IMPROVING OUTCOMES: DIABETES MANAGEMENT IN ALASKAN PRIMARY CARE, AN INTEGRATIVE REVIEW

By

Stephanie Hand, BSN, FNP-S

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Abstract

Diabetes is a chronic, debilitating disease with a rising incidence in the United States. It is a major cause of complications such as renal failure, heart disease, stroke, lower extremity amputations, as well as blindness. The purpose of this integrative review was to discover what strategies are evidence-based and practical for effective diabetes self-management in the primary care setting. There is a plethora of published evidence that proves Diabetes Self-Management Education (DSME) is effective for the management of diabetes and prevention of complications. A review of the most current evidence revealed there is no standardized system that allows delivery of DSME from a primary care standpoint. The dissemination of a delivery system that is both feasible and cost-effective within primary care could be revolutionary to the prevention of diabetes in Alaska. Development of a DSME program for primary care could promote improvement in patient self-management of this complex chronic disease. Improving DSME would also help ameliorate serious complications with resultant decrease in costs associated with uncontrolled diabetes on Alaska's health care system. The possibility of creating healthier lives, healthier communities, and a healthier planet is in the grasp of today's clinicians.

Keywords: diabetes mellitus type II, management, self-care, primary care, improving outcomes, and Diabetes Self-Management Education

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Improving Outcomes: Diabetes Management in Alaskan Primary Care, an Integrative Review

Diabetes is a chronic, debilitating disease with a rising incidence in the United States (US). Type II diabetes (DMII) is a multifactorial metabolic process that stems from the inability of the body to utilize insulin properly (American Diabetes Association [ADA], 2015). Hyperglycemia results from decreased insulin secretion, decreased efficacy, or both. Insulin resistance leads to an increase in intravascular glucose with resultant intracellular glucose deficiency rendering metabolism abnormalities of carbohydrates, fats, and proteins (ADA, 2015). This not only causes the cells to lack energy necessary for homeostasis but also causes microvascular and macrovascular endothelial damage. Imagine rubbing sugar between two fingers. That abrasive effect within the vessels damages the vasculature of the eyes, heart, kidneys, liver, and other organs over time. Diabetes is not only a detrimental illness to the human body, but also to the nation's health care system as it reaches epidemic proportions nationwide (Centers for Disease Control and Prevention [CDC], 2016).

Background and Significance

Prevalence

It is predicted that if no major changes occur in the US healthcare system, one in three Americans could have diabetes by the year 2050 (CDC, 2016). There are currently more than 29 million Americans living with diabetes and 86 million living with pre-diabetes, accounting for more than 20% of all health care costs (CDC, 2016). In Alaska, it is estimated that 59,186 individuals, almost 11% of the adult population, have DMII. Of that amount, 18,000 people are estimated to have DMII but do not know it, putting them at risk for associated health risks (ADA, 2016). Diabetes has many detrimental systemic effects and is a major cause of kidney failure, heart disease, stroke, lower-extremity amputations, and blindness (Stellefson, Dipnarine,

& Stopka, 2013). The financial burden incurred by individuals with DMII and the health care system is staggering.

Cost

The US annual direct and indirect cost for diabetics in 2012 was estimated to be $245 billion. Individual health care costs that year were estimated at $13,700 annually (CDC, 2015). The estimated annual cost of diabetes and pre-diabetes in Alaska is $668 million (ADA, 2016). In 2014 a total of 14.2 million Emergency Room visits were reported among adults with diabetes. After adjusting for age group and sex, average medical expenditures among people with diagnosed diabetes were about 2.3 times higher than expenditures for people without diabetes (CDC, 2017). Diabetes not only causes unfavorable impacts on individuals, but also on communities and health care system costs.

Research demonstrates Diabetes Self-Management Education (DSME) can improve individual's quality of life by decreasing DMII complications, possibly reducing overall health care costs. According to Evergreen Economics (2014) Medicaid recipients with DMII who attended one DSME course experienced a 21.7% reduction in annual Medicaid spending. Estimates for the fiscal year of 2014 suggested a $5,670 reduction in health care costs per person.

Significance to Alaska

In Alaska, DMII was the seventh leading cause of death in 2015 and is believed to be largely underreported. The Alaska Native age-adjusted death rates from diabetes and other chronic illnesses were 1.4 to 2.1 times higher than rates of Caucasians (Alaska Division of Public Health, 2017). The Alaska Division of Public Health (2017) reported 17% of adults ages 18-64 were medically uninsured in 2015. Furthermore, available diabetes resources in Alaskan communities can be few and far between. Primary care practices are often the only diabetes

resource available for DMII care, and often create long-standing relationships based upon trust and communication. By providing diabetes self-management education and training in primary care, there is potential to focus on prevention as well as improving quality of life by reducing co-morbidities associated with this chronic illness.

Framework

The Enhance-Behavior Performance Model (E-BPM) incorporates Orem's Theory of Self-Care and Bandura's Theory of Self-Efficacy into one model (Sousa & Zauszniewski, 2005). It considers personal and environmental factors that influence both self-care actions, as well as possible physical and psychological outcomes. The E-BPM is a significant framework to consider when developing DSME for primary care. This model considers the factors that support improved health outcomes, and the autonomy to perform self-care incorporating motivation, encouragement, and support by health care professionals to achieve specific health promotion goals (Figure D).

Clinical Question

The PICOT question this study aimed to explore was as follows: Does implementation of a primary care diabetes self-management education (DSME) program in newly diagnosed type II diabetics improve self-management skills and hemoglobin A1c values after twelve visits?

P: newly diagnosed type II diabetes patients

I: implementation of a primary care DSME program

C: patients not entered into the DSME program

O: self-management skills and hemoglobin A1c values

T: outcomes after twelve visits.

Project Purpose

The purpose of this proposed project was to

- Discover what strategies are evidence-based and practical for effective diabetes self-management education and training in the primary care setting.
- Improve patient metabolic physiologic outcomes.

Literature Search Strategies

"Without current best evidence, practice is rapidly outdated, often to the detriment of patients" (Melnyk & Fineout-Overholt, 2015, p. 7). The goal of the data collection stage is to perform an exhaustive search of the literature until data saturation occurs. Online databases and cited reference sources were utilized to access published articles pertinent to the clinical question.

Inclusion and Exclusion Criteria

Inclusion criteria included articles written in the English language, published between 2012 and 2017, contained human subjects, and were evidence-based practice or peer-reviewed articles. Abstracts not available as full-text articles that fit the criteria were requested through interlibrary loan from the University of Alaska Consortium Library. Qualitative, quantitative, mixed-methods studies, and systematic reviews were selected to properly capture a variety of data to appraise. Exclusion criteria included articles written in languages other than English, articles posted before the year 2012, as well as other types of published works that were less reliable evidence such as editorials, expert opinion, interviews, book reviews, or narratives.

Search Terms

Keywords utilized in the search included the terms: *diabetes mellitus type II, management, self-care, primary care, improving outcomes, and Diabetes Self-Management Education.*

Databases

The clinical question was evaluated by performing a comprehensive review of the following databases: The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Pubmed, Medline, Web of Science, and Google Scholar.

