

ASSESSING THE EFFECTIVENESS OF DIABETES INTERVENTIONS ON TYPE 2 DIABETES PATIENT OUTCOMES

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OVERVIEW

- Background
- Purpose Statement
- Literatures of Review
- Conclusion and Implications



TYPE 2 DIABETES

- Definition

- “a condition characterized by high blood sugar values, type 2 diabetes results from an increase in resistance to the action of the hormone insulin” (Dasgupta, Jarvandi, De Civita, Pillay, Hajna, Gougeon, Bader, & Da Costa, 2014; National Institute of Diabetes and Digestive and Kidney Diseases, 2017)

- Most common chronic disorder in the Western World (Steinsbekk, Rygg, Lsulo, Rise, & Fretheim, 2012)



(Medical News Today, 2017)



STATISTICS

■ Statistics in 2015

- **29 million adult Americans live with type 2 diabetes, 9.4% of the population** (American Diabetes Association, 2017; Marincic, Hardin, Salazar, Scott, Fan, & Gaillard, 2017).
- **7.2 million adult Americans are undiagnosed** (National Institute of Diabetes and Digestive and Kidney Disease, 2017).
- **84.1 million adult Americans have prediabetes** (National Institute of Diabetes and Digestive and Kidney Disease, 2017).
- **1.5 million Americans are diagnosed each year** (American Diabetes Association, 2017).
- **Diabetes is the 7th leading cause of death in the United States** (American Diabetes Association, 2017).
- **4th most common reason for doctors visits** (Ziba, Mereshi, Seyedfatemi, & Haghani, 2017).



TYPE 2 DIABETES

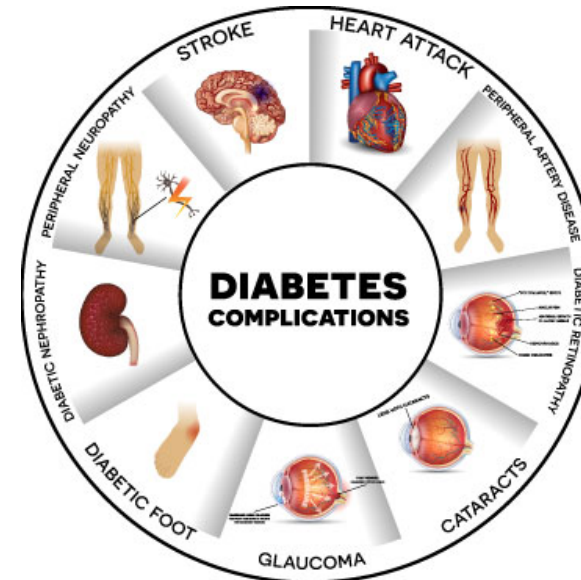
- Risk Factors:
 - Overweight or obese
 - Leading risk factor (Bentley, Otesile, Bacigalupo, Elliott, Noble, Hawley, Williams, & Cudd, 2016)
 - Family history
 - Race or ethnicity
 - High blood pressure
 - Sedentary lifestyle
 - History of heart disease or stroke

(National Institute of Diabetes and Digestive and Kidney Disease, 2016)



TYPE 2 DIABETES: HEALTH CONCERNS AND COMPLICATIONS

- Common complications and health concerns:
 - Blindness
 - End-stage renal disease → dialysis
 - Amputation
 - Increased morbidity and mortality
 - Nephropathy
 - Neuropathy



(Aliha, Asgari, Khayeri, Ramazani, Farajzadegan, & Javaheri, 2012; J. Lee, Chan, Chua, Ng, Paraidathathu, K. Lee, & S. Lee, 2016; Americans Diabetes Association, n.d.).



TYPE 2 DIABETES: LIFESTYLE CHANGES

- Strict glucose control
- Acceptance
- Following a healthy lifestyle:
 - Physical activity
 - Dietary modification
 - Healthy food choices
 - Weight management
 - Smoking cessation



(The Global Diabetes Community, 2018)

(Chong, Ding, Byun, Comino, Bauman, & Jalaludin, 2017)



Which path will you choose to manage your type 2 diabetes?

Both Anna and Mary are recently diagnosed with type 2 diabetes. Everyone's diabetes journey is different. Here are their stories.



ANNA

Anna has difficulties accepting her diagnosis. She has too much going on in her life.

- Sense of loss
- Fear
- Shock
- Anger
- Stress
- Sense of control

MARY

Mary talks to her family and close friends about her diagnosis and next steps.



Anna takes her medicine when she can and sometimes misses her health care provider's appointments. She did not make any healthy changes.

