atthe videos atthe videos atthe end of the(p=0.043)6 monthfrom	viduals.
Journal of Humansubjects randomized to the video and Dietetics, 359.subjects randomized to the video interventionshowed improvement s in HgA1c (p=0.024), total cholesterol (p=0.017), LDLUKwere requested to watch them in their own time. The control group was offered the videos at the end of theshowed improvement s in HgA1c (p=0.024), total cholesterol (p=0.017), LDL	
HumanrandomizedimprovementNutritionto the videosin HgA1candintervention(p=0.024),Dietetics,received thetotal23, 353-three lifestylecholesterol359.videos and(p=0.017),UKwereLDLrequested towatch them intheir owntheir owntime. Thecontrol groupwas offeredthe videos atthe end of thethe end of the	
Nutrition and Dietetics, 23, 353-to the video intervention received the three lifestyle videos and UKs in HgA1c (p=0.024), total cholesterol (p=0.017), LDLUKwere requested to watch them in their own time. The control group was offered the videos at the end of thes in HgA1c (p=0.024), total cholesterol (p=0.017), LDL	
and Dietetics, 23, 353- 359.intervention received the three lifestyle videos and were requested to watch them in their own time. The control group was offered the videos at the end of theintervention (p=0.024), total cholesterol (p=0.017), LDL and increased physical activity measured by pedometer (p=0.043)	
Dietetics, 23, 353- 359.received the three lifestyle videos and weretotal cholesterol (p=0.017), LDLUKwere requested to watch them in their own time. The control group was offered the videos at the end of thetotal cholesterol (p=0.018) and increased physical activity measured by pedometer (p=0.043)	
23, 353- 359.three lifestyle videos and werecholesterol (p=0.017), LDLUKwere requested to watch them in their own time. The control group was offered the videos at the end of thecholesterol (p=0.018) and increased physical activity measured by pedometer (p=0.043)	
359. UKvideos and were requested to watch them in their own time. The control group was offered the videos at the end of the(p=0.017), LDL cholesterol (p= 0.018) and increased physical activity measured by pedometer (p=0.043)	
UKwere requested to watch them in their own time. The control group was offered the videos at the end of theLDL cholesterol (p= 0.018) and increased physical activity measured by pedometer (p=0.043)	
requested to watch them in their own time. The control group was offered the videos at the end of thecholesterol (p= 0.018) and increased physical activity measured by pedometer (p=0.043)	
watch them in their own time. The control group was offered the videos at the end of the(p= 0.018) and increased physical activity measured by pedometer (p=0.043)	
their own time. The control group was offered the videos at the end of theand increased physical activity measured by pedometer (p=0.043)	
time. The control group was offered the videos at the end of thephysical activity measured by pedometer (p=0.043)	
control group was offered the videos at the end of theactivity measured by pedometer (p=0.043)	
was offered the videos at the end of themeasured by pedometer (p=0.043)	
the videos at the end of the (p=0.043)	
the end of the (p=0.043)	
	1
study period baseline,	
study period vith no	
significant	
changes in	
control	
group.	
	et Talk
A V. L., Sweet Talk, a 28 with type 1 12 months not change in was	
	ciated
A., messaging therapy for > 1 conventional with	
	roved
	-efficacy
Greene, S. designed to therapy and al insulin with Sweet and	enneary
	erence;
	aging a
	sically
	iculty to
	h group
trial of insulin clinics in therapy and of y	oung
Sweet therapy and Tayside, Sweet Talk. peop	ple.
Talk, a     improve     Scotland.     Sweet Talk     Whi	ile Sweet
text- glycaemic was Talk	c alone
messaging control in associated did	not
system to pediatric with imp	
	caemic
	trol, it
	have had
	le in
	porting
Diabetic was adherence. the	
	oduction
	ntensive
1338. messages 82% of insu	
UK from the patients felt then	
	eduled,
	ored text
	saging
	rs an
	ovative
goal-specific management mea	ns of
prompts and and 90% supp	porting

r							1.	1.1.
			messages				wanted to	adolescents
			tailored to				continue	with diabetes and could be
			patients' age,				receiving	
			sex and insulin				message	adapted for
								other health-
			regimen.					care settings and chronic
								disease.
Good/	Gerber, B.	RCT	Dondomly	211 motionts	Patients	Base and 1	Only 183	Access to
B	Gerber, Б. S.,	KUI	Randomly placed into	244 patients started study	from 5		subjects	multimedia
Б	Bordsky,		intervention	with 183	public	year	completed	lessons
	I. G.,		group that	completing	clinics in		the study.	resulted in an
	Lawless,		included	the study	Chicago,		There were	increase in
	K. A.,		supplemental	the study	Illinois		no significant	perceived
	Smolin, L.		computer		minois		differences in	susceptibility
	I.,		multimedia				change in	to diabetes
	Arozullah,		use or control				A1c, weight,	complications
	A. M.,		which				blood	, particularly
	Smith, E.		received the				pressure,	in subjects
	VEiser,		standard of				knowledge,	with lower
	A. r		care.				self-efficacy	health
	(2005).		Intervention				or self-	literacy.
	Implemen		included				reported	Despite
	tation and		audio/video				medical care	measures to
	evaluation		sequences to				between the	improve
	of a low-		communicate				intervention	informational
	literacy		information,				and control	access for
	diabetes		provide				groups.	individuals
	education		psychological				There was an	with lower
	computer		support, and				increase in	health
	multimedi		promote				perceived	literacy, there
	а		diabetes self-				susceptibility	was relatively
	applicatio		management				to diabetes	less use of the
	n.		skills				complication	computer
	Diabetes						s in the	among these
	Care,						intervention	participants.
	28(7),						group.	
	1574-						Lower	
	1580.						literacy	
	USA						patients	
							reported this	
							higher. Time	
							on the	
							computer was	
							increased in	
							the	
							intervention	
							group.	
Good/	Gucciardi	RCT	Patients were	61 Patients	Patients of	Baseline	Attitudes,	The study
A	a, E.,		randomly	51 I adonto	Toronto	and 3	subjective	provides
	Demelo,		assigned to	36-control	Western	months	norms,	preliminary
	M., Lee,		receive either		hospital		perceived	evidence that
	R. N., &		diabetes	25-	Diabetes		behavior	culturally
	Grace, S.		education	intervention	Education		control, and	competent
	L. (2007).		counseling		Center		intentions	group
	Assessme		only (control)				towards	education in
	nt of two		or counseling				nutrition	conjunction
	culturally		in				adherence,	with
	competent		conjunction				self-reported	individual
	competent	1	conjunction	l	I	1	sen-reported	murviuuai