CINAHL. A comprehensive search was conducted in CINAHL with the terms: *Diabetes Mellitus Type II, Self-care, primary care,* and *education.* A total of 35 articles were produced from the search terms. After the application of inclusion and exclusion criteria, three articles remained. Two of the articles fit the clinical question and were included for review (Table A).

Pubmed. Pubmed was searched with the term *Diabetes-Self-Management Education* with over three thousand results. One thousand results remained after the application of inclusion and exclusion criteria. The suggested search by Pubmed using keywords *National Standards for Diabetes Self-Management Education* was examined. Two articles met the inclusion and exclusion criteria (Table A).

Medline. A Medline search of the terms *diabetes mellitus type II, education,* and *primary care* yielded four articles after the application of inclusion and exclusion criteria. One article fit the clinical question (Table A).

Web of Science. A cited reference search was performed utilizing the reference of Willard-Grace (2015) because of its relevance to the clinical question. A total of 21 related articles were found. After application of criteria, one article was found appropriate (Table A).

Google Scholar. A search of Google Scholar of the terms *diabetes self-management education, primary care, and education* brings a vast number of studies- over 150,000. After addition of inclusion and exclusion criteria the number was reduced to 15,000. A brief search of the primary articles led to one article that addressed the clinical question. A search of the related articles from that publishing led to two more articles that fit the inclusion and exclusion criteria (Table A).

Alternative methods. After the main articles were identified, a thorough review of the reference lists was performed. Using this method, one additional article was found that fit the clinical question and was utilized in this integrative review (Table A).

In summary, after saturation of the data had been fulfilled and a thorough review of hand-picked articles had been performed, ten articles that fit the clinical question were chosen for further analysis. Two of the ten articles did not meet the original inclusion criteria of being published after the year 2012. An exception to the inclusion criteria was made for these articles because it felt they enhance the strength of this review by exploring technology interventions including computer-based support systems and text messaging.

Data Evaluation

The data evaluation phase of the integrative review included a critical appraisal of the remaining evidence. According to Melnyk and Fineout-Overholt (2015), "Without current best evidence, practice is rapidly outdated, often to the detriment of the patient" (p. 7). The following discussion describes how the evidence discussed in this proposal was organized for synthesis.

Critical Appraisal

Studies were examined for validity, credibility, reliability and applicability utilizing the rapid critical appraisal tool by Melnyk and Fineout-Overholt (2015) (Figure A). The studies

chosen for the integrative review were organized in a table that included the following elements: conceptual framework, design, sample and setting, variables and their measurement, data analysis, study findings, worth to practice, levels of evidence, as well as strengths, weaknesses, and limitations (Table A).

Quality of Evidence

Valid and reliable studies were organized and graded by the evidence pyramid developed by Dearholt and Dang (2012). This evidence pyramid is a seven-level categorization of methodologies and quality of evidence. Level I is the most valid and reliable source of evidence, and level VII is the least reliable (Figure B). The Quality Guide for Evidence by Dearholt and Dang (2012) was utilized as a tool to assist with the evaluation of evidence quality. The evidence is ranked by letters: A being high quality evidence, B is good quality, and C being low quality evidence (Figure C).

Synthesis

Limitations

Some limitations to this review included appraising the value of technology-focused studies. Studies involving technology are limited by the rapid evolution of advances and progressive innovation in that field. Conclusions derived from technology focused evidence may be outdated soon after the information is gathered. One study involving text-messaging to improve clinical outcomes did have the limitation of such a narrow subject for the literature review. The two studies included in this project that appraised technology specifically had a limitation of a small amount of evidence to measure and draw conclusions from.

Seven out of ten studies reported not having a long enough time frame to truly evaluate health outcomes of the participants. Those seven studies recommend further research that can

extend research time to further evaluate physical and psychological health outcomes. Three of the ten studies reported a limitation of restricted geographical area or ethnicities due to the rural setting it took place in. Due to the specificities of the groups measured, the information yielded is not generalizable to larger or different populations. Two studies reported having self-reported outcome data that could potentially cause bias.

Strengths

Four out of the ten articles were level I on the pyramid of levels of evidence, leaving less chance for bias and more chance of generalizability into practice (Dearholt & Dang, 2012). Four articles were level II, and the remaining two were level III. Table A contains synthesis data in this evaluation table. Figures B and C contains descriptions of the levels of evidence and grading criteria used in this review. All articles listed in this project demonstrate an appropriate study design with strong statistical data, in a logical fashion with experimental elements easily identifiable. Potential biases and risks to internal and external validity were noted, as well as the attrition risks and sample sufficiency.

Themes, Patterns, and Unusual Findings

One study demonstrated that patients received improved outcomes and benefits from receiving DSME, regardless of who delivered it. Interestingly, the results from De Jongh et al. (2008) demonstrated the use of text messaging did not improve patient outcomes, unless it was two-way messaging that allowed patient input. According to Oksman et al. (2017), implementing telephone-based health coaching interventions for patients who had sub-optimally controlled chronic disease improved physiologic outcomes with a moderately low cost was achieved. This differs from the findings of Cleveringa et al. (2013), who discovered that computer-delivered support system only improved outcomes if additional support such as a nurse

case manager was provided. The study by Roberts et al. (2017) also found that nurses were vital to improving outcomes when implementing DSME from a rural standpoint.

According to Willard-Grace et al. (2015) by implementing a medical-assistant led health coaching session for twelve months almost doubled the number of individuals that reached their Hemoglobin A1c goals compared to the control group. The authors also note that these full-time medical assistants were still able to keep up with the normal flow of the clinics. Interestingly, the findings demonstrated that no significant improvement of blood pressure was demonstrated even though there were significant glucose improvements. Contradicting that, the study by Pal et al. (2010) demonstrated that computer-based interventions only had a significant effect on blood pressure and Hemoglobin A1c, yet had no effect on weight loss or depression. According to Johnson et al. (2012), the implementation of Diabetic Self-Management Education led by exercise specialists also improved physiological outcomes such as Hemoglobin A1c, lipids, and blood pressure.

Discussion

Implications

Research demonstrates that DSME improves the health outcomes of type II diabetics, no matter who delivers it. Evidence suggests that it is the ongoing support of DSME that is crucial for the long-term success of prevention of the detrimental complications that diabetes takes. By providing this education and support patients can improve self-efficacy and the ability to self-manage their chronic illness, which in turn improves quality of life, potentially mitigating future complications.

Current evidence indicates that providers who continually self-assess and focus on the quality of care provided have better patient outcomes. Providers that took the time to complete

Performance Improvement strategies had improved glycemic control of their patients compared to those performing routine care. Today's health care system is focused on quality measures to improve reimbursement rates due to the Quality Payment Programs of the Center for Medicare and Medicaid Services (CMS, 2017). Despite readily available evidence-based guidelines, there are many diabetics not receiving quality care and management of diabetes, therefore not preventing complications (Rushforth et al., 2016).

Recommendations

An integrative review of relevant literature demonstrated the need for further research and application of DSME in the primary care setting to better manage type II diabetes and prevent associated complications. Providing a structured delivery program that is feasible and affordable for primary care is crucial for the management of diabetes in Alaska. Future recommendations include an electronic health record source or technology database for the collection of outcome measures such as vitals, BMI, hemoglobin A1c, and point-of-care blood sugars. This would potentially reduce bias of self-reported data by patients or providers.

