

THE DEVELOPMENT OF A THEORETICALLY DERIVED VISUAL EDUCATIONAL
TOOL FOR COMMUNICATING BENEFITS OF EXERCISE AND DIET FOR
INCREASING FERTILITY IN PCOS

by

Ella Clare Darden Phillips

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Approved by:

Dana E. Brackney, Ph.D., RN, CNS, CDE, ADM, Thesis Director

Chris Osmond, Ph.D., Second Reader

Jefford Vahlbusch, Ph.D., Dean, The Honors College

The development of a theoretically derived visual educational tool for communicating benefits of
exercise and diet for increasing fertility in PCOS

Ella Clare Phillips

Appalachian State University

Abstract

Problem: There is a need to efficiently communicate health messages to women with PCOS in the management of their fertility.

Background: PCOS is a common cause of infertility and creates uncertainty for women desiring a pregnancy. Health care providers do not effectively communicate the benefit of exercise and diet in increasing fertility. Interpersonal communication theory provides guidance for effective provider-patient communication.

Methods: A quality improvement process included the review of the literature using the terms health communications, health education, picture based messages, framing theory, communication theory, AND PCOS for theoretical guidance. Four transcripts from an ongoing study related to PCOS were reviewed and analyzed for themes. The literature review and transcripts facilitated the development of the *PCOS Fertility Education Tool (P-FET)*.

Outcomes: Picture-based messages of PCOS treatment options with accompanying scripts were developed for future testing with people who live with PCOS and desire a pregnancy.

Keywords: PCOS, infertility, health communication, health education, picture-based messages

Introduction

According to the Thessaloniki European Society of Human Reproduction Embryology (ESHRE)/American Society for Reproductive Medicine (ASRM) - Sponsored PCOS Consensus Workshop Group (2008), Polycystic Ovarian Syndrome (PCOS) affects between 5-10% of women whom have begun menstruating. This autoimmune disease affects PCOS patients' hormones, such as increasing levels of androgen and insulin resistance. Androgen hormones are male sex hormones. However, both men and women produce androgen. Too much androgen in women can lead to the growth of cysts in the ovaries and unwanted symptoms. Common manifestations of PCOS include obesity, dysmenorrhea, hirsutism, acne, and can even result in infertility (Ward & Hisley, 2016). Treatment options for PCOS include oral contraceptive pills, metformin, and hormonal therapy. However, the most preferable option for PCOS treatment is lifestyle changes, such as a healthy diet and exercise (Patel, 2018). Women with PCOS who desire a pregnancy reported that a diagnosis of PCOS was devastating (Huffman, Brackney, & Martin, 2019). In focus groups, these women expressed a need to understand their options for achieving a pregnancy (Huffman et al., 2019).

Women with PCOS who want to understand their conception options need a health care provider who can effectively communicate information about PCOS treatment options. However, successful communication in healthcare is a challenge for providers and their patients (Blackstone, 2015). Hamel (2010) qualitatively researched the level of knowledge health care providers had regarding communication in a health care setting. Hamel (2010) explains that providers face the pressure of increasing their patient load which can decrease the amount of time spent with each patient. Time constraints can have a negative impact for effective health

communication with each individual patient. PCOS patients can make informed decisions about their care if healthcare providers use the time they have available to communicate effectively.

According to Duggan and Street (2015), a trusting relationship between the provider and patient must be established before effective communication can occur. Patients are less likely to follow up with their plan of care if they are dissatisfied with their relationship with their provider. The provider should develop a trusting relationship with the PCOS patient when discussing difficult information such as diet and exercise behavior change.

Dowse (2004), a faculty of Pharmacy at Rhodes University in Grahamstown, South Africa, researches how visual tools can enhance communication of medication information between healthcare providers and their patients. Dowse (2004) explains that visual tools can strengthen understanding of the information for the patient. Paulovich (2015) used qualitative case studies with ethnography to examine real-life patient education provided to children with pictures and words to suggest how to improve the health education experience between clinicians and their patients. Paulovich (2015) claims most patients prefer a visual representation of information. Her findings may translate to the adult health setting. This can be explained by Lidwell, Holden, and Butler (2010) who write about the picture superiority effect. The picture superiority effect is an idea explaining that pictures can be remembered to a greater extent than words, especially if time is limited for delivery of the information. Visual representations of information can enhance education and understanding for patients over a longer period of time (Paulovich, 2015). Patient and provider interactions during an appointment can be limited. Visual aids can allow PCOS patients to take home the information and review it again if needed.

Motivational Interviewing can be an effective health communication technique used by the provider when broaching difficult topics with their patient. Miller and Rollnick (2013)

advanced the theory of Motivational Interviewing. Miller (1983) originally used this communication technique as a way for providers to communicate with their substance abuse patients to change their behavior. However, the effect of Motivational Interviewing has been studied for a variety of health problems such as smoking cessation, hemodialysis adherence, and physical activity (eg. Bommel   et al. 2017, Russel et al. 2011, & Dunn et al. 2019). Motivational Interviewing provides counseling to patients by centering the conversation around their personal needs. The provider is there to facilitate and engage the patient, but ultimately is there to actively listen as the patient comes to their own conclusions (Miller & Rollnick, 2013).

