

Appendix A

Evaluation Table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use in Practice/Application to Practice
Bell, A. M., Fonda, S. J., Walker, S., Schmidt, V., & Vigersky, R. A. (2012). Mobile phone-based video messages for diabetes self-care support. <i>Journal of Diabetes Science and Technology</i> , 6(2), 310-319. USA F-Dept Defense	N.S.	Design: RCT Purpose: Determine if daily video messages of tips on diabetes management and life-style support improves glycemic control.	n = 65 Inclusion Criteria 18+years, care from NP at least 6 months, A1C>8% Exclusion Criteria Pregnant, lactating, planning to become pregnant, using glucocorticoids, amphetamines, anabolic or weight reducing agents. Setting 1 HCF	Dependent HbA1c, BP, SMBG data Independent IVG -SP Video C- UT	Baseline, 3, 6, 9, 12 months HbA1c BP SMBG data #videos viewed	t-test chi-square using SAS	Δ base IVG HbA1c = 1.2%, 1.1%, 1.2%, 1.3% Δ base C HbA1c= 0.4%, 1.1%, 1.1%, 0.9% Δ base at 3 months was SS (p=0.02) between the groups for HbA1c favoring IVG	Challenge would be to record daily video tips, not likely a sustainable model.
Franzetta, D., Willet, K., & Fairchild, R. (2012). A systematic review of smartphone application use for type 2 diabetic patients. <i>Online Journal of Nursing Informatics</i> USA F-Lilly Endowment Fund	N.S.	Design: SR Purpose: Evaluate smartphone technology for management of patients w/ DM2	n = 11 RCT = 7 Descriptive = 4 Inclusion Criteria RCT, DM2, age>18, cell phone intervention, HbA1c	Dependent HbA1c Independent Cell phone intervention	HbA1c	Variable by study	4/6 RCT showed decrease HbA1c QS showed apps that allow true SM, providers have security concerns.	Applicable to practice. HbA1c is reduced by using SP.

Δ- change, A – Asian, AA- African American, AGR – age range, AR – attrition rate, BP – blood pressure, BMI – body mass index, C – control group, CBSA –computer based software applications
 CR – Caucasian race, CL – confidence limits, CI – confidence interval, CS – convenience sample CST – chi-squared test, CVD – cardiovascular diseases, DM1 – diabetes mellitus, type 1, DM2 – diabetes mellitus, type 2, DV- dependent variable, ESRD – end stage renal disease, F – funding, FG – female gender, G – gender, HCF – health care facility, HDL –high density lipoprotein, HRQL – health related quality of life, IBDSME – internet based diabetes self management education, IP – inpatient facilities, IV – independent variable, IVG – intervention group, LDL – low density lipoprotein, LRA – linear regression analysis, MA – mean age, MG – male gender, MHI – mean household income, MTA – meta-analysis, N – sample size (people), n – sample size (studies), NA – Native American, OR – other race, UT – usual treatment, RCT – randomized controlled trial, SM – self-management, SMS – short message service, SMSG – short message service texts generalized, SMSS – short message service texts customized, SP –smartphone, SPA – smartphone application, SR – systematic review, SS- statistically significant, SMLA – single multi-level analysis, Trigs – triglycerides, TT – t-test VM – voice message

<p>Graziano, J. A., & Gross, C. R. (2009). A randomized controlled trial of an automated telephone intervention to improve glycemic control in type 2 diabetes. <i>Advances in Nursing Science</i></p> <p>USA F- Nova Nordisk</p>	<p>Health Belief Model</p>	<p>Design: experimental pre-test-post-test design, RCT Purpose: Determine impact of daily automated telephone intervention on HbA1c</p>	<p>N = 120 IVG= 62 C = 58</p> <p>Inclusion Criteria DM2 for >12 months, age>50 years, HbA1c>7.0%, English speaking, access to cell or landline, ability to hear phone commands, responsible for own care, glucose meter w/ 3 month storage, daily SMBG routine</p> <p>Exclusion Criteria Unable to give informed consent or too ill to participate</p> <p>Setting Midwest HCF</p>	<p>Dependent HbA1c HRQL</p> <p>Independent Usual care</p> <p>Pre-recorded voice message daily</p>	<p>HbA1c HRQL #BGSM</p>	<p>2 sided TT independent sample TT Mann-Whitney U test</p> <p>Used SPSS</p>	<p>Study effect 1.0% decrease in both groups HbA1c</p>	<p>Pre-recorded VM difficult to sustain for practice, but possible. No significant reduction in HbA1c. Improvement in HRQL.</p>
<p>Hunt, C. W., & Sanderson, B. K. (2014). Support for diabetes using technology: A pilot study to improve self-management. <i>Medsurg Nursing</i></p> <p>USA F- Gatson Grindell EBP research grant</p>	<p>Self-Determination Theory</p>	<p>Design: 2 group cross-over, repeated measures, RCT Purpose: Determine if iPad DSME improves self-efficacy, increases participation in monitoring behaviors, improves HbA1c</p>	<p>N= 17 iPad Journal</p> <p>Male = 41.2% Caucasian = 76.5%</p> <p>Inclusion Criteria DM2, age>19 years, read & write English</p>	<p>Dependent HbA1c HRQL Self Monitoring</p> <p>Independent IVG -iPad C- Journaling</p>	<p>Baseline, 3 months, 6 months for crossover HbA1c HRQL</p>	<p>Descriptive statistics Mixed model analysis of variance</p>	<p>Patients had positive feedback on utilizing the application.</p> <p>HbA1c draw was not done due to site starting glycemic control of patients</p>	<p>Possibly applicable due to positive feedback on utilization. Lack of data makes it challenging to verify if HbA1c is impacted.</p>