Gaps found in the literature that would be beneficial to trial include a study utilizing consistent medical assistants (MA) to deliver DSME. In the study by Willard-Grace et al. (2017), there was one medical assistant who was absent for 8 weeks during the study. The missing MA could have affected patient outcomes. Most studies in this integrative review mentioned the lack of adequate follow-up period. A gap that could be addressed with further research is a study lasting more than six months, allowing more time for clinical outcomes to be evaluated.

A recommendation from this integrative review is the creation of a standardized, structured implementation of a DSME program in primary care utilizing medical assistants and

computer-based two-way communications for delivery. An additional recommendation would include monthly visits for a one-year period, with continued computer-based or technological application support for outcomes management and patient-focused educational support. Diabetes is a chronic disease that requires consistency and self-management. Once an optimum Hemoglobin A1c has been achieved, it does not mean all self-efficacy actions can be stopped. The importance of continued support and tools for success cannot be underestimated.

Conclusion

Type II diabetes is a self-managed disease process (Siminerio et al., 2013). Primary care providers see individuals for a brief amount of time in the clinic setting. It is up to the individual to perform self-efficacy behaviors and daily actions to improve health outcomes. DSME alone has proven to be effective for a short period of time. The studies listed in this literature appraisal demonstrate that individuals need support and management for a prolonged period of time after receiving education to be successful.

With the current health care system's pay for performance environment, clinicians can improve patient outcomes by self-reflection and evaluating the process of care (Stowell et al., 2014). Third-party insurance companies are more likely to provide reimbursement for primary care (Stellefson, Dipnarine, and Stopka, 2013). By developing a regimented primary care DSME program, not only could more individuals have support to better manage their chronic illness, but the detrimental costs associated with poor diabetic outcomes could be mitigated. The possibility of creating healthier lives, healthier communities, and a healthier planet is in the grasp of today's clinicians.

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Table A

Evaluation Table

Citation: Cleveringa, F. G., Gorter, K. J., van den Donk, M., van Gijsel, J., & Rutten, G. E. (2013). Computerized decision support systems in primary care for type 2 diabetes patients only improve patients' outcomes when combined with feedback on performance and case management: a systematic review. *Diabetes technology & therapeutics*, *15*(2), 180-192.									
Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables	Measurement of Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Systematic Review (utilized PubMed, Embase, Cochrane). Two pairs of reviewer independently abstracted all data and then data was categorized.	Used RCT's that had to be comparable to usual care. Computerized glucose monitoring systems, diabetes self-management programs, digital eye screening programs, & patient education programs were excluded.	RCT's from peer-reviewed journals written in the English Language. Had to compare effectiveness of DMII care with CDSS compared to that without.	CDSS had to have a computer system that used patient characteristics to generate decision support by software algorithm based on a DMII guideline. Studies only had DMII patients and who had a follow up of at least 6 months Patient clinical outcomes were compared between studies (Hemoglobin A1c, blood pressure, lipids, and body mass index).	Inclusion/exclusion criteria applied and eligibility of the study was assessed and quantified using Cohen K value. Organized via 6 categories separating interventions used: CDSS alone, CDSS combined with reminder system, CDSS with feedback, CDSS with feedback, reminder, and case management. Mean, standard deviation, and range were calculated. "process measures" and "patient outcomes" were measures compared.	CDSS alone without other supportive tools was ineffective. CDSS with reminders improves process of care, but not the clinical outcomes. Ambiguous results with CDSS combined with feedback, but the authors do feel from the studies evaluated that it will improve outcome and process of care. The most effective was the combination of CDSS, feedback, and case management. Nurses specifically in the case management position improved outcomes.	Process of DMII management and patient outcomes can be improved if DSME is implemented from CDSS with feedback and a nurse case manager. A recommended follow up period of over one year is recommended for further evaluation of outcomes.	Strong quality of study, finding the interventions in which CDSS is most likely to improve process and outcome of DMII care. Studied interventions from 2-decade period, technology has changed greatly over the years so conclusions gathered from CDSS programs that no longer exist is outdated. Only statistically significant studies were chosen; therefore, bias cannot be ruled out. Follow up period of 1 year left inability to assess long-term outcomes.	Level I on the pyramid of levels of evidence. Grade: A

Citation: De Jongh, T., Gurol-Urganci, I., Vodopivec-Jamsek, V., Car, J., & Atun, R. (2008). Mobile phone messaging telemedicine for facilitating self management of long-term illnesses. *Cochrane Database of Systematic Reviews*, (4).									
Frame work	Design/Method	Sample/Setting	Variables/ Interventions	Measurement	Analysis	Study Findings	Appraisal of worth to practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Systematic Review	RCT's, QRCT's, CBA, ITS. Studies were only used if able to evaluate the difference of mobile phone messaging independently from other interventions. Data was extracted, examined, and organized by a template that included methods, risk for bias, interventions, outcomes, etc. Four total studies that were included in seven papers were included to review.	Studies chosen for the review had: IV: provide disease-related information to patients, support self-monitoring of illness, support adherence to treatments and medications, and offer a way of peer-to-peer communication and support. DV: participants of all ages, sex, gender, and ethnicity from primary care, outpatient, and community settings.	Primary outcomes: blood pressure, clinical assessments, quality of life, self-reported symptoms, capacity to self-manage, creating supportive environments. Secondary Outcomes: User evaluation of intervention, costs, user perception of safety, potential harms or adverse effects.	Risk for bias was assessed with the Cochrane Handbook for Systematic Reviews of Interventions. Risk ratios were used to measure dichotomous outcomes and mean differences for continuous outcomes. Level of randomization was noted in each trial. A meta-analysis was conducted using the Cochrane Review Manager software. Assessment of risk of bias, measures of treatment effect, unit of analysis issues, treatment, and outcomes were evaluated.	Limited evidence in which mobile phone messaging will provide benefit in supporting self-management of DMII. Only one study had a positive outcome due to a 2-way communication system rather than a 1-way delivery system. One study showed diabetics had improved capacity to handle illness with texting support.	Interventions delivered through mobile phone messaging has little effect on the management of chronic conditions. The highest results with the use of text-messaging is with 2-way communication rather than 1-way deliveries. Recommend further studies needed to understand how messaging can support self-management	Limitations: narrow focus with the topic of text messaging. Heterogeneity was unable to be measured and a sensitivity analysis was unable to be performed due to small amount of studies included. Weakness: due to small amount of studies and small effect size it is difficult to say whether this can be generalizable for practice. The measurement and analysis were appropriate choices for this review study and all efforts were made to decrease bias.	Level I on the pyramid of Evidence Grade: A