The purpose of this descriptive case example of a quality improvement process is to identify and apply evidence-based communication theories (the use of visual aids, developing a trusting relationship, and Motivational Interviewing) to design health education materials in order to effectively communicate infertility treatment options for women with PCOS who desire a pregnancy. The goal is for health care providers to adopt these well-designed health education materials and improve understanding and performance of healthy behaviors in their patients.

Review of Literature

Polycystic Ovarian Syndrome Overview

Polycystic ovarian syndrome is one of the most common diseases of the endocrine system. It affects 5-10% of women of childbearing age (Thessaloniki, 2008). There is not a clear picture of what causes PCOS, and there are differing opinions on how to diagnose and treat PCOS (Thessaloniki, 2008). Overproduction of androgen hormones lead to symptoms including menstrual abnormalities, small cysts in the ovaries, hirsutism, acne, and insulin resistance. PCOS can also lead to comorbidities such as obesity, diabetes, heart disease, cancer, psychological disorders, and infertility. (El Hayek, Bitar, Hamdar, Mirza, & Daoud, 2016).

The endocrine system is made up of the endocrine glands: hypothalamus, pituitary, pancreas, adrenal, thyroid, parathyroid, thymus, pineal, testes and ovaries. Their purpose is to produce and secrete hormones to stimulate activity in certain cells and tissues. When the endocrine glands are not working properly and produce too much or too little of hormones, complications such as PCOS can emerge (Sole, Moseley, & Klein, 2017).

With PCOS, the gonadotropin-releasing hormone (GnRH) is irregularly produced in the hypothalamus (Patel, 2018). Normal production of GnRH leads to the release of the follicle-stimulating hormone (FSH) and luteinizing hormone (LH) which play an important role in a regular menstrual cycle. Irregular production of GnRH will affect FSH and LH levels. Abnormal levels of FSH and LH can cause the ovary to respond with overproduction of androgen hormones (hyperandrogenemia) (Patel, 2018). Androgen hormones are male sex hormones such as testosterone. An elevated amount of androgen hormones can cause anovulation or menstrual irregularities (Barnes, 1998).

Another possible cause for hyperandrogenemia is insulin resistance (Patel, 2018). Different factors can cause insulin resistance including poor diet, lack of exercise, increased inflammation and increased cortisol hormone levels. Theca cells, which aid in follicle growth, are irritated by the insulin resistance. The resistance causes the theca cells to surge the production of androgen hormones (Patel, 2018).

Disruption of these mentioned hormones can lead to the development of cysts in the ovaries. Cysts are fluid-filled sacs. Cysts can develop when follicles in the ovaries containing an immature egg (oocyte) are not properly released from the ovary for fertilization. The cysts, called functional cysts, will inhibit ovulation (Patel, 2018).

Universal diagnostics criteria for PCOS has not yet been accepted worldwide (Wang et al., 2018). Despite the name of the disease, polycystic ovaries alone are not definitive criteria for a PCOS diagnosis. There are three organizations with PCOS consensus guidelines that are commonly accepted for diagnostic criteria: American Society for Reproductive Medicine in Rotterdam, Endocrinology Group in China, and the Endocrine Society in the United States (Wang et al., 2018).

In a comparative analysis, Wang et al. (2018) includes the three commonly accepted guidelines in table form. According to Wang et al. (2018), the American Society for Reproductive Medicine met in Rotterdam in 2004 and defined diagnostic criteria for adults to be at least two out of three: hyperandrogenism, menstrual irregularity, and polycystic ovaries. Additionally, the Endocrinology Group in China (2008) defined diagnostic criteria for adults to be menstrual irregularity, and at least one out of the two: hyperandrogenism or polycystic ovaries. The Endocrinology Group in China also define PCOS to be without “thyroid dysfunction, hyperprolactinemia, delayed adrenocortical hyperplasia, 21-hydroxylase deficiency, Cushing’s syndrome, primary premature ovarian insufficiency or premature ovarian failure, ovarian or adrenal androgen-secreting tumors or functional hypothalamic amenorrhea” (Wang et al., 2018, p. 356). Lastly, the Endocrine Society of the United States defines diagnostic criteria for adults to be at least two out of three: hyperandrogenism, ovulatory dysfunction, and polycystic ovaries. The Endocrine Society of the United States also defines PCOS to be without “thyroid disease, hyperprolactinemia, or nonclassic congenital adrenal hyperplasia” (Wang et al., 2018, p. 356). Wang et al. (2018) concluded that variations in presentation of PCOS symptoms by ethnicity necessitated a formation of ethnicity-defined guidelines for PCOS diagnosis.

El Hayek et al., (2016) presents an overview of PCOS and describes how clinicians review subjective and objective clinical assessments and appropriate laboratory values for the diagnosis of PCOS. The clinician assesses the patient for hyperandrogenism. Symptoms of hyperandrogenism may include: hirsutism, acne, androgenetic alopecia (hair loss), and acanthosis nigricans (hyperpigmentation of the skin). Laboratory values such as increased levels of testosterone and androstenedione would indicate hyperandrogenism as well. The clinician asks the patient to provide subjective data about their menstrual cycle to determine if the patient has menstrual irregularity. Laboratory values would indicate increased levels of LH. To assess for polycystic ovaries, the provider will use an ultrasonography to determine that there are greater than or equal to 12 follicles in each ovary ranging from 2 – 9 mm in size (El Hayek et al., 2016).