Δ- change, A – Asian, AA- African American, AGR – age range, AR – attrition rate, BP – blood pressure, BMI – body mass index, C – control group, CBSA –computer based software applications
 CR – Caucasian race, CL – confidence limits, CI – confidence interval, CS – convenience sample CST – chi-squared test, CVD – cardiovascular diseases, DM1 – diabetes mellitus, type 1, DM2 – diabetes mellitus, type 2, DV- dependent variable, ESRD – end stage renal disease, F – funding, FG – female gender, G – gender, HCF – health care facility, HDL –high density lipoprotein, HRQL – health related quality of life, IBDSME – internet based diabetes self management education, IP – inpatient facilities, IV – independent variable, IVG – intervention group, LDL – low density lipoprotein, LRA – linear regression analysis, MA – mean age, MG – male gender, MHI – mean household income, MTA – meta-analysis, N – sample size (people), n – sample size (studies), NA – Native American, OR – other race, UT – usual treatment, RCT – randomized controlled trial, SM – self-management, SMS – short message service, SMSG – short message service texts generalized, SMSS – short message service texts customized, SP –smartphone, SPA – smartphone application, SR – systematic review, SS- statistically significant, SMLA – single multi-level analysis, Trigs – triglycerides, TT – t-test VM – voice message

Pal, K., Eastwood, S. V., Michie, S., Farmer, A. J., Barnard, M. L., Peacock, R., ... Murray, E. (2013). Computer-based diabetes self-management interventions for adults with type 2 diabetes mellitus (Cochrane Review)	N.S. (likely Lorig's self-management)	Design: SR Purpose Review using computer based interventions for DSME and reduction of HbA1C	n = 16 RCT 3578 participants mean age = 46-67 intervention time = 1-12 months Inclusion Criteria RCT, age >18, DM2, CBSA Exclusion Criteria CBSA targeting DM1, age<18	Dependent HbA1C HRQL Independent CBSA DSME UT CP	HbA1c HRQL	CST	0.2% reduction in HbA1c overall 0.5% reduction in HbA1c in trials utilizing cellular phones	Applicable to practice, SP technology shows reduction in HbA1c. Easy to implement.
Kim, H. S., & Jeong, H. S. (2006). A nurse short message service by cellular phone in type-2 diabetic patients for six months. <i>Journal of Clinical Nursing</i> , 16(6), 1082-1087. South Korea F- Alumni Research Fund, Catholic U or Korea	N.S. (possibly Health Education)	Design: RCT, control group pre-test-post-test design Purpose: To evaluate whether an Internet-based intervention using SMS by a nurse could improve HbA1c in patients with DM2.	N=51 IVG = 25 C=26 Inclusion Criteria Able to self test BG, inject insulin, own a cell phone. Exclusion Criteria Renal insufficiency w/ creatinine >1.5, using insulin pump Setting Endocrinology clinic, remote education, HCF	Dependent HbA1c FPG Independent SMS texting by nurse. UT (office visits)	Baseline, 3, 6 month HbA1c & FPG	CST TT Fisher's exact tests ANOVA	1.15% decrease in HbA1c in IVG which was SS no Δ in FPG	Applicable to practice. Portal that allows texting is in place.
Kirwan, M., Vandelanotte, C., Fenning, A., & Duncan, M. J. (2013). Diabetes self-management smartphone application for	N.S. (likely Individual and Family Self-Management)	Design: RCT Purpose: Examine the effectiveness of a freely available SP application combined with	n = 72 IVG = 36 C = 36 Inclusion Criteria DM1>6 months, age 18-65, HbA1c>7.5%, multiple daily	Dependent HbA1c HRQL Independent SP app –Glucose Buddy	HbA1c at baseline, 3, 6, 9 months HRQL	Linear mixed models analysis Type III Wald test LRA	1.1% decrease in HbA1c in IVG no difference in HRQL	Applicable to practice. Portal allows texting. May not relate as well to DM2 patients who do not use insulin.