Citation: Johnson, S. T., Mundt, C., Soprovich, A., Wozniak, L., Plotnikoff, R. C., & Johnson, J. A. (2012). Healthy eating and active living for diabetes in primary care networks (HEALD-PCN): rationale, design, and evaluation of a pragmatic controlled trial for adults with type 2 diabetes. *BMC Public Health*, *12*(1), 455.									
Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables	Measurement of Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Non-randomized controlled trial design	Non-urban primary care networks in Alberta, Canada. A total of 110 participants (type II diabetics) were in each group for the study	IV: DSME program led by exercise specialist with new model of primary care vs usual or routine care DV: Clinical measures (interval/ratio data) such as: hgbA1c, lipids, glucose, blood pressure, and anthropometric measures; examined at baseline and at 3 and 6 months.	Combination of metrics used- pedometers used for activity. Nutrition behaviors, anthropometric assessments, and biomarkers collected at baseline, 3 and 6 months through surveys and point of care testing. Self-reported measures and satisfaction also collected.	Statistical two-sided tests were utilized with a significance of 0.05 for evaluation. Baseline comparisons were performed using univariate analysis of variance (ANOVA) for continuous variables, and chi-square analysis for categorical variables; which is appropriate for the levels of data (Gray, Grove, & Sutherland, 2017). Statistics were performed for 2 measurement points for the main dependent outcome in a "2 time-point, 2 group, repeated measures design with an a priori fixed and random effects model set to detect a moderate effect size (f = 0.25) while assuming a modest correlation (r = 0.5), the required sample size is 86 participants per group (power = 0.90; alpha = 0.05)" (Johnson, et al., 2012, p. 7). The sample size is also sufficiently powered to detect a clinically meaningful difference between groups of 0.5% for hbgA1c, and an attrition rate of 20% was taken into consideration for the follow up period. The sample size was adjusted to 110 per group to account for the possibility of participant loss.	Ongoing study. They estimate with the sample size and structure, an estimated clinically meaningful difference between the groups of 0.5% HA1c at baseline of 7.2 +- 1.2%. (derived from the Alberta Diabetes Surveillance System).	DSME led by exercise specialist caused positive changes in clinical outcomes (See analysis) as well as self-management skills. They report a 'real-world' solution for the management of chronic disease. They discuss the creation of a diabetes management team to deliver care.	High quality article that fits the critical appraisal tool by Fineout-Overholt & Melnyk, 2015. Weakness: it is not a randomized controlled trial. Limitation includes the heterogeneity of usual care across the various participating PCP's- risking external validity. Strength to counter that is that the study was implemented in four primary care offices to allow for a more comprehensive understanding.	Level III on the pyramid of levels of evidence Grade: B

Citation: Oksman, E., Linna, M., Hörhammer, I., Lammintakanen, J., & Talja, M. (2017). Cost-effectiveness analysis for a tele-based health coaching program for chronic disease in primary care. *BMC health services research*, *17*(1), 138.									
Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables	Measurement of Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Two-arm randomized control trial	Telephone-based health coaching intervention for 3 patient groups with sub-optimally controlled disease: DMII, CAD, CHF.	Intervention group received monthly individual health coaching for 1 year in addition to routine health care. Control group received routine health care. Independent variable is the trained nurses who made the motivational interviewing calls.	Health related quality of life measured with 15 D questionnaire (self-administered instrument with 5 ordinal levels). Data for costs and use of healthcare services was collected. Secondary care data included all outpatient visits and hospital admissions.	Difference in cost between intervention and control group was calculated and divided by their difference in effect.	Cost effectiveness of health coaching was highest in the DMII group. It improved the quality of life of those with both DMII and coronary artery disease with moderate costs. Short follow-up period noted by authors, further recommendations include a longer follow-up period for evaluation of long-term health outcomes.	Effective outcomes with a moderately low cost for implementation (20,000 Euro).	One of the few studies demonstrating cost-effective analysis of health coaching on critically ill people, in a real-life setting and RCT. Utilized national registries and local patient administration systems to include all social and health care services and their costs in follow up (it was documented and proven, not just self-reported data). Weakness and limitation is that it had a short follow up period, a long-term evaluation is needed.	Level II on the pyramid of levels of evidence Grade: A

Citation: Pal, K., Eastwood, S. V., Michie, S., Farmer, A. J., Barnard, M. L., Peacock, R., ... & Murray, E. (2010). Computer-based diabetes self-management interventions for adults with type 2 diabetes mellitus. *Cochrane Database Syst Rev*, *3*.									
Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables	Measurement of Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Electronic databases were searched as well as reference lists. Two review authors independently screened extracted data. Taxonomy for behavior change techniques was used to describe the active ingredients of intervention.	Selection criteria: RCT's of computer-based self-management interventions for adults with DMII. 16 RCT's chosen with wide range of interventions. Mean participant age was 46-67 years. Duration of intervention was 1-12 months. Studies were excluded that involved DMI patients or that were targeted solely for health professionals.	IV: computer based software applications to deliver self-management support DV: DMII patients and their health outcomes	Measurement was performed of variables for health outcomes such as HA1c, BMI, depression, and anxiety.	Two reviewers assessed each study independently. Bias risk assessed using Cochrane Collaboration's Tool and rated as 'low', 'high' or 'unclear'. Measures of treatment effect, unit of analysis, missing data, and heterogeneity was evaluated. Data was summarized statistically and organized by setting, intervention, duration etc.	Evidence shows computer programs only have a small benefit on glucose control (average of 0.2% reduction of HA1c). Studies involving mobile phones to deliver intervention had a 0.5% reduction of HA1c. Slight improvement of cholesterol took place, no significant changes in weight or coping with depression was found. Mixed effects on cholesterol were found. Mobile phone-based intervention improved blood pressure more than computer-based.	Computer-based intervention programs have a small effect on improving HA1c values, mobile phone interventions appear to have a larger effect for both HA1c and blood pressure. Computer-based interventions have the potential to provide ongoing management support to re-enforce the benefits of DSME, which often only has short-term benefits fading over time There are no harmful effects of implementing this intervention but it does not show significant effects on weight loss or depression.	Certain long-term health outcomes were not practical to fully study such as heart attack, stroke, quality of life, or death. This study is of high quality and low risk for bias as the studies were random but not blinded, and the effect size was appropriate for the study to properly make statistical findings.	This is a level I on the pyramid of levels of evidence. Grade: A

Citation: Rise, M. B., Pellerud, A., Rygg, L. Ø., & Steinsbekk, A. (2013). Making and maintaining lifestyle changes after participating in group based type 2 diabetes self-management educations: A qualitative study. *PloS One, 8*(5), e64009. doi:10.1371/journal.pone.0064009									
Framework	Design/Method	Sample/Setting	Variables/ Interventions	Measurement	Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Qualitative study, conducted over 1 year (2007-2008), specifically discussing experiences with creating and maintaining healthy lifestyle changes	Patients were recruited from 7 diabetes self-management courses from 2 hospitals. They had been diagnosed with diabetes type 2 between 1 month and 20 years before they participated in the course. There was no pre-set cut-off level for A1C. Patients who had attended a diabetes education program during the last 12 months were excluded.	There is no control group, this is qualitative study. Patients who consented were interviewed in both focus groups and individual interviews.	Patients were interviewed at the end of the course and 6 months afterwards, both in focus groups and individual interviews. A semi-structured interview guide was utilized by the authors. Specifically, they were asked how their lifestyle changed after the course and what they were doing to maintain that lifestyle.	The authors found similar responses from the focus groups and more in-depth personal interviews, so they combined the two for analyzing. Systematic text condensation was used to analyze the findings. Main themes and subgroups emerged from the interview information.	Participants successfully implemented at least one behavior change. The information patients receive from self-management courses is what inspires them to make the lifestyle changes. It is the support they receive after that maintains the change. They found that if patients felt diabetes was not 'scary' enough or would be too time consuming they would not maintain the healthy changes. They suggest further studies look more in depth at the stages of change for type II diabetics undergoing lifestyle changes.	DSME is a short-term success, to maintain the healthy lifestyle and truly prevent detrimental comorbidities DMII patients need ongoing support and management	Limitation: restricted geographical area. 6-month follow-up period is short. Strength: wide variety of variation in participants from ethnicity and age due to recruitment from seven different education groups.	Level III on the pyramid of levels of evidence Grade: B