TIME PASSES



Mary joins a type 2 diabetes program, works with her health care provider, and starts to make small, healthy changes.



Anna starts having trouble seeing because her blood glucose is high. She starts to worry.

TIME PASSES



Mary knows that change is tough, sometimes she makes unhealthy choices but works hard to stay on track. She's feeling healthier.



Anna runs the risk of developing complications:

- Heart disease and stroke
- High blood pressure
- Kidney disease
- Amputation
- Blindness

TIME PASSES



Mary continues to learn how to live well with diabetes. She and her family are making healthier choices together.

(American Diabetes Association, 2014)



TYPE 2 DIABETES: NUTRITION RECOMMENDATIONS

- Limiting caloric intake
 - Achieving healthful weight
- Limiting total and saturated fats, cholesterol, and sodium
- Consuming nutrient-dense carbohydrates
 - From fruits, vegetables, whole-grains, and legumes
- Consuming adequate fiber
- Goal: prevent or slow diabetic-related complications and achieve controlled HbA1c levels (7.0% or lower)



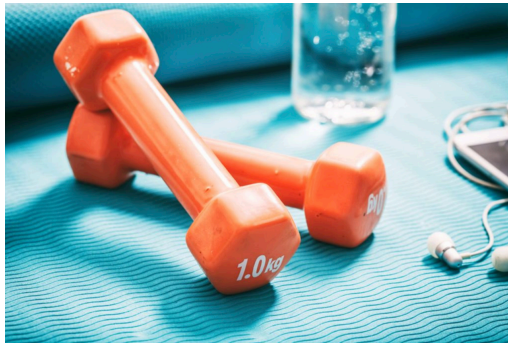
(Diabetes in Control, n.d.)

(Archuleta, VanLeeuwen, Halderson, Jackson, Bock, Eastman, Powell, Titone, Marr, & Wells, 2012; Jaworski, Panczyk, Cedro, & Kucharska, 2018)



IMPORTANCE OF PHYSICAL ACTIVITY

<http://abcnews.go.com/GMA/video/studies-show-impact-exercise-type-diabetes-42870959>

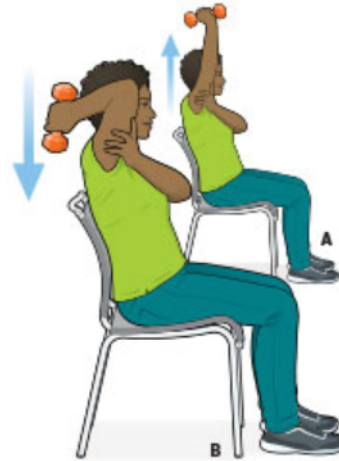
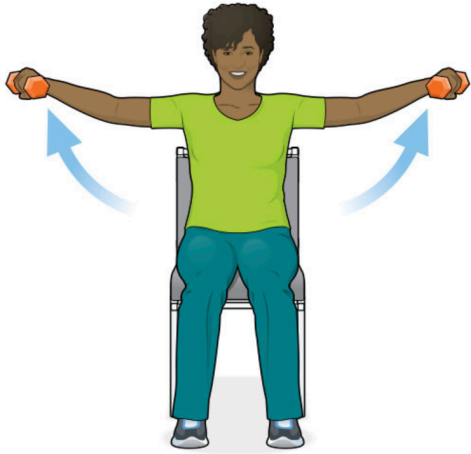


(Reader's Digest, n.d.)

(ABC News, 2016)



SEATED EXERCISES



(Colberg-Ochs, 2017)



WHY IS THIS IMPORTANT?

- 50% of individuals living with diabetes do not achieve and sustain the recommended target of <7.0% for HbA1c (Chrvala, Sherr, & Lipman, 2016).
- Achieving target HbA1c is associated with reduced risk of complications, both microvascular and macrovascular (Rasekaba, Graco, Risteski, Jasper, Berlowitz, Hawthorne, & Hutchinson, 2012).