	I							
	diabetes		with group				nutrition	counseling
	education methods:		education (intervention)				adherence	may be more efficacious in
			(intervention)				and glycemic	
	Individual		•				control	shaping
	versus						significantly	eating
	individual						improved in	behaviors
	plus group						both groups,	than
	education						over the 3	individual
	in C						month study	counseling
	Canadian						period, yet	alone. Larger
	Portugues						those	longitudinal studies are
	e adults						receiving	needed to
	with type 2 diabetes.						individual	determine the
	<i>Ethnicity</i>						counseling with group	most
	and						education	efficacious
	Health,						showed	education
	12(2),						greater	method to
	12(2), 163-187.						improvement	sustain long-
	Canada						in all	term nutrition
	Canaud						measures	adherence
							with the	and glycemic
							exception of	control.
							glycemic	2011101.
							control,	
							where no	
							significant	
							difference	
							was found	
							between the	
							two groups at	
							3 months.	
Fair/A	Halkoaho,	CBA	Data	9 individuals	9 patients	Post	The results	The results
	А.,		collected by	with	from	interview	suggest that	suggest that
	Kavilo,		questionnaire	diabetes	outpatient	questionnai	the Self-Care	the Self-Care
	M., &		and	3 diabetes	program,	res	system	system
	Pietila, A.		interview.	nurses	the nurses		software	software
	М.		People with		worked		supports and	supports and
	(2007).		diabetes were		with those		motivates	motivates
	Informatio		sent a		patients		diabetes self-	diabetes self-
	n		questionnaire				care. The	care. The
	technolog		and the				nurses felt	nurse felt that
	У		nurses were				that the	the
	supporting		interviewed				application	application
	diabetes						was useful	was useful
	self-care:						when	when
	A pilot						changes were	changes, such
	study.						introduced.	as starting
	European						Both groups	insulin
	Diabetes						disliked the	treatment,
	Nursing,						mechanical	were
	4(1), 14-						nature of the	introduced.
	17. UK						software	The
								application
								was further
								described as
								effective and
								motivatina
								motivating in short-term

								intensive diabetes education and monitoring; however, both nurses and patients disliked the mechanical nature of the software
Good/ B	Huang, J. P., Chen, H. H., & Yeh, M. L. (2009). A Comparis on of diabetes learning with and without interactive multimedi a to improve knowledg e, control, and self- care among people with diabetes in Taiwan. <i>Public</i> <i>Health</i> <i>Nursing</i> , 26(4), 317-328. Taiwan	RCT	The experimental group received patient education through interactive multimedia about diabetes for 3 months, while the control group received a routine 3 month patient education. Data were collected from both groups at baseline and at the completion of the patient education. Findings were then compared to evaluate the effects of the intervention on the subjects' knowledge of diabetes, blood sugar control and self-care.	60 participants 30-control 30- intervention	Recruited from the endocrinol ogy Outpatient department at a regional hospital in the south of Taiwan.	Baseline and 3 months	The experimental group showed greater improvement in understandin g diabetes than the control (t=3.29, p<0.001). There was no significant difference in control of blood sugar levels (t=- 1.72, p=.10) and self-care (F=1.03, p=.32)	The use of an interactive multimedia device to intervene in diabetes self- care was effective only in raising the subjects' knowledge about the disease. Additionally, the subjects may need more time to implement more effective blood sugar control and self-care activities after receiving instruction.
Good/ A	Izquierdo, R. E., Knudson, P. E., Meyer, S., Kearns, J., Ploutz- snyder, R., &	RCT	Determine whether diabetes education can be provided as effectively through telemedicine technology as	56 adults with diabetes 28 control group 28 intervention group	Patients at the Joslin Diabetes Center at SUNY Upstate medical University in	Baseline and 3 months	Patient satisfaction was high in the telemedicine group. Problem Areas in Diabetes	Diabetes education via telemedicine and in person was equally effective in improving glycemic control, and

	1		1	1	1	1	1	
	Weinstock		through in-		Syracuse,		scale scores	both methods
	, R. S.		person		New York		improved	were well
	(2003). A		encounters				significantly	accepted by
	compariso		with diabetes				with diabetes	patients.
	n of		nurse and				education,	Reduced
	diabetes		nutrition				and the	diabetes-
	education		educators.				attainment of	related stress
	administer		Randomized				behavior	was observed
	ed		to receive				change goals	in both
	through		diabetes				did not differ	groups.
	telemedici		education in				between	These data
	ne versus		person				groups. With	suggest that
	in person.		(control				diabetes	telemedicine
	Diabetes		group) or via				education,	can be
	Care,		telemedicine				HgA1c	successfully
	26(4),		(telemedicine				improved	used to
	1002-		group). The				from 8.6 +/-	provide
	1002		education				1.8% at	diabetes
	USA		consisted of				baseline to	education to
	USA							
			three				7.8 +/-1.8%	patients
			consultative				3 months	
			visits with				after the third	
			diabetes				educational	
			nurse and				visit, with	
			nutrition				similar	
			educators.				changes	
			The in-person				observed in	
			and				the	
			telemedicine				telemedicine	
			groups were				and in-person	
			compared				groups.	
			using					
			measures of					
			glycemic					
			control and					
			questionnaire					
			s to assess					
			patient					
			satisfaction					
			and					
			psychosocial					
			functioning					
			as related to					
			diabetes.					
Fair/B	Jennings,	CBA	These	17 patients,	Outpatient	Base and 6	Participants	An internet-
	А.,		patients used	convenience	s from	months	found the	based system
	Powell, J.,		a virtual	sample	three UK		virtual clinic	to aid the
	Armstron		clinic system	<u> </u>	hospitals		easy to use	management
	g, N.,		that allowed		in the West		and	of diabetes
	Stuart, J.,		communicati		and East		positively	appears
			on with		Midland		rated its	feasible and
	& Dale, J.				windiand			
	(2009). A		health				design. Peer	well accepted
	virtual		professionals;				support was	by patients.
	clinic for		interact with				the most	The pilot
	diabetes		peers and				valued aspect	study did not
	self-		access				and the	identify
	managem		information.				discussion	evidence of
	ent: Pilot						boards the	an impact on
	study.						most used	improving
	Journal of						component.	quality of life
L	sournai 0j	I	1	I	I	I	component.	quanty of file

			[		[		4.11	10
	Medical						All	or self-
	Internet						participants	efficacy in
	Research,						highly rated	patient who
	<i>11</i> (1), 1-8.						the virtual	used insulin
	UK						clinic in	pump therapy
							terms of	
							improving	
							communicati	
							on with	
							peers, but	
							few agreed it	
							had	
							improved	
							communicati	
							on with	
							health care	
							professionals	
							. No	
							significant	
							improvement	
							s in	
							physiological	
							and	
							psychologica	
							1	
							measurement	
							s were found.	
							Regarding	
							HgA1c	
							measurement	
							s, there was	
							no significant	
							difference	
							found	
							between the	
							pre and post	
							test results	
							(p=0.53).	
							(p=0.55). Mean	
							ADDQoL	
							scores at	
							base were -	
							2.1 compared	
							to -2.0 post	
							test (p=.62).	
							Patient's	
							confidence in	
							their ability	
							to perform	
							self-care	
							tasks was	
							found to be	
							significantly	
							reduced from	
							base to	
							follow up	
							(p=0.45)	
Good/		RCT	Dentisinante	129	Patients at	Base and 3	There was an	Multimedia
G000/								
D	Khan, M.	KC1	Participants					
В	Khan, M. A., Shah, S.,	KUI	either viewed a computer	uninsured, primarily	a county clinic in	months	increase in the number	users received a greater