Patients with PCOS have an increased risk of developing a number of comorbidities due to the pathophysiology of the disease. It is important to diagnosis a patient with PCOS appropriately to allow for the management of these comorbidities (Patel, 2018). Some comorbidities patients with PCOS are at risk for can include: obesity, hypertension, cardiovascular disease, dyslipidemia, type 2 diabetes, sleep apnea, uterine cancer, psychological disorders, and infertility (El Hayek et al., 2016; Patel, 2018). The increased risk of infertility is directly related to the pathophysiology of polycystic ovaries. The excess androgen hormones impair ovarian quality. (El Hayek et al., 2016).

Treatment for PCOS consists of managing patient symptoms. Therefore, treatment varies for each patient with PCOS (El Hayek et al., 2016). Often the first line of treatment for PCOS are lifestyle changes including adopting a lower caloric diet and an increasing exercise (Patel, 2018). In a narrative review, Brennan et al. (2017) cites a study that has shown that a weight loss of 5-10% of the patient's body weight can significantly increase ovulation and live births. This

amount of weight loss can also decrease the patient's risk for developing comorbidities. In this prospective study, thirty-three anovulatory and overweight patients with PCOS were asked to follow a 1200 kcal/day diet and to exercise. Eighteen out of the twenty-five patients who lost at least 5% of their original weight, developed regular menstrual cycles and fifteen experienced ovulation (Crosignani et al., 2003).

Metformin is a medication commonly given to decrease insulin insensitivity in Type 2 diabetes. However, in pregnant women with PCOS, metformin was shown to improve outcomes by regulating androgen and LH levels. In a prospective randomized control trial, 32 women with PCOS and 32 women with normal menstrual cycles received either metformin or a placebo for 40 days. The results of this study showed that metformin has an effect on the pituitary gland by decreasing LH levels (Billa et al., 2009). Metformin may also prevent the development of gestational diabetes if used throughout a pregnancy (Kumar & Khan, 2012). Another common medication given is oral contraceptive pills. Oral contraceptive pills manage symptoms by decreasing LH and testosterone levels. However, using oral contraceptive pills would not be beneficial for infertility treatment. (El Hayek et al., 2016).

A common medication initiated is clomiphene citrate for ovulation if lifestyle changes are not effectively treating infertility. This medication can be used with or without metformin (El Hayek et al., 2016). Clomiphene citrate is nonsteroidal and induces ovulation by regulating the production of FSH and LH to initiate ovulation (Bulun & Adashi, 2016). Next, patients may be treated with exogenous gonadotropins, *in vitro* fertilization or laparoscopic ovarian drilling if fertility has not been achieved (El Hayek et al., 2016).

Visual Aid Utilization for Patient Education

Understanding how to effectively communicate health information from provider to patient is a complex idea. Patients might not fully comprehend information presented by their providers. This is a concept C. Doak, L Doak, and Root (1996) have researched to modify health care information for patients to easily comprehend what they are being told. The cause of confusion among patients can be for various reasons including ineffective provider communication or if the patient has low literacy (Doak et al., 1996). A tool that can help with both of these barriers and can convey information effectively is the use of visual representations or visual aids for presenting health information (Doak et al., 1996).

Doak et al. (1996) explains how visual representations of information have been determined to be more influential for the learner than if the information was presented without visual representation. Complicated health information can be understood better with visual aids because it is easier for the human brain to recall a visual image in the memory system than if patients were just hearing it verbally (Doak et al., 1996). Picture-based messages can also be beneficial for language barriers or with communication between cultures (Dowse, 2004).

Doak et al. (1996) has made suggestions when designing effective visual aids. After determining the message to provide, Doak et al. (1996) lists four steps: concentrate on the main message, reduce the amount of reading in the text, provide visual cues and interaction, and provide motivation.

Concentrate on the main message. The health message should not contain too much detail in the pathophysiology when designing a visual aid. This can be confusing to patients who do not fully understand the scientific background. The concept of the visual aid should be straightforward (Doak et al., 1996).

Reduce the amount of reading in the text. Visuals can show complex concepts in a simpler way. Patients are more likely to get frustrated and lose interest in long, difficult, hard-to-read texts (Doak et al., 1996).

Provide visual cues and interaction. The visual aid can be designed to emphasize certain aspects and important messages within the image. This can be done with arrows, circles, colors, or bolding. These tools can attract the patient's eye to enhance understanding of the main concept (Doak et al., 1996). It is also important for the provider to be involved with the presentation of the visual aid. The provider should be guiding the patient to notice important aspects about the image and to provide context about the information. According to Dowse (2004), visual aids should be presented with verbal instruction as well. Visual aids and verbal instruction of health information are most effective together (Dowse, 2004).

Provide Motivation. Visuals that capture the audience will motivate the patient to want to look at the image further. Using images on the cover of a booklet, to tell a story, or for testimonials are effective ways to motivate readers to want to look further into the health message (Doak et al., 1996).

Overall, picture-based messages can be very influential. Nonetheless, it is important that the message is not misinterpreted (Dowse, 2004). Patients with low literacy will have difficulty understanding visual representations compared to patients with high literacy. However, providers will need to assist with guidance for all types of readers, so the visual representation can be fully comprehended by the patient. The provider should thoroughly explain the information provided in the visual aid. Visual aids should always be presented with verbal instruction to strengthen patient understanding (Dowse, 2004).