DIABETES STATE & LOCAL PROGRAMS

- Centers for Disease Control and Prevention's Division of Diabetes Translation (DDT)
 - Provides funding for state and local health departments to provide programs and resources to prevent or delay the onset of type 2 diabetes
 - Helps improve health outcomes for those already living with diabetes

(Centers for Disease Control and Prevention, 2017)



NATIONAL DIABETES PROGRAMS

- National Diabetes Prevention Program

- Goal: prevent individuals from developing type 2 diabetes by providing education and resources through the Lifestyle Change Program
- Provides Research-Based Prevention Program for those living with diabetes

(Centers for Disease Control and Prevention, 2018)

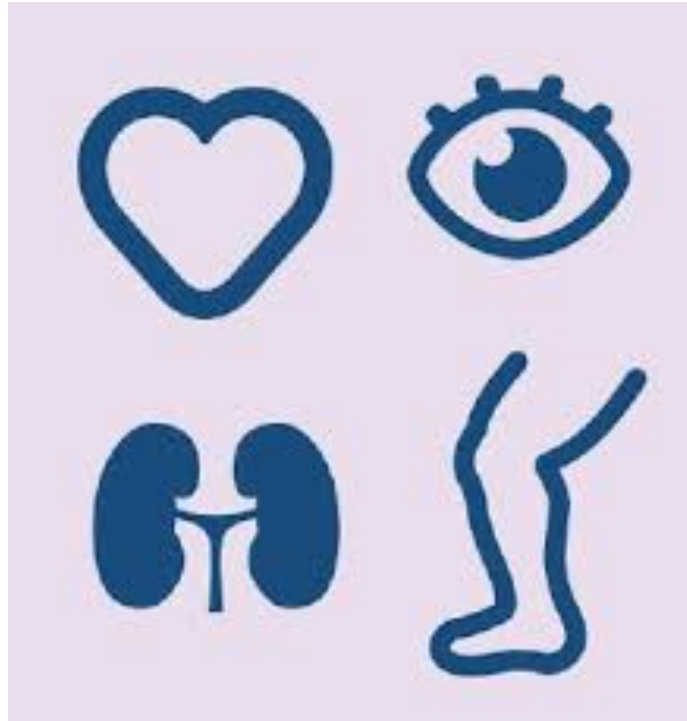
- National Diabetes Education Program

- Goal: to reduce the burden of diabetes
- Encourages lifestyle change and adoption of healthy practices

(Centers for Disease Control and Prevention, 2017)



PERSONAL EXPERIENCE WITH TYPE 2 DIABETES



PURPOSE STATEMENT

- The purpose of this presentation is to educate future dietetic professionals on effective intervention methods to improve diabetes-related outcomes in individuals with type 2 diabetes.



(Diabetes Health Page, n.d.)



LITERATURE REVIEW

- Intervention methods with type 2 diabetes patients using various education techniques to improve patient outcomes
 - The Effects of Education with Printed Materials on Glycemic Control in Patients with Diabetes Type 2 Treated with Different Therapeutic Regiments (Selea, Sumarac-Dumanovic, Lesic, Suluburic, Stamenkovic-Pejkovic, Cvijovic, & Micic, 2011).
 - A Randomized Trial about Glycemic Index and Glycemic Load Improved Outcomes Among Adults with Type 2 Diabetes (Miller & Gutschall, 2009).



EDUCATIONAL MATERIALS INTERVENTION

- The Effects of Education with Printed Material on Glycemic Control in Patients with Diabetes Type 2 Treated with Different Therapeutic Regimens
 - Purpose: To utilize printed educational materials regarding glycemic control in type 2 diabetes patients and determine their impact using different therapeutic modalities.

(Selea et al., 2011)



METHODOLOGY

- **Sample**
 - Type 2 diabetes patients (364), having the disease for more than 6 months
 - Recruits from clinics and hospitals in Serbia
- **Data Collection**
 - HbA1c and Fasting Plasma Glucose were collected at initial visits, 3, 6, and 18 months
 - Patients received educational materials “healthy lifestyle with diabetes type 2.” Quantitative questionnaires were distributed to test patient knowledge.
- **Data Analysis**
 - Statistical analysis—descriptive and analytical statistic methods (SPSS 10)

(Selea et al., 2011)



RESULTS

- Significantly better glycemic control achieved at 3 and 6 months from initial visit (Fig. 1)
 - 6 and 18 month marks, HbA1c had not significant improved
- Questionnaire analysis—different groups of questions
 - Type A: general health issues
 - Type B: knowledge of basic facts regarding diabetes
 - Type C: acute complications related to diabetes
 - Type D: chronic complications related to diabetes