	G 1 .	1	1 1.		GI :		C 1	
	Grudzien,		multimedia	ethnic	Chicago,		of oral	intensificatio
	A.,		education	minority	Illinois		diabetes	n of diabetes
	Onyejekw		program	adults with			medications	therapy, but
	e, N.,		(intervention)	type 2			prescribed	demonstrated
	Banskota,		or read an	diabetes			over 3	no difference
	P., Karim,		educational	67			months to	in self-
	S.,Gerbe		brochure	intervention			multimedia	management
	r, B. s		(control)	group			users	in comparison
	(2011). A		while in the	62 control			compared	with those
	diabetes		waiting room	group			with those in	receiving
	education						the control	educational
	multimedi						group	brochures.
	a program						(p=0.017).	The
	in the						HgA1c	availability of
	waiting						declined by	a computer
	room						1.5 in the	multimedia
	setting.						multimedia	program in
	Diabetes						group versus	the waiting
	Therapy,						0.8 in the	room appears
	2(3), 178-						control group	to be a novel
	188.						(p=0.06).	and
	USA						There were	acceptable
							no difference	approach in
							between	providing
							groups in	diabetes
							changes in	education for
							blood	underserved
							pressure	populations
							levels, self-	populations
							efficacy, and	
							most diabetes	
							related	
							behaviors.	
							Self-reported	
							exercise	
							increased in	
							the control	
							group	
							compared	
							with the	
							multimedia	
							group	
C 1/	17. 4	<b>D</b> / ·		101 0 1		D I'	(p=0.016)	771
Good/	King, A.	Pre/post	Experimental	101 Control	Board	Baseline	Mean HbA1c	The program
А	B., &	pilot	site- NPs	group	certified	and 12	values	provided
	Wolfe, G.	study	received a 6	34	family or	months	decreased	insights
	S. (2009).		hour	Experimenta	internal		from baseline	regarding the
	Evaluatio		instruction in	l group	medicine		by 0.46% in	importance of
	n of		the use of the		practitione		the active	electronic
	diabetes		treatment		rs located		treatment	records and
	specialist-		algorithms		within a		group versus	provider
	guided		based on the		100 mile		0.06% in the	notifications,
	primary		ADA		radius of		control	patient
	care		guidelines of		Salinas		group;	adherence,
	diabetes		care, the		California		however,	prioritization
	treatment		accompanyin				reductions in	of provider
	program.		g algorithm				HgA1c did	resources by
	Journal of		guidebook for				not achieve	risk level
	the		reference and				statistical	among
	American		flow sheets				significance	patients and
							-	

Academy of Nurse Practitionfor the chart record in the clinic. The control sitepotentially because of the small sample size of the24-30.had noof the experimental the individual patients after the chartgroup. Mean SBP values were significantly reduced in both groups; however, LDL-C was the study, the	access to self- management education
Practition ers, (21), 24-30.clinic. The control site had nothe small sample size of the 	
ers, (21), 24-30.control site had nosample size of the experimental group. Mean patients after the chart review and during the 12 month study.sample size of the experimental group. Mean SBP values were significantly reduced in both groups; however, LDL-C was	education
24-30.had noof theUSAcontact withgroup. Meanpatients aftersBP valuesthe chartwerereview andsignificantlyduring the 12both groups;month study.Aftercompletion ofLDL-C was	
USA contact with the individual patients after review and during the 12 month study. After completion of LDL-C was	
the individual patients after the chartgroup. Mean SBP values were significantly reduced in both groups; After completion ofduring the 12 month study.both groups; however, LDL-C was	
patients after the chart review and during the 12 month study.SBP values were significantly reduced in both groups; however, LDL-C was	
patients after the chart review and during the 12 month study.SBP values were significantly reduced in both groups; however, LDL-C was	
review and during the 12 month study. After completion of	
during the 12 month study. After completion ofreduced in both groups; however, LDL-C was	
during the 12 month study. After completion ofreduced in both groups; however, LDL-C was	
month study.     both groups;       After     however,       completion of     LDL-C was	
After however, completion of LDL-C was	
completion of LDL-C was	
I I I I I I I I I I I I I I I I I I I	
charts of the significantly	
same patients reduced in	
were again the control	
reviewed and group where	
data group where	
collected. aggressive use of statins	
may have	
Good/         Krakow,         RCT         To compare         1109         Outpatient         Baseline         Type 2 LIP	Patient
BD., &the LINDAdiabetess in centersand 1 yearpatients	education had
Feulner- (living, patients. with achieved	a limited
krakow, interactive, 374 type 2 ambulant lower HgA1c	effect on
G. (2007). new, non-insulin treatment mean of	knowledge
LINDA: distinguished, dependent. only in 6.2% and a	and self-
Theactivating)449 type 2Munich,reduction of	reported self-
diabetes with a insulin Germany BMI of 0.8	management
self- standard treated. 286 kg/m2. The	behavior but
managem education type 1 control group	a significant
ent program. diabetes. reached a	effect on self-
training This program mean HgA1c	efficacy in
programm has 4 basic 7% and	patients with
e for modules showed an	type 2
people covering increase in	diabetes
with type nutrition, BMI of 0.7	
1 or type blood glucose kg/m2.	
2 diabetes. monitoring, Mean blood	
<i>European</i> medication, pressure	
Diabetes         hypoglycemia         improved	
Nursing, , HgA1c, from 145/85	
4(3), 106- podiatry, to 134/80in	
112. micro and LIP patients	
Germany macro and 138/79	
vascular long in control	
term group.	
consequence, Triglyceride	
hypertension, and	
weight cholesterol	
reduction, levels	
and sports.	
Modules 5 both groups.	
and 6 pertain For type 2	
to insulin.	
Module 7 is mean HgA1c	
gestational fell to 6.8% in	