Motivational Interviewing

Motivational Interviewing (MI) was originally designed in the 1980s to counsel patients with substance abuse issues; however, it has recently been used to help patients with alternative health behaviors as well (Smith, 2018). It is a technique that providers can use to counsel patients into changing a behavior. It creates an opportunity to shape a conversation that can change the patient's outlook on their behavior. It can motivate them to explore and discuss their feelings about the certain behavior (Lundahl & Burke, 2009).

Motivational Interviewing builds upon other behavioral theories including cognitive dissonance theory (Lundahl & Burke, 2009). Cognitive dissonance theory is the feeling of discomfort a person has when there is discrepancy of their cognitions (beliefs, ideas, values, etc.) and their actions. This feeling of discomfort can lead to a behavioral change (Cooper & Carlsmith, 2015). Patients receiving information from their health care provider might not spark a change in their behavior. Health care providers must also motivate and reduce the patient's resistance to change. Motivation can increase the likelihood of new behavior adoption (Lundahl & Burke, 2009).

The 'spirit of MI' is a foundational concept for successful use of Motivational Interviewing. Miller and Rollnick (2013) discuss the 'spirit of MI' when educating health care professionals about how to approach the technique. The 'spirit of MI' encompasses compassion, collaboration, acceptance and evocation. Another important factor of Motivational Interviewing is that the provider and patient are to develop a trusting partnership for the conversation to be most successful. The provider's role is not to tell the patient what they need to do; instead, the provider's role is to guide the conversation with compassion. This allows the patient to explore their own thoughts on their behavior (Miller & Rollnick, 2013). The purpose of Motivational

Interviewing is to have the patient become self-motivated and to identify their own reasons for wanting to change their behavior (Miller & Rollnick, 2013).

Providers using MI while conversing with their patients about their behavior commonly use these concepts: open-ended questions, affirmation, reflective listening, and summary (Smith, 2018). It is important to begin with open-ended questions to gauge the patient's knowledge and their feelings about the topic. Additionally, it is essential to ask the patient for permission before the provider gives information about the topic. This is because the process is about the patient's needs and how they are feeling, not about the provider's own personal goals (Smith, 2018). Affirmation identifies the patient's strengths. Reflective listening is a time to develop the patient's change talk to be increasingly more positive. The summary is a brief recap of the conversation (Smith, 2018).

In a systematic review of four meta-analyses, Lundahl & Burke (2009) compared the use of MI to no intervention or another active intervention (cognitive behavior therapy). Lundahl & Burke reported that the use of Motivational Interviewing increased patient engagement by 5-15% compared to no use of MI and patient engagement also increased with MI compared to cognitive behavioral therapy but the difference was not significant.

According to Lundahl and Burke (2009), researchers are currently constructing the most effective means to teach Motivational Interviewing to providers. The most common teaching method is professional workshops with post-workshop guidance. These workshops typically are over a 2-day span (9-16 hours) and incorporate didactic lessons and role-playing activities (Lundahl & Burke, 2009).

Methods

This descriptive case example follows a quality improvement process method to develop clinical education materials for women with PCOS. According to Lobiondo-Wood and Haber (2014), the quality improvement process consists of four steps: assess, analyze, develop, and test and implement. The first three steps were followed for the development of these materials. The fourth step (test and implement) is itself composed of four steps: plan, do, study, and act. This fourth step was not yet performed.

In the first step of this quality improvement method, the objective for the improvement is assessed and defined. The objective for this quality improvement case example was to improve communication of PCOS health information between health care provider and patient. Sources of data for selection of the objective included: expert opinion, focus group transcripts and literature review of PCOS management.

The second step was to analyze available information related to the objective. A literature review was conducted to gather information about effective communication techniques to aid in creating an educational tool for women with PCOS who desire a pregnancy. The literature review consisted of using terms such as health communications, health education, picture-based messages, framing theory, communication theory, AND PCOS. Additionally, four written transcripts from an ongoing study of women with PCOS who desired a pregnancy were analyzed to inform the development of the health provider tools. These transcripts were analyzed by listening for themes in the dialogue and taking notes from what was heard (Huffman et al., 2019).

The third step was to develop what was known about the objective into an educational intervention. The resulting studies from the literature review provided theoretical guidance and

the PCOS focus groups' transcripts provided information to clearly communicate with these patients about their lifestyle changes treatment options. This information became the foundation for developing a visual communication tool and a health provider script with Motivational Interviewing. Picture-based messages were selected due to its demonstrated effectiveness in communication (Doak et al., 1996). The original concept while creating the educational tool was to have a two-sided picture-based message portraying useful information and an accompanying script for the provider. The tool was intended for providers with patients who have PCOS to educate about the benefits of diet and exercise for increased ovulation. The visual representation that was developed was created by using the suggestions provided from Doak et al. (1996): concentrate on the main message, reduce the amount of reading in the text, provide visual cues and interaction, and provide motivation. Changes to the health education materials were made with emerging understanding of the theory and from feedback. The health education materials were shown to content experts, healthcare providers, women of childbearing age, and senior nursing students for feedback throughout its development. This process is a form of member checking.

Future study will build on this foundation to complete the fourth step (test and implement) for future advancement of this quality improvement process.