Citation: Roberts, D. P., Ward, B. M., Russell, D. J., & O'Sullivan, B. G. (2017). Accessibility and outcomes from a rural diabetes nurse-educator led self-management program. *Australian Journal of Advanced Nursing, the, 34*(4), 26-33.									
Frame work	Design/ Method	Sample/Setting	Variables/ Interventions	Measurement	Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	Retrospective cohort study	A total of 232 adults diagnosed with type II diabetes between 2008 and 2012 participated in the study by attending at least one session. From a rural community-health service area in Australia, with a population of 10,000.	Diabetes Self-Management Education (DSME) program with an initial assessment, one two-hour long group education session (facilitated by RN educator and dietician),and clinical reviews at 3, 6, and 12-month periods ID: DSME program DV: clinical outcomes	Outcomes were measured by management goals for hgbA1c, BMI, total cholesterol, and overall quality of life, as well as psychological distress	Multivariate logistic regression models were utilized to test associations between demographic and clinical indicators against the attendance outcome and achieving goal hgbA1c levels. Variables that were significant at the $p < 0.25$ in bivariate analysis were included in multivariate models, and were retained in the final model if it was significant at $p < 0.05$. McNemar's test was utilized by the authors to test if there were significant differences in proportion of participants seeing improvements compared to those with those experiencing depreciations of their goal.	After 12 months statistically significant improvements in diabetes management goals for cholesterol, BMI, overall quality of life, and psychological distress were discovered. hgbA1c results were available for 86 participants, of which 20% did not reach their goal of less than 7.0%. The authors discovered the factors of age and English-speaking birth country associated with a hgbA1c > 7.0% at the 12-month mark with bivariate logistic regression ($p<0.05$).. The authors demonstrate that diabetes nurse-educator led self-management programs which adapt to rural contexts may remain disregarded and less able to access services.	Nurse-led DSME programs in rural areas have significant improvements on patient's health. Noticeable improvements not just in clinical outcomes, but in overall quality of life and mental health. Also available for vulnerable rural health groups	Limitation: performed with a single rural community, and site comparisons or the addition of a control group was not available. Due to Victorian government who does not recognize dyslipidemia in DMII patients, clinical changes in lipid outcomes was not available. Overall a strong study utilizing appropriate statistical measures to demonstrate significant results.	Level III on the pyramid of levels of evidence Grade: A

Citation: Siminerio, L., Ruppert, K. M., & Gabbay, R. A. (2013). Who can provide diabetes self-management support in primary care?: Findings from a randomized controlled trial. *The Diabetes Educator, 39*(5), 705-713. doi:10.1177/0145721713492570									
Frame work	Design/Method	Sample/Setting	Variables/ Interventions	Measurement	Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	141 people who completed Diabetic Self-Management Education (DSME) were followed up for 6 months by trained staff for continuing education PRISM study design (see variables/intervention)	141 people who completed Diabetic Self-Management Education (DSME) and have type II diabetes	PRISM study design: each group of the 141 individuals divided went into separate groups: diabetes self-management support; educator self-management support; peer self-management support; office staff self-management support; and usual care self-management support. Usual care would be the control group. A follow up visit in office was performed at 6 weeks, three months, and 6 months.	Behavioral and self-management questions were answered via survey on pen and pencil. Patients had labs drawn at 6 weeks, 3 months, and 6 months (lipid panel and hemoglobin A1C). Height, weight, and blood pressure was measured at each visit like any routine visit would at the primary care office.	Random Controlled Trial- repeated measures design. Mixed modeling was used to analyze the change in outcome values from baseline to follow-up between study groups. Data was analyzed according to the intention-to-treat principle.	There were improvements in Self-management skills and physical effects such as blood sugar, weight, and cholesterol. Improvements were shown the most with diabetic educator's vs other staff members like peer or practice staff. Results still reasonable with all those implementing education. They conclude it is feasible and effective to provide DSME from a primary care standpoint.	DMII is a self-managed disease. To better improve outcomes, DSME should be implemented. Providing DSME from a primary care standpoint is feasible and achievable. Though outcomes may not be as high as with a diabetic educator the outcomes are still improved compared to routine or usual care and should be implemented if possible.	High quality study. Effect size large enough to generalize into practice. Limitation: Whether other races/ethnicities would respond differently is unknown. The intervention was performed one-on-one rather than a group setting so it was limited by reach. A longer follow up period is recommended for future study to better measure outcomes.	Level II on the pyramid of levels of evidence Grade: A

Citation: Stowell, S. A., Baum, H. B. A., Berry, C. A., Perri, B. R., King, L., Mijanovich, T., . . . Miller, S. C. (2014). Impact of performance-improvement strategies on the clinical care and outcomes of patients with type 2 diabetes. *Clinical Diabetes : A Publication of the American Diabetes Association, 32*(1), 18-25. doi:10.2337/diaclin.32.1.18									
Framework	Design/Method	Sample/Setting	Variables/ Interventions	Measurement	Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Levels of Evidence
N/A	Retrospective, comparative study	Type II diabetes patients treated by providers who completed the Performance Improvement education process	The intervention for this study is those providers that completed the PI, versus traditional continuing medical education (CME) participants	Hemoglobin A1C levels were measured as well as LDL and HDL cholesterol levels.	One hundred fifty PI completers from the Diabetes PI 2009 activity were compared to 71 participants who completed only the Stage A chart review. Linear models were estimated for A1C, LDL cholesterol, and HDL cholesterol. Logistic regression models were estimated for categories of blood pressure and LDL cholesterol levels An ordinal logistic regression model was estimated for categorical A1C levels	Completion of PI CME demonstrated improvement of clinical outcomes such as HA1c. Today's healthcare system is driven by clinician performance-reimbursement models, which this study supports. Self-assessment, improvement planning, implementation tailored to data, and re-evaluation of the success of the plan of care (or improvement plan) can contribute to someone's health in a positive way, possibly decreasing comorbidities of diabetes.	Clinicians noted that the time and resources PI took to complete were barriers, yet the study shows the gains from PI CME completer to be greater than CME completers alone. Providers that complete PI training have better clinical outcomes and glycemic control than providers that do not.	High quality study with appropriate statistics for study type. Limitation: wide variance of time frames when patient improvement occurred (the data was allowable to be entered at any time). Participants who had well-controlled diabetes may have been excluded from the study due to belief of under-estimation of glycemic control. Bias possible with self-reported actions. To reduce bias data was collected over multiple points in time. Sample size is small limiting strengths of conclusions.	This study is a level I on the pyramid of levels of evidence Grade: A