r	r	1		[	r	r		1
			diabetes.				the LIP and	
							control group	
							was 7.4%. A	
							quality of life	
							questionnaire	
							showed	
							improvement	
							s from 20%	
							to 80% in	
							people who	
							used the LIP	
Good/	Kulzer,	RCT	Didactic	193 patient	Patients	3 and 15	Mean HgA1c	In middle
В	В.,		oriented	with type 2	living in	months	and FBG	aged adults
	Hermanns		group	diabetes	Wurzburg,		were reduced	with type 2
	, N., &		intervention		Germany		more in the	diabetes, a
	Reinecker		(4-90minute		-		self-	group self-
	, H.		sessions)				management	management
	(2007). A		focusing on				group than in	approach to
	self-		acquisition of				the didactic	patient
	managem		knowledge,				group, but	education was
	ent		skills, and				the self-	more
	approach		information				management	effective than
	to patient		about				and self-	a group
	education		treatment of				management	didactic
	for type 2		diabetes; self-				individual	approach.
	diabetes		management				groups did	Providing
	was more		oriented				not differ.	some of the
	effective		group				Groups did	self-
	than a		intervention				not differ for	management
	didactic		(12-90minute				improvement	intervention
	approach.		sessions)				in BMI,	as individual
	Diabetes		focusing on				diabetes	sessions did
	Medicine,		emotional,				knowledge,	not provide
	24, 415-		cognitive, and				and	any
	423.		motivational				frequency of	advantage
	Germany		processes of				glucose	over all group
			behavior				monitoring.	sessions.
			change; and				The self-	5055101151
			self-				management	
			management				group	
			oriented				showed more	
			individual				improvement	
			intervention				than the	
			(6-individual				didactic	
			and 6-group				group in	
			sessions) with				psychologica	
			the same				l	
			content as the				determinants	
			second group.				of eating,	
			The				anxiety, and	
			interventions				frequency of	
			were				exercise; the	
			conducted by				2 self-	
			4-trained				management	
			health				groups did	
			psychologist.				not differ for	
			psychologist.				these	
							outcomes.	
Good/	Lee, T. I.,	Quasi-	Both received	274	Outpatient	3,6,9, and	Standard	The POEM
0000/	Lee, 1. I.,	Quasi-	Dom received	2/4	Outpatient	3,0,9, and	Stanuaru	THEFUEN

		-	r					ı
А	Yeh, Y.	experime	treatment	participants1	visiting the	12 months	Deviations	system can
	T., Liu, C.	ntal	based on	34 in	Metabolis		are listed for	help patients
	Т., &		same	intervention	m Center		testing. I:C.	control their
	Chen, P.		guidelines,	group (57%			1=1 <sup>st</sup> follow	glucose,
	L. (2006).		the	male 43%			up, 2=2 <sup>nd</sup>	HbA1c and
	Developm		intervention	female).			follow up,	total
	ent and		group	140 in			$3=3^{rd}$ follow	cholesterol
	evaluation		received	control			up. Fasting	levels to
	of a		access to	group			Blood Sugar-	manage their
	patient-		POEM	(46%male			1-	diabetes,
	oriented		(patient	and 54%			47.47:43.46;	providing an
	education		oriented	female).			2-	easy and
	system for		diabetic	Both			47.67:42.37;	inexpensive
	diabetes		education	received			3-	way to extend
	managem		management	treatment			45.52;41.44.	hospital-
	ent.		system). Lab	based on			HgA1c-1-	based patient
	Internatio		test results	same			2.16:1.49;2-	education
	nal		including	guidelines,			2.14:1.49;3-	services for
	Journal of		fasting blood	the			2.12:1.65.Tot	community-
	Medical		glucose,	intervention			al	based
	Informatic		HbA1c, total	group			Cholesterol-	continuous
	s, 76(9),		cholesterol,	received			130.25:37.36	education
	s, 70(9), 655-663.		triglyceride	access to				cuucation
	Taiwan		and HDL	POEM			, 229.57:39.41	
	Tarwali		were tested	IOLM			; 3-	
			from the first				; 5- 29.047:40.59	
							29.047:40.59 7.	
			visit through					
			each follow				Triglyceride- 1-	
			up at 3,6,9				-	
			and 12				58.58:64.63;	
			months				2-	
							58.59:64.65;	
							3-	
							58.50:64.67.	
							HDL-1-	
							14.02:11.82;	
							2-	
							14.07:11.57;	
							14.03:11.66.	
							Follow Up-	
							1-A	
							significant	
							difference in	
							fasting blood	
							glucose	
							levels. 2 <sup>nd</sup> -	
							fbg and	
							HgA1c were	
							significantly	
							different. 3-	
							Signifcant	
							difference in	
							fasting blood	
							glucose,	
							HgA1c and	
							total	
							cholesterol	

Ecin/A	Mallhaun	DCT	In the	08 patients	Dotionts -+	Dage 2	Disease	Diabatas
Fair/A	McIlhenn	RCT	In the	98 patients	Patients at	Base, 3	Disease	Diabetes
	y, C. V.,		intervention	48	two rural	and 6	knowledge	knowledge
	Guzic, B.		group that	intervention	medical	months	and self-	and self-
	L., Knee,		received	group	clinics		blood	blood glucose
	D. R.,		regularly	50 control			glucose	monitoring
	Demuth,		scheduled;	group			monitoring	improved
	B. R., &		one-on-one				improved	with one-on-
	Roberts, J.		individualize				with one-on-	one
	B. (2011).		d diabetes				one	education.
	Using		related health				education.	High attrition
	technolog		education and				Demographic	and a short
	y to		hands on				and baseline	study period
	deliver		instruction				scores were	were
	healthcare		how to use an				similar	limitations of
	education		internet portal				between	this study.
	to rural		by a nurse				groups. At 6	The
	patients.		educator.				months, the	researchers
	Rural and		Control				intervention	speculate that
	Remote		patients in the				group	the age of the
	Health,		second clinic				showed	participants
	<i>11</i> (1798),		were given				significant	and low
	1-11.		pamphlet				increase in	internet
	USA		describing				disease	penetration
			how to access				knowledge	affected
			the portal.				and self-	satisfaction
			uie portai.				blood	scores.
			All				glucose	300103.
			participants				monitoring	
			completed				behavior.	
			baseline and				There were	
			post studies.				no	
			Disease				differences in	
			knowledge				QOL	
			and problem				between the	
			areas in				groups at 6	
			diabetes were				months.	
			measured.				Participants	
			All				in the	
			participants				intervention	
			completed a				group were	
			behavior				highly	
			modifications				satisfied with	
			survey post				the educator,	
			study.				but not the	
			A satisfaction				internet as a	
			survey was				resource	
			completed.					
			Serum					
			glucose,					
			HgA1c, and					
			lipids were					
			reviewed					
Good/	McLough	Randomi	Subjects were	94 patients	Patients in	Baseline	Significant	Nurse led
В	ney, C. R.,	zed	placed into	with	clinic	and 1 year	reduction in	clinics can
	Khan, A.,	Prospecti	groups where	diagnosis of	between	<b>J</b> • • •	systolic	effectively
	& Ahmed,	ve Study	the focus was	type 2	April 2003		blood	improve CV
	A. B.		learning and	diabetes	and March		pressure (167	risk factors,
	(2007).		controlling		2004		$\pm 12$ versus	hypertension
	Effectiven		the secondary				132 versus	and
	ess of a		issues of				<u>+</u> 8mmHg,	hyperlipidemi
L	C35 01 a		155005 01	I	I	I	<u> </u>	nypempluenii