Outcomes: Development of Educational Tool

The outcome of this quality improvement process method include health educational materials for women with PCOS who desire a pregnancy consisting of two picture-based messages and a Motivational Interviewing guide to communicate the benefits of exercise and diet for their fertility. The development of these health educational materials transitioned through

seven different versions. The name of this educational tool is *PCOS Fertility Education Tool (P-FET)*.

Side One Version One

The first image constructed was side one of the *P-FET*. This side of the *P-FET* shows an image of a scale with a title that reads “Exercise leads to” labeled on the top of the scale and “Pregnancy” labeled on the bottom of the scale. The scale included two tones of blue. The color scheme was picked because the color blue has been shown to have a calming effect (Valdez & Mehrabian, 1994). A two-sided chart was included in the middle of the scale. The left side of the chart represents the patient’s weight: “300”, “275”, “250”, “225”, “200”, and “175”. The right side of the chart represents the number of pounds the patient should make as a goal to lose. In the literature, it was found that a weight loss of 5-10% of the patient’s body weight can significantly increase ovulation and live births (Brennan et al., 2017). Seven percent was used in the calculation because it was thought it would be easier for the patient to read one number for a weight loss goal instead of a range. The weight amounts on this side of the chart included “21 pounds”, “19 pounds”, “17 pounds”, “15 pounds”, “14 pounds”, and “12 pounds” (see Figure 1).

The first side of the educational tool was shown to three content experts, maternal health registered nurses, and senior nursing students completing their mother-baby clinical rotation. Feedback was collected to further develop the first side of the educational tool. The original title of this side “Exercise leads to Pregnancy” was found to be misleading for the intended population. The title cannot be a guaranteed statement. Another suggestion recommended to add labels for each side of the chart. Lastly, it was suggested to identify somewhere on the image that the pounds listed for intended weight loss was calculated from 7%.

Side One Version Two: The Final Version

In version two of side one, the title was changed to “EGGzercise” and placed inside of the scale. On the left side of the chart “Your weight” and the right side “Weight loss goal*” were added to clarify the two sides of the chart. The star included at the end of “Weight loss goal*” on the right side of the chart indicates these numbers were calculated from 7% of the patient’s original body weight. At the bottom of the image “*7% of body weight” is labeled to indicate how the goal for weight loss was found (see Figure 2).

Side Two Version One

The *P-FET* side two developed with an idea of comparing different fertility methods to diet and exercise. Using different shapes, an image of a baby was created. This baby is the color pink and is able to change in size. The size of the baby represents the chance of pregnancy to occur. Thus, the larger the baby, the greater the chance of a pregnancy to occur. A graph was created and titled “Pregnancy Success Rates”. The Y-axis includes percentages in increments of 10. The X-axis includes the comparing fertility treatment methods: “Clomid”, “IVF”, and “Diet/Exercise”. The graph visually represents diet and exercise having the largest sized baby thus representing diet and exercise as giving the patient the best chance of achieving a pregnancy (see Figure 3). However, after being reviewed by a content expert and looking back in the literature review, this idea was not supported.

Side Two Version 2

Version two of the *P-FET* side two is titled “Infertility Treatments and Their Benefits”. Underneath the title, there is a chart comparing infertility treatment options with their corresponding benefits. The chart is made up of 4 columns and 4 rows. The treatment options on the rows include: “Diet and Exercise”, “In Vitro Fertilization”, and “Medication (Ex. Clomid)”.

The benefits which are shown in the columns from left to right are “Normal Newborn Birth Weight”, “Gestational Diabetes Prevention”, and “Ovulation”. In each of the boxes there is either an X mark or a check mark indicating if the fertility treatment will provide the benefit. The X mark indicates that the fertility method will not provide the corresponding benefit. The check mark indicates that the fertility method will provide the corresponding benefit. For example, the “Diet and Exercise” row has a check in all of the boxes that correspond with “Normal Newborn Birth Weight”, “Gestational Diabetes Prevention”, and “Ovulation”. The color scheme was used to match the *P-FET* side one. The different colors distinguish the titles in each column and row. “Normal Newborn Birth Weight”, “Gestational Diabetes Prevention”, and “Ovulation” are in blue boxes. “Diet and Exercise”, “In Vitro Fertilization”, and “Medication (Ex. Clomid)” are in gray boxes. The color distinguishers were created to make it easier for the reader to see treatments vs. benefits (see Figure 4).

Side Two Version Three

To make it clearer for the patient, version three of side two includes changing the column titles to read from left to right: “Ovulation”, “Gestational Diabetes Prevention”, and “Normal Newborn Birth Weight” (see Figure 5).

Side Two Version Four

Version four of side two included changing the title to “Benefits of Infertility Treatments” to be more concise and straightforward. Changes also included adding a subtitle next to the treatments called “Treatments”. “Treatments” is in a same colored gray box (see Figure 6).

Side Two Version Five: The Final Version

Version five of side two, the final version, has a similar change by adding a subtitle “Benefits” in a same colored blue box above the columns of the benefits (see Figure 7).

Motivational Interviewing Guide

A Motivational Interviewing guide was created to accompany the *P-FET* picture-based messages. The guide’s intention is to be used as a guideline for the provider to use when communicating with their patient. Developing a trusting relationship with the patient is the main focus for this method of communication. Reading word for word from a script will fail to establish this kind of relationship. The guide was developed based on Motivational Interviewing. Motivational Interviewing can be useful to providers when discussing a lifestyle change such as fertility treatments for patients with PCOS. Providers should educate and explain the benefits of diet and exercise if the patient agrees to converse about the subject. For some women, this might mean a change in their lifestyle. Talking about these changes through Motivational Interviewing can be helpful in making sure the patient feels like they are being heard, can reach self-awareness, and be motivated to make a behavioral change.