Citation: Willard-Grace, R., Chen, E. H., Hessler, D., DeVore, D., Prado, C., Bodenheimer, T., & Thom, D. H. (2015). Health coaching by medical assistants to improve control of diabetes, hypertension, and hyperlipidemia in low-income patients: a randomized controlled trial. *The Annals of Family Medicine*, *13*(2), 130-138.									
Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables	Measurement of Variables	Data Analysis	Study Findings	Appraisal of Worth to Practice	Quality Strength/ Weakness & Limitations	Level of Evidence
N/A	randomized control trial	441 patients at 2 safety net primary care clinics in CA. They had to meet at least 1 of 3 criteria: HA1c >8% in the last 3 months, uncontrolled HTN with SBP >140 in the last two weeks, uncontrolled hyperlipidemia if LDL >160mg/dL or 100mg/dL if diabetic within the last 6 months. Also had to be 17-75 years old.	Intervention group received 12 months of coaching from medical assistants working full-tim in clinics. 224 randomized to health coaching group, 217 to usual care group.	Interviews at baseline and 12 months with measures of HA1c, BP, lipids, and BMI. Outcome was to reach at least one goal for which they were uncontrolled at baseline.	Independent sample t tests and chi square tests were used for continuous and categorical data. The change in continuous secondary outcomes was measured with linear regression models, with the composite and individual clinical outcomes as the outcome variable and the study arm as the predictor variable. The role of the site was explored in multivariate linear and logistic regression models by controlling for site and examining the interaction between study arm and site on the primary and secondary outcomes.	Health-coaching variable were more likely than those in usual care to achieve both the primary composite measure of reaching at least 1 clinical goal and the secondary measure of reaching all of their goals. Almost double of the coaching arm reached a Ha1c <8%. No significant difference in systolic blood pressure goal by groups.	Medical assistants can implement health coaching to significantly improve health outcomes for DMII patients and other comorbidities. Glycemic control was almost doubled in the intervention group. This is applicable and relatively affordable. Minimal impact on clinic flow was found.	With the sample size of 440 patients this gave a power of 80%, allowing for up to 20% attrition rates. Limitations include variations in the sites, one site did not have a CMA there for 8 weeks. Various culture competencies and practices were found in the CMA's. The research assistants were not blinded, but bias was stated as small.	Level II on the pyramid of levels of evidence Grade: A

- (…. Add Ghorob, A., & Bodenheimer, T. (2015). Building teams in primary care: A practical guide. Families, Systems & Health : The Journal of Collaborative Family Healthcare, 33(3), 182-192. doi:10.1037/fsh0000120????)

Legend:

BMI: Body Mass Index, CAD: Coronary Artery Disease, CBA: controlled before-after, CDSS: Computerized Decision Support Systems, CHF: Congestive Heart Failure, CMA: Certified Medical Assistant, CME: continuing medical education, DMII: type II diabetes mellitus, DSME: Diabetes Self-Management Education, DV: Dependent Variable, HA1c: Hemoglobin A1C, HDL: High-density Lipoprotein, HTN: Hypertension, ITS: Interrupted time series, IV: Independent Variable, PCP: Primary Care Provider, PI: Performance Improvement, LDL: Low-density Lipoprotein, QRCT: Quasi-randomized controlled trial, RCT: Randomized Controlled Trial, SBP: Systolic Blood Pressure

Level 1: Experimental study, randomized controlled trial (RCT), systematic review of RCTs, with or without meta-analysis

Level 2: Quasi-experimental study, systematic review of a combination of RCTs & quasi-experimental, or quasi-experimental studies only, with or without meta-analysis

Level 3: Non-experimental study, qualitative study, or meta-synthesis

Level 4: Opinion of respected authorities and/or nationally recognized expert committee/consensus panels based on scientific evidence includes: clinical practice guidelines & consensus panels

Level 5: Based on experiential and non-research evidence. Includes: Literature review; Quality improvement, program or financial evaluation; Case reports; Opinion of nationally recognized experts(s) based on experiential evidence

(Dearholt & Dang, 2012)

Table B

Synthesis Table

Citation	Design, Level/Quality	Sample	Improvement in Patient Outcomes	Cost	Adequate follow up period
Cleveringa, et al. (2013)	Level I Grade A I Systematic Review	RCT's comparing usual care to computerized decision support systems	↓ in HA1c, SBP, BMI, & Lipids ONLY with CDSS, feedback, and nurse management	↑ ↓ NE	 No
De Jongh, et al. (2008)	Level I Grade A IIb Systematic Review	studies used where an intervention of mobile phone messaging delivers education and support to DMII patients.	↑ ability to self-manage illness ONLY with 2-way communication	NE	NE
Johnson, et al. (2012)	Level III Grade B IIa (ongoing study) Nom-randomized controlled study	110 DMII patients undergoing DSME program led by exercise specialists versus standard routine care.	N/A- ongoing study.	NE	NE
Oksman, et al. (2017)	Level II Grade A II a Randomized controlled trial	3 patient groups with sub-optimally controlled chronic disease (DMII, CAD, CHF) undergoing telephone-based health coaching.	↓ in HA1c, SBP, BMI, & Lipids	↓ moderate to low cost-implementation	No
Pal, et al. (2010)	Level I Grade AI Systematic Review	16 RCT's examined and reviewed. Adults with DMII undergoing computer-based delivery of self-management support	Small HA1c ↓ Small ↓ lipids No BMI change, no depression change	NE	NE
Rise, et al. (2013)	Level III Grade A IIb Qualitative study	DMII adults who had not experienced DSME within the last 12 months	1 behavior change	NE	No

Roberts, et al. (2017)	Level III Grade A II b Retrospective cohort study	232 adults with DMII	↓ in HA1c, BMI, & Lipids. ↑ quality of life and mental health.	NE	NE
Siminerio, Ruppert, & Gabbay (2013)	Level II Grade AI Randomized controlled trial	141 adults with DMII who attended DMSE education	↓ in HA1c, BMI, & Lipids. ↑ self-management skills	↓ cost implementation	No
Stowell, et al. (2014)	Level I Grade A IIb Retrospective comparative study	Adults with DMII treated by providers who completed the Performance Improvement education process	↓ in HA1c, lipids	↑ implementation cost and barriers to implement	NE
Willard-Grace, et al. (2015)	Level II Grade AI Randomized controlled trial	441 adults with DMII, hypertension, or uncontrolled hyperlipidemia.	↓ in HA1c No change in SBP	↓ cost implementation	NE

Legend:

NE: not evaluated, N/A: not applicable, PCPs: primary care providers, BMI: Body Mass Index, SBP: Systolic Blood Pressure, Lipids: cholesterol panel, HA1c: Hemoglobin A1C,

*All ten studies did not contain a conceptual framework, so conceptual framework was eliminated from synthesis.