	specialist		hyportension		[		n < 0.001 and	a lavals
	specialist		hypertension				p<0.001) and	a levels.
	nurse-led		or				diastolic BP	
	interventi		hyperlipidemi				(85 <u>+</u> 9 versus	
	on clinic		a by a nurse-				70 <u>+</u> 7 mmHg,	
	in the		led, protocol				p<0.001).	
	managem		driven, doctor				92%	
	ent of		supervised				achieved	
	cardiovasc		clinic				target BP.	
	ular risk						Those treated	
	factors in						for	
	diabetes.						hyperlipidem	
	European						ia (6.0+1.2	
	Diabetes						versus	
	Nursing,						3.9+0.7	
	4(3), 100-						mmol/l,	
	105. UK						p<0.001) and	
							triglycerides	
							(4.2 <u>+</u> 0.8	
							versus	
							2.4 <u>+</u> 1.2mmol	
							/l, p<0.001)	
							significantly	
							improved.	
							91% of	
							patient	
							achieved	
							target lipid	
							levels. The	
							mean HbA1c	
							level also	
							improved	
							(8.5 <u>+</u> 1.5	
							versus	
							7.4 <u>+</u> 1.5%,	
							p<0.01) and	
							45%	
							achieved	
							target	
							glycemic	
							control.	
Good/	McMahon	RCT	All	104 patients	Patients	Baseline,	Patients	Web-based
B	, G. T.,		participants	52 in	with	3, 6, 9 and	receiving	care
-	Gomes,		completed a	Control	diabetes	12 months	web-based	management
	H. E.,		diabetes	group	and HgA1c	12 11011113	care	may be a
	Hickson-		education	52 in	>=9.0%		management	useful adjunct
			class and		>=9.0% who		had lower	in the care of
	Hohne, S.,			intervention				
	Hu, T. M.,		were	group	received		A1c over 12	patients with
	Levine, B.		randomized		their care		months when	poorly
	A., &		to continue		at a		compared	controlled
	Conlin, P.		with their		Departmen		with	diabetes
	A. (2005).		usual care or		t of		education	
	Web-		receive web-		Veterans		and usual	
	based care		based care		Affairs		care.	
	managem		management.		medical		Persistent	
	ent in		The web-		center		website users	
	patients		based group		were		had greater	
	with		received a		recruited.		improvement	
	poorly		notebook		iceration.		in A1c when	
	controlled		computer,				compared	
	diabetes.		glucose and				with	
	utabetes.	I	giucose anu	I	I	I	witti	

<i>Diabetes</i> blood	intermittent	
Care, pressure	users or	
28(7), monitoring	education	
1624- devices, and	and usual	
1629. access to a	care. A	
USA care	larger	
management	number of	
website. The	website data	
website	uploads was	
provided	associated	
•		
educational	with a larger	
modules,	decline in	
accepted	A1c.	
uploads from	Hypertensive	
monitoring	participants	
devices, and	in the web-	
had an	based group	
internal	had a greater	
messaging	reduction in	
system for	systolic	
patients to	blood	
communicate	pressure.	
with the care	HDL	
manager	cholesterol	
manager	rose and	
	triglycerides	
	fell in the	
	web-based	
	group	
Fair/ANew, N.QuasiFocus group20Participant	There were	A co-created
(2010). experime was used to participants s were	no significant	teaching
Teaching ntal develop and in each from the	differences	approach
so they evaluate the group delta	found	better meets
hear: Pilot co-created region of	between the	the learning
Using a study; diabetes self- Arkansas,	focus group	needs of
co-created pre/post management which	that	adults with
diabetes interview education contains	developed	type 2
self- intervention. seven of	the	diabetes and
managem The nine	intervention	results in
ent intervention counties	with	enhances
education phase was a with a	participants	ability to
approach. quasi diabetes	who created	perform the
<i>Journal of</i> experimental prevalence	the sessions	self-care
the design with of 11%-	and the	activities
American pre and post 12.6%.	control	required for
Academy intervention Forrest	groups with	successful
of Nurse data City	regard to	diabetes
Practition         collection for         Arkansas	knowledge,	control.
ers, 22, diabetes was actual	adaptation	Better
316-325. knowledge, site.	and program	diabetes
USA self- Diabetes	satisfaction.	control
management education	Diabetes	reduces visits
activities, and centers in	self-care	to monitor
adaptation. Jonesboro	activities	and treat
The and west	significantly	complication
intervention Memphis,	improved	and the need
group was Arkansas	(p=.02) for	for repetitive
	-	
compared to a were the	the	educational
	-	

			diabetes who received the usual DSME education offered by local hospitals.					party pay limits and extend the time needed for patient encounters.
Fair/A	Noh, J. H., Cho, Y. J., Nam, H. W., Kim, D. J., Yoo, H. S.,Woo, M. h (2010). Web- based comprehe nsive informatio n system for self- managem ent of diabetes mellitus. <i>Diabetes</i> <i>Technolog</i> <i>y &amp;</i> <i>Therapeut</i> <i>ics</i> , 12(5), 333-337. Korea	RCT	Evaluate the effect of a web-based comprehensiv e information system, consisting of Internet and cellular phone use, on blood glucose monitoring Intervention patients received training in eMOD usage and logged into the system whenever it was convenient for them. The control group received diabetes educational books with similar contents	40 patients Age 18-80; type 2 diabetes and A1c between 7- 10 with stable control. Randomly assigned to intervention group (20) or Control group (20).	Outpatient department from 5 hospitals	Base and 6 months	Significant decrease in A1c in intervention group but not in the control group. There was a relationship between the change in A1C and frequency of access to the eMOD system by computer and cellular phone	Significant HgA1c was improved by a web-based intervention not only via computer but also via cellular phone at 6 months post initiation in patients with type 2 diabetes. These results indicate that the use of a convenient web-based education system could be more effective for glycemic control than traditional education for diabetes patients.
Good/ A	Reed, R. L., Revel, A. D., Carter, A. O., Hussein, F. S., & Dunn, E. V. (2005). A controlled before- after trial of structured diabetes care in primary health centres in	Controlle d before and after trial	Outcomes and adherence to guidelines were measured over the year before the intervention began and for a second one year period at the end of the intervention period. Structured diabetes care, including the development of general	738 participants	9 Primary Health Centers in the United Arab Emirates.	One year prior to interventio n and one year after interventio n	Three outcomes variables were compared. Total cholesterol measurement s in the intervention clinics (- 12.0mg/dl) compared with the control clinics (+8.3 mg/dl). The rate of measuring HbA1c was	The intervention described in this study demonstrated an improvement in some process of care measures suggesting an impact of this type of delivery model in the environment