Δ- change, A – Asian, AA- African American, AGR – age range, AR – attrition rate, BP – blood pressure, BMI – body mass index, C – control group, CBSA –computer based software applications
 CR – Caucasian race, CL – confidence limits, CI – confidence interval, CS – convenience sample CST – chi-squared test, CVD – cardiovascular diseases, DM1 – diabetes mellitus, type 1, DM2 – diabetes mellitus, type 2, DV- dependent variable, ESRD – end stage renal disease, F – funding, FG – female gender, G – gender, HCF – health care facility, HDL –high density lipoprotein, HRQL – health related quality of life, IBDSME – internet based diabetes self management education, IP – inpatient facilities, IV – independent variable, IVG – intervention group, LDL – low density lipoprotein, LRA – linear regression analysis, MA – mean age, MG – male gender, MHI – mean household income, MTA – meta-analysis, N – sample size (people), n – sample size (studies), NA – Native American, OR – other race, UT – usual treatment, RCT – randomized controlled trial, SM – self-management, SMS – short message service, SMSG – short message service texts generalized, SMSS – short message service texts customized, SP –smartphone, SPA – smartphone application, SR – systematic review, SS- statistically significant, SMLA – single multi-level analysis, Trigs – triglycerides, TT – t-test VM – voice message

adults with type 1 diabetes: Randomized controlled trial. <i>Journal of medical Internet research, 15(11),</i> New Zealand F-Central Queensland University		SMS feedback to improve glycemic control in adults with DM1	injections or insulin pump Exclusion Criteria Pregnant or already using a SP app Setting HCF, single clinic, remote education					
Noh, J. H., Cho, Y. J., Nam, H. W., Kim, J. H., Kim, D. J., Yoo, H. S., ... Yoo, M. J. (2010). Web-based comprehensive information system for self-management of diabetes mellitus. <i>Diabetes Technology & Therapeutics, 12(5), 333-337.</i> Republic of Korea F-Korean Diabetes Association	N.S. (possibly chronic care model)	Design RCT Purpose To evaluate the effect of a web-based comprehensive information system consisting of internet and cellular phone use on BG.	N= 40 IVG=20 C=20 Inclusion Criteria Age 18-80, HbA1c 7%-10%, drug naïve or prior drug therapy, stable glycemic control – no Δ in therapy for 3 months, internet access, and cellular phone Exclusion Criteria Severe medical illness- cirrhosis, ESRD, cancer.	Dependent HbA1c, BP, FPG, BMI, LDL, HDL, Trigs Independent IVG- eMOD system of online education C-diabetes education books	HbA1c, BMI, BP, FPG, LDL, HDL, Trigs at baseline, 6 months Frequency of accessing via internet or SP	Student’s <i>TT</i> Pearson’s x2 test Wilcoxon Sign Rank test LRA P=0.05	SS reduction in HbA1c 1.53%, and post prandial of -54.58 all other were not SS	Applicable to practice, easy to implement. Patient portal allows texting.
Russell-Minda, E., Jutai, J., Speechley, M., Bradley, K., Chudyk, A., & Petrella, R. (2009). Health	N.S. (possibly chronic care model)	Design SR Purpose Determine the strength of evidence for the effectiveness of	n= 18 RCT Inclusion Criteria Age > 14 and youth 7-14 years with DM1 or DM2,	Dependent HbA1c n=17 HRQL Independent	HbA1c, total steps HRQL	Variable by study	SMBG devices demonstrate a decrease in HbA1c in both insulin dependent and noninsulin forms.	Applicable to practice, devices show reduction in HbA1c.

Δ- change, A – Asian, AA- African American, AGR – age range, AR – attrition rate, BP – blood pressure, BMI – body mass index, C – control group, CBSA –computer based software applications
 CR – Caucasian race, CL – confidence limits, CI – confidence interval, CS – convenience sample CST – chi-squared test, CVD – cardiovascular diseases, DM1 – diabetes mellitus, type 1, DM2 – diabetes mellitus, type 2, DV- dependent variable, ESRD – end stage renal disease, F – funding, FG – female gender, G – gender, HCF – health care facility, HDL –high density lipoprotein, HRQL – health related quality of life, IBDSME – internet based diabetes self management education, IP – inpatient facilities, IV – independent variable, IVG – intervention group, LDL – low density lipoprotein, LRA – linear regression analysis, MA – mean age, MG – male gender, MHI – mean household income, MTA – meta-analysis, N – sample size (people), n – sample size (studies), NA – Native American, OR – other race, UT – usual treatment, RCT – randomized controlled trial, SM – self-management, SMS – short message service, SMSG – short message service texts generalized, SMSS – short message service texts customized, SP –smartphone, SPA – smartphone application, SR – systematic review, SS- statistically significant, SMLA – single multi-level analysis, Trigs – triglycerides, TT – t-test VM – voice message