Figure A

Rapid Critical Appraisal Tools

RAPID CRITICAL APPRAISAL OF QUALITATIVE EVIDENCE

1. Are the results of the study valid (trustworthy and credible)?

a. How were the participants chosen?
b. How were accuracy and completeness of data assured?
c. How plausible/believable are the results?
    i. Are implications of the research stated? Yes No Unknown
        1. May new insights increase sensitivity to others needs? Yes No Unknown
        2. May understandings enhance situational competence? Yes No Unknown
    ii. What is the effect on the reader?
        1. Are results plausible and believable? Yes No Unknown
        2. Is the reader imaginatively drawn into the experience? Yes No Unknown

2. What are the results?

a. Does the research approach fit the purpose of the study? Yes No Unknown
    i. Does the researcher identify the study approach? Yes No Unknown
        1. Are language and concepts consistent with the approach? Yes No Unknown
        2. Are data collection and analysis techniques appropriate? Yes No Unknown
    ii. Is the significance/importance of the study explicit? Yes No Unknown
        1. Does review of the literature support a need for the study? Yes No Unknown
        2. Do sample composition and size reflect study needs? Yes No Unknown
    iii. Is the sampling strategy clear and guided by study needs? Yes No Unknown
        1. Does the research control selection of the sample? Yes No Unknown

2. Do sample composition and size reflect study needs? Yes No Unknown

b. Is the phenomenon (human experience) clearly identified? Yes No Unknown

i. Are the data collection procedures clear? Yes No Unknown

1. Are sources and means of verifying data explicit? Yes No Unknown

2. Are researcher roles and activities explained? Yes No Unknown

ii. Are data analysis procedures described? Yes No Unknown

1. Does analysis guide direction of sampling and when it ends? Yes No Unknown

2. Are data management processes described? Yes No Unknown

c. What are the reported results (description or interpretation)?

i. How are specific findings presented?

1. Is presentation logical, consistent, and easy to follow? Yes No Unknown

2. Do quotes fit the findings they are intended to illustrate? Yes No Unknown

ii. How are the overall results presented?

1. Are meanings derived from data described in context? Yes No Unknown

2. Does the writing effectively promote understanding? Yes No Unknown

3. Will the results help me in caring for my patients?

a. Are the results relevant to persons in similar situations? Yes No Unknown

b. Are the results relevant to patient values and/or circumstances? Yes No Unknown

c. How may the results be applied in clinical practice? Yes No Unknown

RAPID CRITICAL APPRAISAL OF EVIDENCE BASED GUIDELINES

1. Credibility

a. Who were the guideline developers?

b. Were the developer's representative of key stakeholders in this specialty (interdisciplinary)? Yes No Unknown

c. Who funded the guideline development?

d. Were any of the guideline's developers funded researchers of the reviewed studies? Yes No Unknown

e. Did the team have a valid development strategy? Yes No Unknown

f. Was an explicit (how decisions were made), sensible and impartial process used to identify, select, and combine evidence? Yes No Unknown

g. Did its developers carry out a comprehensive, reproducible literature review within the past 12 months of its publication/revision? Yes No Unknown

h. Were all important options and outcomes considered? Yes No Unknown

i. Is each recommendation in the guideline tagged by the level/strength of evidence upon which it is based and linked with the scientific evidence? Yes No Unknown

j. Do the guidelines make explicit recommendations (reflecting value judgments about outcomes)? Yes No Unknown

k. Has the guideline been subjected to peer review and testing? Yes No Unknown

2. Applicability/Generalizability

a. Is the intent of use provided (national, regional, local)? Yes No Unknown

b. Are the recommendations clinically relevant? Yes No Unknown

c. Will the recommendations help me in caring for my patients? Yes No Unknown

d. Are the recommendations practical/feasible (e.g. resources-people and equipment) available? Yes No Unknown

e. Are the recommendations a major variation from current practice? Yes No Unknown

f. Can the outcomes be measured through standard care? Yes No Unknown

RAPID CRITICAL APPRAISAL QUESTIONS FOR COHORT STUDIES

1. Are the results of the study valid?

a. Was there a representative and well defined sample of patients at a similar point in the course of the disease? Yes No Unknown

b. Was follow-up sufficiently long and complete? Yes No Unknown

c. Were objective and unbiased outcome criteria used? Yes No Unknown

d. Did the analysis adjust for important prognostic risk factors and confounding variables? Yes No Unknown

2. What are the results?

a. What is the magnitude of the relationship between predictors (i.e. prognostic indicators) and target outcomes? Yes No Unknown

b. How likely is the outcome event(s) in a specified period of time? Yes No Unknown

c. How precise are the study estimates? Yes No Unknown

3. Will the results help me in caring for my patients?

a. Were the study patients similar to my own? Yes No Unknown

b. Will the results lead directly to selecting or avoiding therapy? Yes No Unknown

c. Are the results useful for reassuring or counseling patients? Yes No Unknown

RAPID CRITICAL APPRAISAL CHECKLIST FOR A RANDOMIZED CLINICAL TRIAL

1. **Are the results of the study valid?**
    a. Were the subjects randomly assigned to the experimental and control groups? Yes No Unknown
    b. Was random assignment concealed from the individuals who were first enrolling subjects into the study? Yes No Unknown
    c. Were the subjects and providers blind to the study group? Yes No Unknown
    d. Were reasons given to explain why subjects did not complete the study? Yes No Unknown
    e. Were the follow-up assessments conducted long enough to fully study the effects of the intervention? Yes No Unknown
    f. Were the subjects analyzed in the group to which they were randomly assigned? Yes No Unknown
    g. Was the control group appropriate? Yes No Unknown
    h. Were the instruments used to measure the outcomes valid and reliable? Yes No Unknown
    i. Were the subjects in each of the groups similar on demographic and baseline clinical variables? Yes No Unknown
2. **What are the results?**
    a. How large is the intervention or treatment effect (effect size, level of significance)?
    b. How precise is the intervention or treatment?
3. **Will the results help me in caring for my patients?**
    a. Were all clinically important outcomes measured? Yes No Unknown
    b. What are the risks and benefits of the treatment?
    c. Is the treatment feasible in my clinical setting? Yes No Unknown
    d. What are my patient's values/family's values and expectations for the outcome that trying to be prevented and the treatment itself?

RAPID CRITICAL APPRAISAL OF SYSTEMATIC REVIEWS OF CLINICAL INTERVENTIONS/TREATMENTS

1. **Are the results of the review valid?**
    a. Are the studies contained in the review randomized controlled trials? Yes No Unknown
    b. Does the review include a detailed description of the search strategy? to find all relevant studies? Yes No Unknown
    c. Does the review describe how validity of the individual studies was assessed (e.g. methodological quality, including the use of random assignment to study groups and complete follow-up of the subjects)? Yes No Unknown
    d. Were the results consistent across studies? Yes No Unknown
    e. Were individual patient data or aggregate data used in the analysis? Yes No Unknown
2. **What were the results?**
    a. How large is the intervention or treatment effect (odds ratio, effect size, level of significance)?

        _____

    b. How precise is the intervention or treatment?

        _____
3. **Will the results assist me in caring for my patients?**
    a. Are my patients similar to the ones included in the review? Yes No Unknown
    b. Is it feasible to implement the findings in my practice setting? Yes No Unknown
    c. Were all clinically important outcomes considered, including risks and benefits of treatment? Yes No Unknown
    d. What is my clinical assessment of the patient and are there any contraindications or circumstances that would inhibit me from implementing the treatment? Yes No Unknown
    e. What are my patient's and his/her family's preferences and values about the treatment that is under consideration?