				1		1	0	
	a newly		practice				too low to	
	developed		diabetes				determine	
	country.		clinics, a				whether any	
	Internatio		patient				changes were	
	nal		education				made in this	
	Journal		program, a				parameter.	
	for		health care				Fasting	
	Quality in		professional				glucose did	
	Health		education				improve in	
	Care,		program, and				the	
	17(4),		improved				intervention	
	281-286.		recording of				clinics (-	
	United		clinical				0.7 mg/dl	
	Arab		information				when	
	Emirates		was provided				compared	
	Limates		for the 33				with the	
			month time				control	
			period.				clinics	
			periou.				(+4.8mg/dl)	
							although this	
							was not	
							statistically	
							significant.	
							Mean blood	
							pressure	
							worsened in	
							the	
							intervention	
							clinics	
							(+2.7mm	
							Hg) when	
							compared	
							with the	
							intervention	
							clinics (-1.4	
							mm Hg) and	
							this	
							difference	
							was	
							statistically	
							significant).	
Good/	Selea, A.,	RCT	In all patients	364 patients	From 3	Baseline,	There was a	Education
A	Sumarac-		fasting	with	regional	3, 6, and	significant	with printed
	dumanovi		plasma	diabetes	health	18 months	improvement	material led
	c, M.,		glucose and	5.40000	centers in	10 11011010	in HgA1c	to
	Pesic, M.,		HgA1c were		Serbia		levels after 3	improvement
	Suluburic,		measured and		Seroiu		months	s in glycemic
	D.,		subsequently				(8.00+1.66%	control and
	D., Stamenko		the patients				(8.00 <u>+</u> 1.00%) VS	level of DM
	vic-		fulfilled the				$9.06 \pm 2.23\%$ ,	knowledge in
	pejkovic,		questionnaire.				p<0.00+2.23%, p<0.01) and	our patients.
	D., Cuiliania		At the end of the visit the				after 6	Education
	Cvijovic,						months	with printed
	G., &		patients were				(7.67 <u>+</u> 1.75%	material may
	Micic, D.		given the				VS	be a useful
	(2011).		printed				9.06 <u>+</u> 2.23%,	adjunct to
	The		material				p<0.01).	DM treatment
	effects of		"Healthy				There was no	and should be
	education		lifestyle with				further	structured
	with		diabetes type				improvement	according to
	with		diabetes type					according to

	and the t		o?? TI				:	41
	printed		2". The same				in HgA1c	the treatment
	material		procedure				levels after	modality.
	on		was repeated				18 months	
	glycemic		after 3,6 and				(7.88 <u>+</u> 1.46%	
	control in		18 months				VS	
	patients		(printed				7.67 <u>+</u> 1.75%)	
	with		material was				, p>0.05).	
	diabetes		only given at				There was a	
	type 2		first office				significant	
	treated		visit). BMI				improvement	
	with		was obtained.				in the	
	different		Questionnaire				average test	
	therapeuti		s were				score after	
	c		regarding				three months	
	regimens.		diabetes				(64.6% vs	
	Military		knowledge,				55.6%,	
	Medical		diabetes				p<0.01).	
	å		empowermen				There were	
	Q Pharmace		t, and attitude				no further	
	utical		toward				statistically	
	Journal of		diabetes.				significant	
	Serbia &		diabetes.				changes in	
	Monteneg						the general	
	ro, 68(8),						level of DM	
	676-683.						knowledge	
	Serbia						after 6	
	Serbia							
							months	
							(65.0 <u>+</u> 32.5%	
							VS	
							64.5 <u>+</u> 33.7%,	
							p>0.005) and	
							after 18	
							months	
							(64.8% <u>+</u> 32.7	
							VS	
							64.5 <u>+</u> 33.7%,	
							p>0.005).	
							There was a	
							significant	
							difference in	
							education	
							intervention	
							response in	
							DM type 2	
							patients on	
							different	
							therapeutic	
							regimens.	
Good/	Sevick,	RCT	Participants	296-	Patients	Baseline, 3	HgA1c was	Two
B	M. A.,	-	in both	completed 3	treated on	and 6	reduced in	behavioral
_	Korytkow		groups	months.	campus of	months	the	approaches to
	ski, M.,		received	246	university		intervention	improving
	Stone, R.		training in	completed 6	of		group by	general
	A.,		use of a study	months.	Pittsburgh		0.5% at 3	lifestyle
	A., Piraino,		provided	monuis.	medical		months and	management
	B., Ren,		glucose meter		Center.		0.6% at 6	in individuals
	D., &		and sufficient		Self-		months	with type 2
	D., & Sereika,		supplies to		referred		(p<0.001 for	diabetes
	Serenka, S.,Burke				reichteu		-	mellitus were
			perform <u>&gt;</u>				each), and	effective in
	, L. e		measurement			I	the control	effective in

				1	1			
	(2012).		per day. All				group by	improving
	Biophysio		participants				0.3%	glycemic
	logic		also were				(p<0.001) at	control, but
	outcomes		given				3 months and	no significant
	of the		pedometer				0.2%	between
	enhancing		with				(p<0.05) at 6	group
	adherence		instructions				months; but	differences
	in type 2		for use and a				between	were
	diabetes		target level of				group	observed.
	(ENHAN		physical				differences	
	CE) trial.		activity of				were not	
	Journal of		10,000 steps				significant.	
	the		per day.				In those with	
	Academy		Intervention				baseline	
	of		group was				HgA1c <u>&gt;</u> 8%	
	Nutrition		exposed to				and	
	and		group				estimated	
	Dietetics,		counseling				glomerular	
	112(8),		sessions				filtration rate	
	1147-		guided by the				<u>&gt;60 mL/min,</u>	
	1157.		Social				HgA1c was	
	USA		Cognitive				reduced in	
			Theory and				the	
			given a palm				intervention	
			pilot with a				group by	
			dietary self-				1.5% at 3	
			monitoring				months and	
			program.				1.8% at 6	
			Intervention				months; but	
			group				between	
			sessions were				group	
			held weekly				differences	
			during				were not	
			months 1 and				significant.	
			2 and				In random	
			biweekly				intercept	
			during				models, the	
			months 3 and				estimated	
			4 and				reduction in	
			monthly				HgA1c of	
			during				0.29% was	
			months 5 and				not	
Enic/A	Similar	Dilat	6. Dhasa I	20 motionts	I Inizyan-ita	Deceline	significant.	Implant
Fair/A	Siminerio,	Pilot	Phase I-	29 patients	University	Baseline	Provider	Implementing
	L. M., Piatt, G.,	Study Pre/post	Extensive chart review	Six primary care	of Pittsburgh	and 12 months	adherence to ADA	systems to support
	& Zgibor,	interventi	as the	providers: 4	medical	monuis	Standards of	decision
	J. C.		as the baseline	providers: 4 physicians,	Center		Care	support, self-
	J. C. (2005).	on	measurement.	1 nurse	Center		increased	management
	(2003). Implemen		Phase II-	practitioner,			significantly	education,
	ting the		Included	1			across all	and delivery
	chronic		provider and	physician's			process	system
	care		patient	assistant			measures.	redesign has a
	model for		education	assistant			Patient who	positive
	improvem		provided by				received	influence on
	ents in		CDE. Phase				DSME at	practices and
	diabetes		III-Repeat				point of	patient
	care and		chart review				service in the	outcomes in
	education		with post-				primary care	outlying rural
	in a rural		intervention				practice	communities.
l	marutai	1	mer vention	I	1	1	practice	communities.