The Motivational Interviewing guide was developed as a flowchart to represent the different types of patients a provider might encounter. Each patient will have a similar introduction to begin the conversation. The provider might say, “Hi Ms. _____. How are you feeling today?” As the provider actively listens to the patient as they answer this question, a trusting relationship might be developing. Next, the provider will use empathy to broach the educational aspect. “I understand that you have had a hard time getting pregnant. I know this has been a difficult time for you, and I want to help and support you as best I can.” Lastly, the provider will ask for permission to share information: “I want to give you some more

information about some of your options that I believe may help you achieve a healthy pregnancy. Would it be okay if I shared this with you?” It is important for the provider to ask for permission because if the patient is not willing to receive the information, the educational conversation will not be effective.

Regarding this question, there are three different categories of responses the provider might receive from their patient. The flowchart begins to separate into the “Yes”, “No”, and the “Maybe” patients.

The “Yes” patient. If the patient is inclined to hear the information, the provider will inform the patients about their fertility treatment options regarding diet and exercise. An example statement might include: “Your PCOS makes it hard for your body to regulate your reproductive hormones which makes it difficult for you to become pregnant. Consistent exercise combined even with a small amount of weight loss, 5-10% of your body weight, can increase your chance of getting pregnant.” At this point, the provider will show the patient the “EGGzercise” side of the picture-based message and ask, “What does EGGzercise mean to you?” This is an open-ended question that allows the patient to develop a deeper understanding of their situation. Depending on how the patient answers, the provider will clarify. The provider and patient will find the patient’s weight together to see the weight loss goal this patient is encouraged to make. Next, the provider will show side two of the *P-FET* and explain the chart informing the patient that diet and exercise will give the patient the best chance at a healthy pregnancy. The provider might say: “Even with your diagnosis of PCOS, there are ways for you to achieve a healthy pregnancy. Research tells us that the healthiest and most effective way for you to do this would be following a diet and exercise plan.” Then, the provider will begin to make a plan with the patient to make it a realistic goal: “What ways do you see yourself improving your diet and

adding exercise into your life?” An open-ended question will promote change talk within the patient and help her develop a realistic plan for weight loss. This is the beginning of the process of behavior change and if the patient desires more help, dietitians and other weight loss experts can be consulted.

The “No” patient. If the patient is not interested in hearing the information, a way to handle this is to use empathy and build a conversation from what they are thinking. “I understand. Each person needs to do what’s best for them. Can you tell me about your experience with diet and exercise?” This allows the patient to self-reflect and the provider can pick up on keywords to provide affirmation for the patient. If the patient claims to have lost any weight, no matter how much, the provider should provide affirmation: “Diet and exercise are really challenging, but losing ___ pounds is quite an accomplishment. How did you do that?” At this point, the patient can explain what they did to accomplish the weight loss. Now, the provider can bring out the *P-FET* side one, find their weight on the chart and ask, “What do you think about that as a weight loss goal?”

The “Maybe” patient. The patient that is undecided about whether or not they can lose weight due to financial burdens, lack of resources, time management, etc., will be approached like a “No” patient. First, the provider will begin with empathy and ask an open-ended question. “I understand. Tell me more about your experience with diet and exercise.” Now the patient can explain their experience with diet and exercise and if the provider hears any accomplishment, big or small, he/she can use that to help the patient change their perspective. If the patient claims to have had weight loss in the past, the provider can say, “How confident do you feel that you could do it again on a scale of 1-10?” Have them answer, then the provider can ask, “Why not a lower number?” By using this decision ruler, it allows the patient to realize that as long as they did not

say zero, they somewhat have confidence in themselves that they would be able to do it again. If at this point, the patient feels more inclined to hear the information, the provider can continue on as if they had said yes. Otherwise, the provider can keep asking open-ended questions to develop the conversation and the trusting relationship.

Discussion

To improve the quality of provider patient communication, a visual educational tool was developed with an accompanying Motivational Interviewing guide. The value of visual aids in education, effective communication techniques, and the pathophysiology behind PCOS were all considered in the creation of the *P-FET*.

Visual representation has been found to increase understanding and comprehension of health information (Doak et al., 1996). However, visual aids should not be provided to the patient without verbal instruction in order to ensure effective communication (Dowse, 2004). Providers that present the *P-FET* visual representation should also use the accompanying script as a guide, thus implementing Dowse's (1996) findings. The script was developed using Motivational Interviewing to increase patient understanding of the benefits of diet and exercise on ovulation and to promote health behavior change. The MI guide uses open ended sentences and active listening. If followed appropriately by the provider, the guide will create a partnership between the provider and patient and encourage a healthier lifestyle for the patient.

The population for this descriptive case example of a quality improvement process is patients with PCOS who desire a pregnancy. Many of these patients who are overweight or obese and could benefit from weight loss due to diet and exercise. Motivational Interviewing is an appropriate technique that can be used to change a PCOS patient's behavior. Motivational

interviewing is incorporated in the *P-FET* model to promote self-awareness in the patient, so they might be able to motivate themselves to change their behavior.