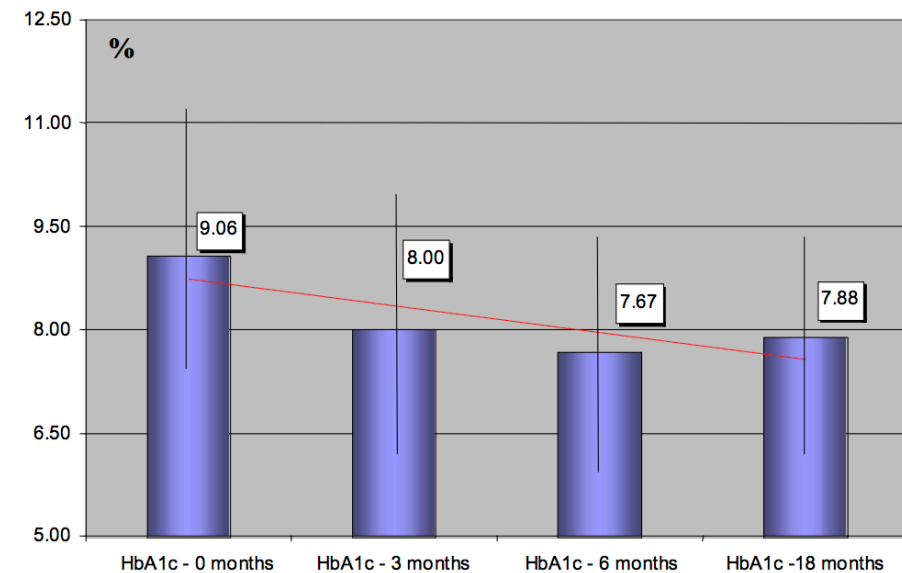


Fig. 1 – Change in HbA1c after educational intervention

(Selea et al., 2011)



RESULTS

- **Type A Questions**
 - 90%+ accuracy at introductory test, 3, 6 and 18 month tests
- **Type B Questions**
 - <10% accuracy at introductory test, 3, 6, and 18 month tests
 - However, noticeable increase from baseline to 18 month test
- **Type C Questions**
 - Pts treated with insulin had biggest percent accuracy
 - Percent accuracy increased from baseline to 18 month test, but was small
- **Type D Questions**
 - Significant increase in all therapeutic regimens

(Selea et al., 2011)



DISCUSSION, CONCLUSION, & IMPLICATIONS

▪ Discussion

- Educational materials significantly reduced HbA1c levels in patients being treated with insulin and oral hypoglycemic drugs and increased diabetes-related knowledge in all participants.
- Low levels of percent accuracy indicate the need for individualized patient education based on patient's education and literacy levels.

▪ Conclusion

- Printed education materials led to an increase in diabetes knowledge and improved HbA1c levels of type 2 diabetes patients.

▪ Future Research

- Printed education materials specific to a patient's needs prove to be effective.
- Provide structured nutrition education materials specific to disease treatment regimen.

(Selea et al., 2011)



CLINICAL FOCUSED NUTRITION EDUCATION INTERVENTION

- A Randomized Trial about Glycemic Index and Glycemic Load Improves Outcomes Among Adults with Type 2 Diabetes
- Purpose: to determine the impact of theory-based nutrition intervention regarding glycemic index and glycemic load on dietary intake, knowledge, self-efficacy, outcome expectation, and empowerment outcomes.

(Miller & Gutschall, 2009)



METHODOLOGY

- Sample
 - Adults (40-70 years of age) with type 2 diabetes for > 1 year, not using insulin therapy
- Research Design
 - Randomized pre-post test
 - Baseline assessment → immediate group (0-9 weeks) → 2nd assessment at 9 weeks, treatment-control period → delayed group (9-18 weeks) → 3rd assessment at 18 weeks, maintenance of change period
- Data Collection
 - Quantitative questionnaires
 - 24-hour dietary recall

(Miller & Gutschall, 2009)



NUTRITION INTERVENTION

- Nutrition Education Curriculum
 - The Social Cognitive Theory and Theory of Meaningful Learning
 - Learning Tools:
 - Concept maps
 - Building upon previous lessons, adding minimal concepts during current sessions
 - Hands-on application
- 9 weekly sessions covering the following topics:
 - Self-monitoring, **goal setting**, portion control, carb counting as a form of control, GI and factors that influence postprandial glucose response, and strategies for maintaining behavior change
- Families and spouses encouraged to attend

(Miller & Gutschall, 2009)



RESULTS AND DISCUSSION

- **Weeks 0-9** (immediate group: initial assessment through initial treatment-control group)
 - Significant improvement in areas of knowledge, self-efficacy components, empowerment, and dietary GI values
 - Dietary barriers, family support, and glycemic control expectations improved
- **Weeks 9-18** (delayed group: second assessment through maintenance period)
 - Significant improvement in the same areas as the immediate group
 - Greater improvement in glycemic control and dietary behavior expectations
- **Week 18 Follow-Up** (maintenance period for immediate group)
 - Decline in self-regulation efficacy among immediate group
 - Improved glucose monitoring expectations
 - Improvement in empowerment and total carbohydrate intake maintained
 - Decrease in GI between both groups