r	1 .	1	1	1	1	1		,
	primary		measures.				setting	
	care						gained	
	practice.						improvement	
	The						in	
	Diabetes						knowledge,	
	Educator,						empowermen	
	(31), 225-						t, A1C, and	
	234.						high-density	
	USA						lipoprotein	
							cholesterol	
							levels. There	
							was an	
							improvement	
							in A1c >7	
							(40.7% verse	
							39.5%) and	
							LDL >100	
							mg/dL	
							(58.8% verse	
							50%) but a	
							worsening in	
							blood	
							pressure	
							control	
							(75.6% verse	
							82.1%). All	
							changes in	
							clinical	
							values were	
							non-	
							significant.	
Good/	Siminerio,	RCT	A nurse who	Patients with	Four	Baseline	Of the 5344	Providing
B	L. M.,	Rei	was a	diabetes:	Communit	(January	diabetes	DSME in
D	Ruppert,	Pre and	certified	Suburban	y Medical	(January 2003)	patients in	primary care
	Kuppert, K.,		diabetes	practice		through	the four	is feasible
		post test			primary			
	Emerson,		educator was	(857+2055)	care	December	practices,	and offers the
	S.,		deployed to	= 2912.	practices, 2	2006	784 received	opportunity to
	Solano, F.		provide point	Urban	urban		point of	reach patients
	X., &		of service	practice	academic		service	who may not
	Piatt, G.		diabetes	(624+1808)	medical		diabetes	be receiving
	A. (2008).		education	=2432.	center and		education	DSME
	Delivering		(POSE) to		2 suburban		(POSE).	services.
	Diabetes		four		practices.		Mean HgA1c	However,
	Self-		University of		-		values were	further
	Managem		Pittsburgh				higher at	research is
	ent		Medical				baseline in	needed to
	Education		Center				those patients	evaluate other
	(DSME)		Community				who received	methodologie
	in primary		Medicine				POSE than	s to increase
	· ·							
	care.		Practices				those who	access to
	Disease		primary care				received	DSME and
	Managem		practices.				usual care.	other factors
	ent Health		The group of				There was a	that my
	Outcomes,		patients who				significant	influence
	16(4),		received				decrease in	improvement
	267-272.		POSE was				HgA1c and	in clinical
	201-212.	1			1		LDL-c levels	
	USA		compared				LDL-C IEVEIS	outcomes.
			compared with patient					outcomes.
			with patient				in both	outcomes.
								outcomes.

			practices who were identified as having diabetes and who received usual care. The number of patients				there was not a significant between- group difference in HgA1c, those who received POSE had	
			was computed and a percentage calculated for comparison against <i>Healthy</i> <i>People 2010</i> goals. The HgA1c				significant improvement in LDL-C levels compared with the usual care group.	
			values of patients were tracked from January 2003 through December 2006, during the timeframe that POSE was provided.					
Good/ A	Song, M., & Kim, H. (2007). Effect of the diabetes outpatient intensive managem ent programm e on glycaemic control for type 2 diabetic patients. <i>Journal of</i> <i>Clinical</i> <i>Nursing</i> , <i>16</i> , 1367- 1373. Korea	Pre/post control group design test	The intervention group was provided with Diabetes outpatient intensive management program (DOIMP), which received multidisciplin ary diabetes education, complication monitoring and telephone counseling during 12 weeks. Participants in the control group received a brief conventional description of diabetes mellitus and were	25 patients in the intervention group. 24 patients in the control group.	Participant s were recruited from the university affiliated diabetes center of St Vincent's Hospital between September 2004 and January 2005.	Baseline and 3 months	Patients in the intervention group had a mean decrease of 2.3%, which those in the control group having a mean decrease 0.4% in HgA1c. There was no difference between the two groups in FBG and two hour post- prandial. The proportion of the patients with HgA1c < 7% was higher in the intervention group.	Diabetes outpatient intensive management can reduce HgA1c in type 2 patients.

	1			1	1	1		,
			instructed to undertake					
			medical					
			nutrition					
			therapy by a					
			diabetic					
			education					
			nurse.					
			Regular					
			physical					
			activity was					
			recommended					
			and followed					
			up on an					
			outpatient					
			basis with					
			causal					
			medical care					
			at regular					
			intervals.					
Fair/B	Song, M.,	Quasi	Participants	31	Patient	Baseline, 6	The	The study
	Choe, M.,	experime	in the web	participants.	with	weeks and	characteristic	indicated that
	Kim, K.	ntal	group	15 in	diabetes	3 months	s of both	a web-based
	S., Yi, M.	investigat	(intervention)	intervention	treated in		groups were	diabetes self-
	S., Lee, I.,	ion with	took part in a	group and	the		the same;	management
	& Kim,	non-	web-based	16 in control	university-		The level of	education
	J.,Shim,	equivalen	diabetes self-	group.	affiliated,		knowledge	program has
	Y. s	t control	management	Initially 31	tertiary		increased in	potential as
	(2009).	group,	education	intervention	care		both groups	an effective
	An	pre	program,	and 29	hospital		in 6 weeks	alternative to
	evaluation	test/post	while those in	control but	from		but not 3	group lecture
	of web-	test	the lecture	decreased	March to		months.	education in
	based	design	group	due to drop	December 2006.		There was	terms of
	education		(control) attended the	out	2006.		significant diabetic care	improving diabetes care
	as an		diabetes				behavior in 6	
	alternative to group		education				weeks, but	knowledge, improve
	lectures		lectures				only in the	diabetes care
	for		provided by				web-based	behavior and
	diabetes		healthcare				group at 3	improving
	self-		professionals				months.	physiological
	managem		specializing				There was a	variables,
	ent.		in diabetes				significant	HbA1c and
	Nursing		care. They				increase in	FBG
	and		attended 1				diabetes care	
	Health		hour lectures				behavior;	
	Sciences,		every week				there were no	
	11, 277-		for three				changes in	
	284.		consecutive				fasting blood	
	Korea		weeks. The				glucose	
			lectures in the				levels.	
			first, second,					
			and third					
			weeks were					
			provided by a					
			diabetes care					
			specialist					
			nurse, a					
			dietician and					
			a physician.	I			I	<u> </u> ]