<p>technologies for monitoring and managing diabetes: A systematic review. <i>Journal of Diabetes Science and Technology</i>, 3(6), 1460-1471.</p> <p>F-Canadian Institute of Health Research</p>		<p>self-monitoring devices and technologies for individuals with DM1 or DM2.</p>	<p>interventions w/ self-monitoring device, clinical outcomes with device, English, 1985-2008, RCT & observational studies Exclusion Criteria N<10, cross-sectional data, primary interventions with medications, studies assessing accuracy of devices, telemedicine applications, CGM devices</p>	<p>SMBG n=5 SMS n= 7 Activity n=4 SP app n=2</p>			<p>Mixed results on pedometers for demonstrating a increase in steps, no evidence for improvement in metabolic parameters.</p> <p>SMS/internet interventions showed decrease in HbA1c</p> <p>SP based app may decrease HbA1c.</p>	
<p>Saffari, M., Ghanizadeh, G., & Koenig, H. G. (2014). Health education via mobile text messaging for glycemic control in adults with type 2 diabetes: A systematic review and meta-analysis. <i>Primary Care Diabetes</i></p> <p>(Korea, Taiwan, USA) F- Baqiyatallh Univeristy of Medical Sciences</p>	<p>Health Education</p>	<p>Design: SR and meta-analysis Purpose Review all published articles that have reported the effects of health education by text intervention on glycemic control</p>	<p>n = 10 RCT N= 960</p> <p>Inclusion Criteria Educational intervention using SMS, DM2 diagnosis, HbA1c measurement, age<18 years, RCT Exclusion Criteria Other chronic disorders like CVD, pregnant patients</p>	<p>Dependent HbA1C</p> <p>Independent SMS texting UT</p>	<p>HbA1c</p>	<p>CST</p> <p>Data analysis through Comprehensive Meta-analysis Software</p>	<p>50% greater reduction in HbA1c in IVG compared to UT from meta-analysis</p>	<p>Applicable to practice, patient portal allows texting, shows reduction in HbA1c.</p>

Δ- change, A – Asian, AA- African American, AGR – age range, AR – attrition rate, BP – blood pressure, BMI – body mass index, C – control group, CBSA –computer based software applications
 CR – Caucasian race, CL – confidence limits, CI – confidence interval, CS – convenience sample CST – chi-squared test, CVD – cardiovascular diseases, DM1 – diabetes mellitus, type 1, DM2 – diabetes mellitus, type 2, DV- dependent variable, ESRD – end stage renal disease, F – funding, FG – female gender, G – gender, HCF – health care facility, HDL –high density lipoprotein, HRQL – health related quality of life, IBDSME – internet based diabetes self management education, IP – inpatient facilities, IV – independent variable, IVG – intervention group, LDL – low density lipoprotein, LRA – linear regression analysis, MA – mean age, MG – male gender, MHI – mean household income, MTA – meta-analysis, N – sample size (people), n – sample size (studies), NA – Native American, OR – other race, UT – usual treatment, RCT – randomized controlled trial, SM – self-management, SMS – short message service, SMSG – short message service texts generalized, SMSS – short message service texts customized, SP –smartphone, SPA – smartphone application, SR – systematic review, SS- statistically significant, SMLA – single multi-level analysis, Trigs – triglycerides, TT – t-test VM – voice message

Appendix B

Synthesis Table

	Bell (2012)	Frazetta (2012)	Graziano (2009)	Hunt (2014)	Pal (2013)	Kim (2006)	Kirwan (2013)	Noh (2010)	Russell (2009)	Saffari (2014)
Trial type	RCT	SR	RCT	RCT	SR	RCT	RCT	RCT	SR	SR
DM1 %	8%	0	0	0	0	0	100%			0
DM2 %	92%	100%	100%	100%	100%	100%	0			100%
HbA1c	↓	↓	∅	∅	↓	↓	↓	↓	↓	↓
HRQL	N	N	Y	Y	Y	N	Y	N	Y	N
SMSG		Y			Y				Y	
SMSS		Y			Y	Y	Y		Y	
IBDSME		Y			Y			Y	Y	
PC									Y	
VM	Y		Y						Y	
SPA		Y		Y	Y		Y	Y	Y	

DM1 – diabetes mellitus, type 1, **DM2** – diabetes mellitus, type 2, **HbA1c** – glycolated hemoglobin, **HRQL** – health related quality of life, **IBDSME** – internet based diabetes self management education, **PC** –phone call, **RCT** – randomized controlled trial, **SMSG** – short message service texts generalized, **SMSS** – short message service texts customized, **SP** –smartphone, **SPA** – smartphone application, **SR** – systematic review, **VM**– voice message, **∅** – no change, **↓**- decrease