        _____

Figure B

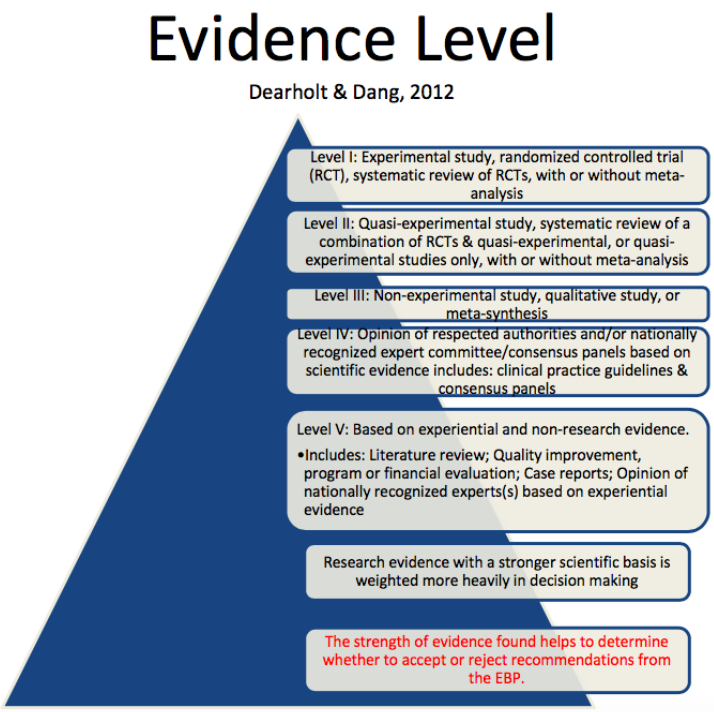
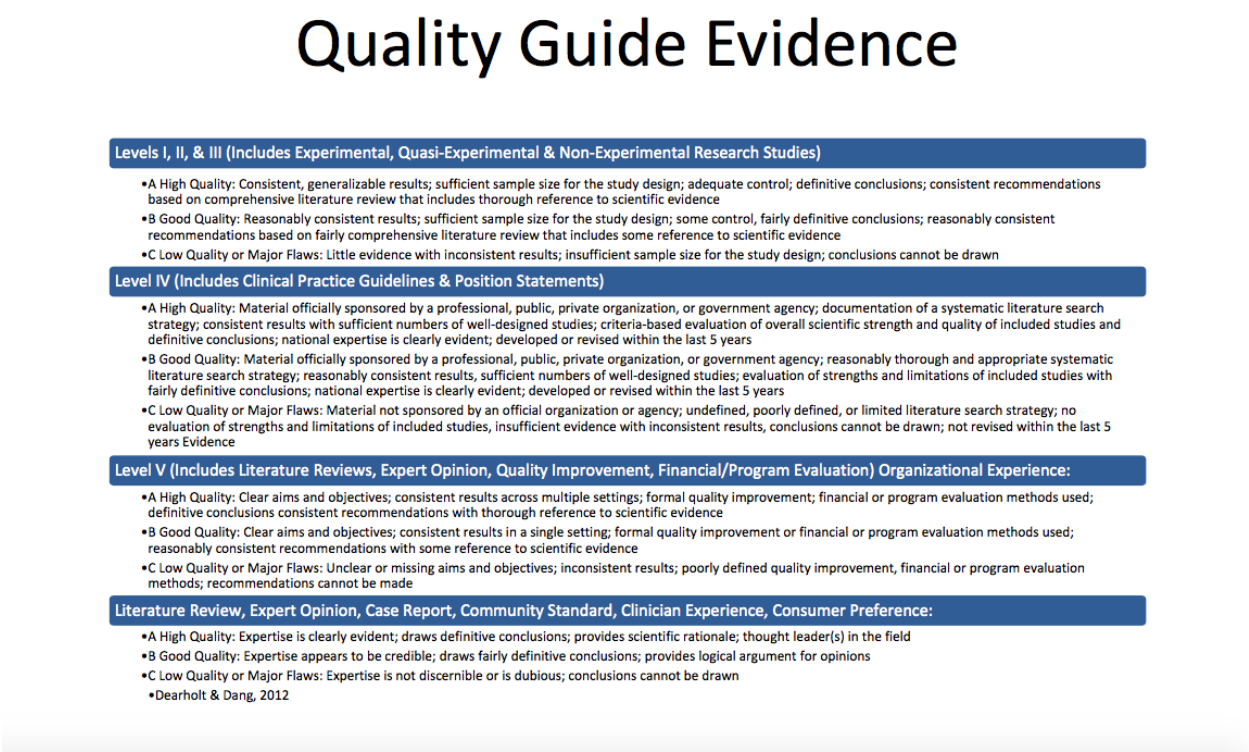

Evidence Level
Dearholt & Dang, 2012
Level I: Experimental study, randomized controlled trial (RCT), systematic review of RCTs, with or without meta-analysis
Level II: Quasi-experimental study, systematic review of a combination of RCTs & quasi-experimental, or quasi-experimental studies only, with or without meta-analysis
Level III: Non-experimental study, qualitative study, or meta-synthesis
Level IV: Opinion of respected authorities and/or nationally recognized expert committee/consensus panels based on scientific evidence includes: clinical practice guidelines & consensus panels
Level V: Based on experiential and non-research evidence.
•Includes: Literature review; Quality improvement, program or financial evaluation; Case reports; Opinion of nationally recognized experts(s) based on experiential evidence
Research evidence with a stronger scientific basis is weighted more heavily in decision making
The strength of evidence found helps to determine whether to accept or reject recommendations from the EBP.

Figure C

Grading Tools for Evidence Quality



Quality Guide Evidence

Levels I, II, & III (Includes Experimental, Quasi-Experimental & Non-Experimental Research Studies)

- A High Quality: Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence
- B Good Quality: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
- C Low Quality or Major Flaws: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn

Level IV (Includes Clinical Practice Guidelines & Position Statements)

- A High Quality: Material officially sponsored by a professional, public, private organization, or government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well-designed studies; criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years
- B Good Quality: Material officially sponsored by a professional, public, private organization, or government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years
- C Low Quality or Major Flaws: Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the last 5 years Evidence

Level V (Includes Literature Reviews, Expert Opinion, Quality Improvement, Financial/Program Evaluation) Organizational Experience:

- A High Quality: Clear aims and objectives; consistent results across multiple settings; formal quality improvement; financial or program evaluation methods used; definitive conclusions consistent recommendations with thorough reference to scientific evidence
- B Good Quality: Clear aims and objectives; consistent results in a single setting; formal quality improvement or financial or program evaluation methods used; reasonably consistent recommendations with some reference to scientific evidence
- C Low Quality or Major Flaws: Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement, financial or program evaluation methods; recommendations cannot be made

Literature Review, Expert Opinion, Case Report, Community Standard, Clinician Experience, Consumer Preference:

- A High Quality: Expertise is clearly evident; draws definitive conclusions; provides scientific rationale; thought leader(s) in the field
- B Good Quality: Expertise appears to be credible; draws fairly definitive conclusions; provides logical argument for opinions
- C Low Quality or Major Flaws: Expertise is not discernible or is dubious; conclusions cannot be drawn
- Dearholt & Dang, 2012

Figure D