This method of visual representation of health information and Motivational Interviewing together may support other patients who need to make difficult health decisions. Aspects of this educational tool and literature review could potentially be used for patients who could benefit from weight loss. This quality improvement process could be used to develop other health educational tools who are encouraged to lose weight. For example, people with cardiovascular disease or type 2 diabetes who could benefit from Motivational Interviewing and aspects of the *P-FET* model.

Limitations

The *P-FET* was developed using information gathered by an ongoing study of women with PCOS. However, data saturation has not yet been achieved from this ongoing study (Huffman et al. 2019). Only preliminary data from this ongoing study was analyzed to develop the *P-FET*. Additional responses from women are yet to be recorded and included in the ongoing study. Varying observations and comments from more women could have enhanced the development of the *P-FET*. The *P-FET* was shown to many women of childbearing age. However, presenting the *P-FET* in PCOS focus groups would be beneficial to gain feedback from this population and could enhance the *P-FET*.

Another limitation is that this tool requires education for providers who intend to use it. Education regarding how to use Motivational Interviewing and the tool combined is pertinent for the *P-FET* to be used adequately. Further research and testing should be done to determine the correct method of educating providers about how to use this tool in the most effective way.

Conclusion

In conclusion, this descriptive case example of a quality improvement process identified that there is a need to effectively communicate the benefits of diet, exercise, and weight loss to patients with PCOS who want to achieve a pregnancy. The provider's role in delivering information about treatment options to the patient in an empathetic and understandable way is paramount for ensuring the patient is able to make the best decision for herself. Providers can use different methods and techniques to effectively initiate difficult conversations about lifestyle changes including Motivational Interviewing and the use of visual aids. Through a quality improvement process, the *P-FET* was created as a visual educational tool that incorporates beneficial information about lifestyle changes, infertility treatment options, and Motivational Interviewing presented by the provider. The development of a visual tool, *PCOS Fertility Treatment Options*, represents the benefits of exercise, diet, and weight loss for PCOS patients who wish to achieve a pregnancy.

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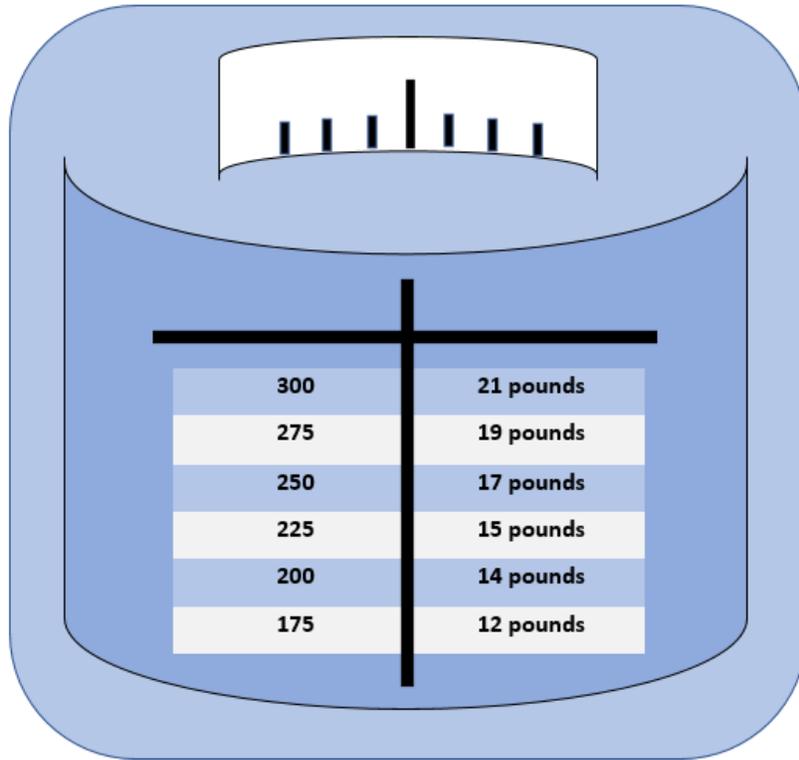
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Appendix

Exercise leads to



Pregnancy

Figure 1. Side one version one.