(Miller & Gutschall, 2009)



CONCLUSION AND IMPLICATIONS

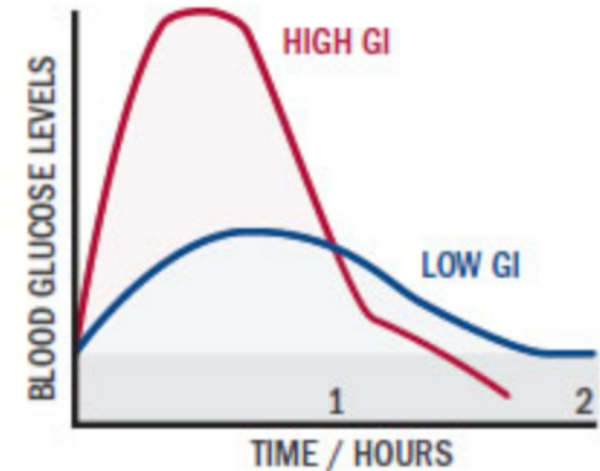
- **Conclusions**
 - Effective short-term for the adoption of lower GI diet and in improving SCT outcomes among individuals with type 2 diabetes.
 - Theory helped focus the intervention on factors that can impact dietary intake.
- **Implications for Dietetics Professionals and Future Research**
 - Interventions using theory can facilitate the development and implementation of an educational intervention.
 - Setting SMART goals accompanied by self-regulation facilitates behavior change.
 - Although short-term success was obtained, continued education and support may be needed to sustain improved outcomes.

(Miller & Gutschall, 2009)



LOW GLYCEMIC INDEX SNACK DEMONSTRATION

- Definition of Glycemic Index (American Diabetes Association, 2014):
 - Measures how a carbohydrate-containing food raises blood glucose
 - A food with a high GI raises blood sugar more than a food with a medium or low GI.
- Low GI Foods (55 or less)
- Medium GI Foods (55-69)
- High GI Foods (70 or more)



(Harvard Health, n.d.)



SUMMARY

- Increasing prevalence of diabetes indicates need for effective strategies to prevent diabetes-related complications and improve patient outcomes.
- Literature indicates that patient education should be individualized and catered towards patient needs.
- Interventions examined in literature include:
 - Weekly group education sessions
 - Nutrition education on self-monitoring, goal setting, portion sizes, carbohydrate amount and quality
 - Theory-based nutrition education
 - Printed educational materials on living with type 2 diabetes

(Selea et al., 2011; Miller & Gutschall, 2009)



STRENGTHS AND WEAKNESSES OF INTERVENTIONS

- Strengths
 - Both interventions were the first of their kind
 - Increase in glycemetic control
 - Advanced level of diabetes-related knowledge
 - Included families of participants
- Weaknesses
 - Interventions were only effective short-term
 - Multidisciplinary approach



ADDITIONAL INTERVENTIONS

- **Use of Technology**
 - 12 online lesson plans aimed to address any barriers and motivate participants to change in regards to dietary modification (Ramadas, Chan, Oldenburg, Hussien, & Quek, 2015).
 - Diabetes education SMS messages sent on a daily basis regarding diet, physical activity, complications, etc. (Abaza & Masrchollek, 2017).
 - Messaging for Diabetes (MED) uses mobile communication platform to deliver and tailor text messages and voice communications to promote medication adherence (Nelson, Mulvaney, Gebretsadik, Johnson, & Osborn, 2016).
- **Structured Education**
 - 4-week education consisting of 4 different units; healthy eating, blood glucose monitoring, complications and importance of regular health care (Strajtenberger-Trbovic, Turk-Strajtenberger, & Sekerja, 2011).



IMPLICATIONS FOR FUTURE DIETETICS PROFESSIONALS

- Implementing individualized diabetes education to meet the needs of your patients
 - Empowering patients demonstrated to be an effective strategy (Iyer, Joshi, & Dhruv, 2010).
 - Structured nutrition education programs can improve diabetes knowledge (Muchiri, Gericke, & Rheeder, 2016).
- No “one-size-fits” all approach for working with diabetes patients, individualization is key
 - Work with patients to assess where they are at with their disease, what they need to learn, their motivation levels, etc. (Vos, Eikelenboom, Klomp, Stellato, & Rutten, 2016).
 - Maintenance strategies (Vos, Eikelenboom, Klomp, Stellato, & Rutten, 2016).
 - Goal setting (Miller & Gutschall, 2009)



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