Good/	Sturt, J.	Cluster	The	245 adults	48 Urban	Outcomes	There was no	The Diabetes
A	A.,	randomiz	intervention	with Type 2	general	were	significant	Manual
л	Whitlock,	ed,	group was	diabetes	practices in	assess at	difference in	achieved a
	S., Fox,	controlle	given	with a mean	the West	baseline	HbA1c,	small
	С.,	d trial	immediate	age of 62	Midlands,	and at 26	between the	improvement
	Hearnsha	a titui	education by	years old.	UK with	weeks	intervention	in patient
	w, H.,		an educated	years ora.	high	weeks	group and	diabetes-
	Farmert,		practice		population		the control	related
	A. J.,		nurse,		deprivation		group (-	distress and
	Wakelin,		consisting of		levels.		.08%, 95%	confidence to
	M.,Dale,		a 15 minute				CI28, .11).	self-care over
	J. (2008).		face to face				Diabetes	26 weeks,
	Psycholog		consultation				related	without a
	ical issues		to introduce				distress	change in
	and		the 12 week				scores were	glycemic
	education		diabetes				lower in the	control.
	effects of		Manual				intervention	Further study
	the		program.				group	is needed to
	diabetes		Phone				compared	optimize the
	manual		support was				with the	intervention
	1:1		provided in				control group	and
	structured		weeks 1,5				(difference -	characterize
	education		and 11.				4.5, 95% CI -	those for
	in primary		The deferred				*.1, -1.0).	whom it is
	care.		intervention				Confidence	more
	Diabetic		group had				to self-care	clinically and
	Medicine,		routine care				scores were	psychological
	25,722-		and after 26				11.2 point	ly effective to
	731. UK		weeks of				higher (95%	support used
			collecting				CI 4.4, 18.0)	in primary
			data, this				in the	care
			group was introduced to				intervention	
			the Diabetes				group compared	
			Manual				with the	
			program				control	
			program				group.	
Good/	Van	RCT	Patients were	191	29 general	Baseline, 8	No	Positive
A	Sluljsesth	KC1	invited to	Intervention	practices	weeks, 6	significant	effects on
	er, E. M.,		speak with	205	throughout	months	intervention	physical
	Van		their provider	Controlled	Netherland	and 1 year	effect over	activity level
	Poppel, N.		at baseline for	controlled	s. Each	una i jeur	time was	and body
	M.,		a 10 minute		general		observed on	weight were
	Twisk, J.		consultations,		practitione		physical	observed, but
	W., Paw,		irrespective		r identified		activity level	the PACE
	M. J.,		of		a target		or stage of	intervention
	Calfas, K.		randomizatio		population		change for	was not more
	J., & Van		n. In addition		on the		regular	effective than
	Mechelen,		to discussing		basis of the		physical	the standard
	W.		diabetes, the		inclusion		activity, and	physical
	(2005).		provider		criteria and		an inverse	activity
	Effect of a		offered		the		intervention	advice.
	tailored		advice to the		research		effect was	
	physical		patient about		team		observed for	
	activity		becoming		randomize		waist	
	interventi		more		d them		circumferenc	
	on		physically				e. The study	
	delivered		active. The				population as	
	in general		provider used				a whole	
	practice		the PACE				exhibited a	

		1	(1		1	1	· · · · ·	
	settings:		(physician				significant	
	Results of		based				increase in	
	а		assessment				physical	
	randomize		and				activity and	
	d		counseling				borderline	
	controlled		for exercise)				significant	
	trial.		program.				decrease in	
	American						body weight	
	Journal of						at the 1 year	
	Public						follow up.	
	Health,							
	95(10),							
	1825-							
	1830.							
	Netherlan							
	ds							
Good/	Wu, S. V.,	RCT	Participants	145 patients.	Patients	Baseline, 3	The scores	This study
А	Lee, M.		were	72-	were	and 6	for the	revealed that
	C., Liang,		pretested to	intervention	treated at	months	efficacy	a self-efficacy
	S. Y., Lu,		establish a	73-control	an		expectations,	program for
	Y. Y.,		baseline and		outpatient		outcome	diabetes was
	Wang, T.		then post-		clinic of a		expectations,	acceptable
	J., &		tests were		municipal		and self-care	and effective
	Tung, H.		undertaken 3		hospital.		activities had	in the short
	H. (2011).		and 6 months				significantly	term in the
	Effectiven		after the				increased in	self-
	ess of a		baseline data				the	management
	self-		were				intervention	of persons
	efficacy		collected.				group at the	with type 2
	program		The				3 and 6	diabetes.
	for		participants				months	
	persons		in the				follow-ups,	
	with		intervention				when	
	diabetes:		group				compared to	
	А		received the				those of the	
	randomize		standard				control	
	d		diabetes				group. A	
	controlled		education				smaller	
	trial.		program and				proportion of	
	Nursing		an additional				the	
	and		self-efficacy				participants	
	Health		program				in the	
	Sciences,		(Self-Efficacy				intervention	
	13, 335-		Enhancing				group had	
	343.		Intervention				been	
	Taiwan		Program-				hospitalized	
			SEEIP)				or had visited	
							and	
							emergency	
							room than in	
							the control	
							group at the	
							6 month	
							follow-up.	
Good/	Yukawa,	RCT	Evaluation of	128	Participant	Baseline, 3	The findings	These finding
Α	К.,		the Chronic	participants	s were	and 6	indicated	suggest that
	Yamazaki		Disease Self-	with	recruited	months	statistically	the CDSP can
	, Y.,		management	diabetes	from 18		significant	be effective
	Yonekura,		Program by		Chronic		positive	for Japanese
	Y.,		comparing		Disease		changes in	people with
L		•				1		1

· · · · ·								
	Togari, T.,		changes in		Self-		health	chronic
	Abbott,		health		manageme		distress,	conditions.
	F., &		outcomes.		nt Program		coping with	
	Homma,		The program		workshops		symptoms,	
	M.,Kaga		is a patient				stretching	
	wa, Y.		centered				exercises,	
	(2010).		educational				communicati	
	Effectiven		program for				on with the	
	ess of		the self-					
							physician,	
	chronic		management				and	
	disease		of chronic				satisfaction	
	self-		conditions				with daily	
	managem		delivered by				living. The	
	ent		one of 18				positive	
	program		workshops.				changes were	
	in Japan:		The health				especially	
	Preliminar		outcomes that				remarkable	
	y report of		were				among the	
	a a report of		measured				groups with	
							diabetes and	
	longitudin		included					
	al study.		health status,				rheumatic	
	Nursing		self-				disease.	
	and		management					
	Health		behaviors,					
	Sciences,		utilization of					
	12,456-		health					
	463. Japan		services, self-					
	105. Jupun		efficacy,					
			satisfaction					
			with daily					
			living, and					
			clinical					
			indicators.					
Fair/A	Zyskind,	RCT	Both received	108	Large	3,6 and 9	The	The study
	A., Jones,		standard of	participants	urban	months	intervention	allowed
	K. C.,		care diabetes	58 in	community		group had a	patients with
	Pomerantz		treatment.	intervention	health		small decline	low-literacy
	, K. L., &		The	group	center with		in HgA1c	levels to
	Barker, A.		intervention	50 in the	Spanish		(-0.3%) and	receive health
	L. (2009).			control	speaking		(-0.5%) and LDL	information
	· /		group					
	Exploring		received	group	patients.		(-9.9mg/dl).	targeted for
	the use of		additional				-	their
	computer		computer				The control	comprehensio
	based		based				group had a	n. The study
	patient		diabetes				small	found a
	education		education in				increase in	downward
	resources		either English				HgA1c	trend in both
	to enable		or Spanish				(+0.1%) and	HgA1c and
	diabetic		from the				LDL	LDL. Due to
	patients		Medline-				(+0.5mg/dl)	small size the
	from						(+0.5mg/ui)	differences
	underserv		Plus.gov					
			website					were not
								statistically
	ed							
	ed population							significant.
	ed							significant. This study
	ed population							
	ed population s to self-							This study supports the
	ed population s to self- manage their							This study supports the theory that
	ed population s to self- manage their disease.							This study supports the theory that computer
	ed population s to self- manage their							This study supports the theory that

	& Use, 9, 29-				positively impact
43	3.USA				clinical
					outcomes.

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