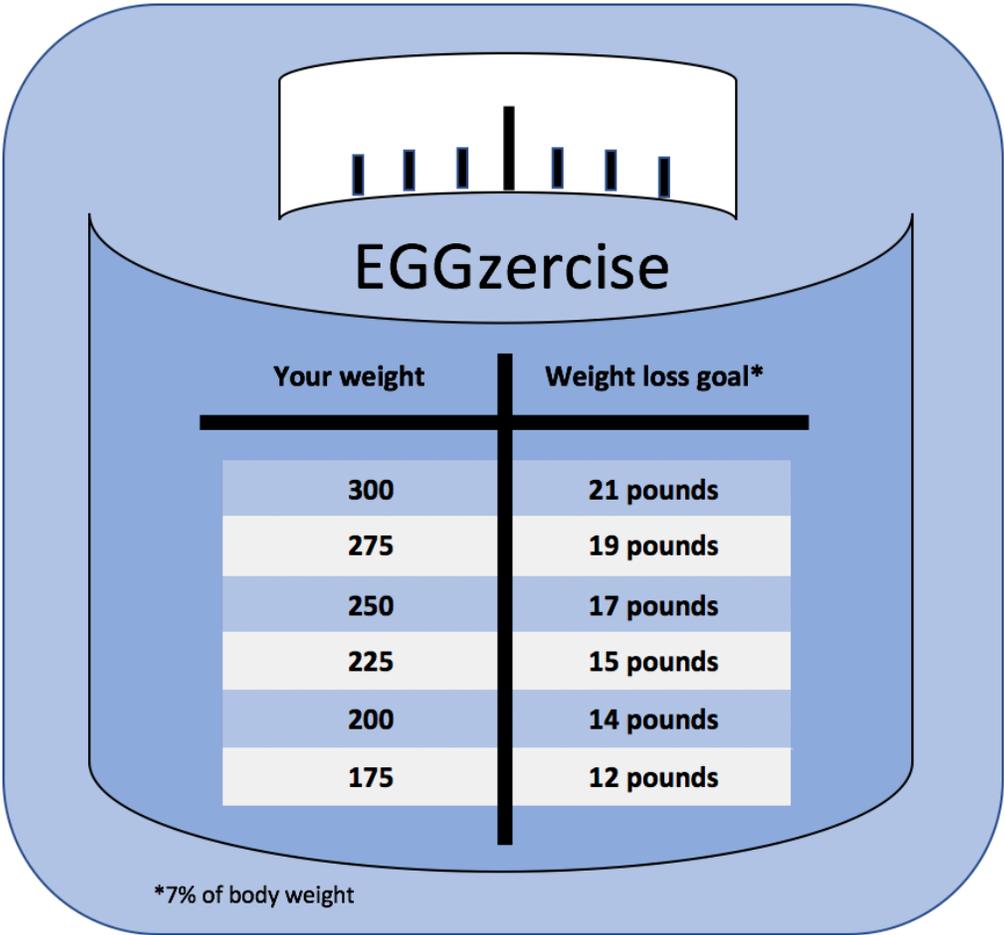


Figure 2. Side one version two: The final version.

Pregnancy Success Rates

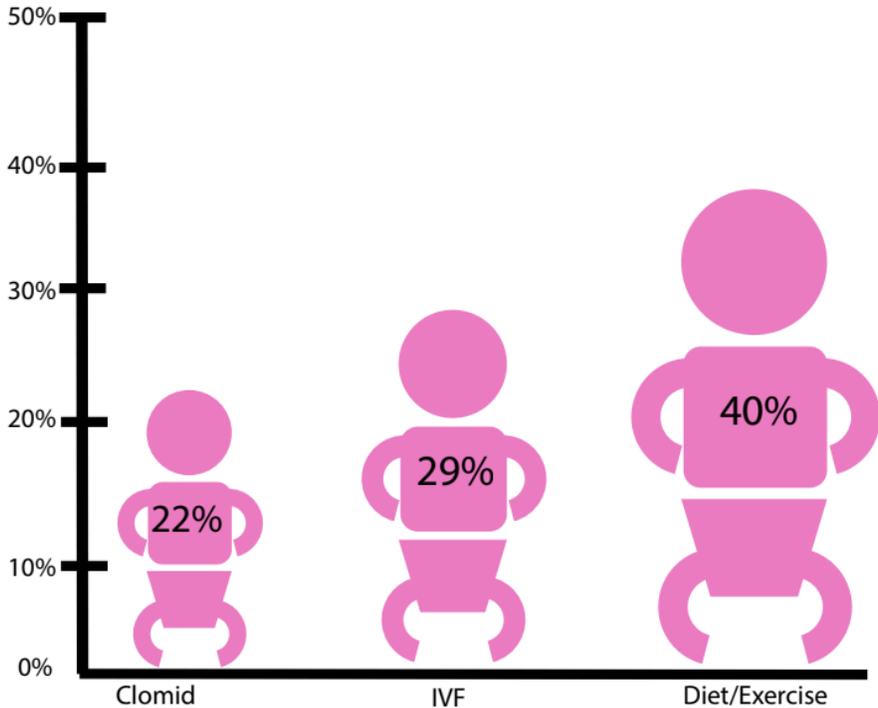


Figure 3. Side two version one.

Infertility Treatments and Their Benefits			
	Normal Newborn Birth Weight	Gestational Diabetes Prevention	Ovulation
Diet and Exercise	✓	✓	✓
In Vitro Fertilization	✗	✗	✓
Medication (Ex. Clomid)	✗	✗	✓

Figure 4. Side two version two.

Infertility Treatments and Their Benefits			
	Ovulation	Gestational Diabetes Prevention	Normal Newborn Birth Weight
Diet and Exercise	✓	✓	✓
In Vitro Fertilization	✓	✗	✗
Medication (Ex. Clomid)	✓	✗	✗

Figure 5. Side two version three.

Benefits of Infertility Treatments		Ovulation	Gestational Diabetes Prevention	Normal Newborn Birth Weight
Treatments	Diet and Exercise	✓	✓	✓
	In Vitro Fertilization	✓	✗	✗
	Medication (Ex. Clomid)	✓	✗	✗

Figure 6. Side two version four.

Benefits of Infertility Treatments				
		Benefits		
		Ovulation	Gestational Diabetes Prevention	Normal Newborn Birth Weight
Treatment	Diet and Exercise	✓	✓	✓
	In Vitro Fertilization	✓	✗	✗
	Medication (Ex. Clomid)	✓	✗	✗

Figure 7. Side two version five: The final version.