Improving Insulin Resistance Management in Women with Polycystic Ovarian Syndrome (PCOS): A Lifestyle Medicine Approach

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Abstract

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder affecting women of reproductive age and is closely associated with insulin resistance (IR). Primary care clinicians (PCCs) are well-positioned to identify and manage IR—one of the core pathophysiological features of PCOS that affects a significant percentage of women—through the implementation of evidence-based lifestyle interventions. IR significantly contributes to the development and progression of PCOS and its related comorbidities, including Type 2 diabetes and cardiovascular disease (Zhao et al., 2023). To adequately support patients with PCOS, PCCs require current knowledge of diagnostic criteria, treatment protocols, and lifestyle-based strategies, along with a foundational understanding of the condition and the ability to provide patient-centered care (Pirotta et al., 2021). Given that PCCs often serve as the first point of contact, they must be equipped to recognize early signs of PCOS and guide patients toward appropriate management. Following a structured literature review, ten (n = 10) Level I evidence studies (systematic reviews or meta-analyses) were selected. These studies emphasized the efficacy of lifestyle medicine interventions, specifically nutrition, exercise, sleep, and stress reduction, in improving insulin sensitivity, hormonal regulation, and overall quality of life in women with PCOS. The literature also revealed gaps in PCCs' knowledge, attitudes, and clinical practice behaviors, which contribute to delayed diagnoses, inconsistent treatment, and fragmented care delivery.

To address these challenges, a quality improvement (QI) project was implemented at a women's health primary care clinic in South Florida. The project aimed to enhance clinicians' knowledge, confidence, and practice behaviors related to IR management in PCOS. Clinicians were provided with evidence-based lifestyle approaches grounded in scientific research and supported by the Six Pillars of Lifestyle Medicine: nutrition, physical activity, restorative sleep,

stress management, avoidance of risky substances, and social connection. An educational intervention was delivered in person via a PowerPoint presentation during a lunchtime session. A total of 29 clinicians participated. Pre- and post-intervention surveys were administered and analyzed using a paired samples t-test. The results demonstrated measurable improvements across all domains: knowledge scores increased by 36.1% (pre-intervention mean = 3.05; post-intervention mean = 4.15), attitude scores improved by 40.0% (pre-mean = 3.19; post mean = 4.47), and practice behavior scores improved by 67.9% (pre-mean = 2.79; post mean = 4.68). A paired, two-tailed t-test revealed statistical significance ($p = 0.014$), supporting the rejection of the null hypothesis. These findings suggest that targeted, evidence-based education can significantly improve PCCs' knowledge, attitudes, and practice behaviors in managing IR in women with PCOS. Ongoing education and integration of lifestyle medicine principles into clinical practice are recommended to improve long-term outcomes for this population.

Keywords: primary care clinicians, PCOS, insulin resistance, lifestyle medicine, clinical education, quality improvement

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Introduction

Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age and is a leading cause of ovulatory infertility. The condition is characterized by hormonal imbalance, irregular menstrual cycles, and signs of hyperandrogenism such as acne, hirsutism, and polycystic ovarian morphology (Teede et al., 2018). Many women with PCOS also have metabolic complications, including insulin resistance (IR), dyslipidemia, and obesity (Wang et al., 2021). Although PCOS is frequently encountered in primary care settings, it often goes undiagnosed due to its heterogeneous presentation and symptom overlap with other conditions (Ehrmann, 2021).

The most widely accepted diagnostic criteria for PCOS are the Rotterdam criteria, which require the presence of at least two of the following: oligo- or anovulation, clinical or biochemical hyperandrogenism, and polycystic ovaries identified by ultrasound (Teede et al., 2018). While these criteria offer a standardized diagnostic framework, primary care clinicians (PCCs) often face challenges in applying them due to limited time, insufficient training in reproductive endocrinology, and uncertainty about the relevance of each criterion in diverse clinical scenarios (Teede et al., 2023). Moreover, clinical encounters often prioritize symptom relief, such as hormonal contraceptives or fertility treatments, over addressing the underlying metabolic dysfunction (Teede et al., 2023).

IR plays a central role in the pathophysiology of PCOS and contributes to many of its hallmark symptoms (Wang et al., 2021). Women with PCOS are at increased risk for long-term complications, including Type 2 diabetes, cardiovascular disease, and metabolic syndrome (Cameron et al., 2020; Wang et al., 2021). Early identification and intervention are crucial for preventing disease progression and reducing its clinical burden. However, screening and

management of IR remain inconsistent in primary care. This gap may stem from limited clinician awareness and variability in the application of evidence-based treatment strategies for the metabolic dimensions of PCOS (Teede et al., 2023).

In addition to its physical manifestations, PCOS imposes a significant psychosocial burden. Many women report frustration, diminished self-worth, and dissatisfaction with the care they receive (Ismayilova & Yaya, 2022). Psychological complications such as anxiety, depression, disordered eating, and negative body image are common (Maan et al., 2025). These issues can interfere with treatment adherence, strain interpersonal relationships, and reduce overall quality of life. Therefore, it is imperative that PCCs understand both the physiological and psychosocial aspects of PCOS to provide truly comprehensive care.

Problem Statement and Significance

Despite the availability of national and international guidelines, such as those from the Endocrine Society (Legro et al., 2013), the American College of Obstetricians and Gynecologists (ACOG, 2018), and the International PCOS Network (Teede et al., 2018), many women with PCOS remain undiagnosed or inadequately managed in primary care. This may be attributed to brief visit times, limited clinician training in metabolic disorders, and uncertainty regarding appropriate screening and treatment strategies (Teede et al., 2018). As a result, PCCs may overlook early signs of insulin resistance, thereby delaying interventions that could improve long-term outcomes. Research has shown that many PCCs report limited knowledge and confidence in their ability to identify and manage IR in women with PCOS (Dokras et al., 2017; Zhao et al., 2020). Concurrently, patients often express dissatisfaction with the clinical information provided, citing confusion, misinformation, and a lack of individualized care (Ismayilova & Yaya, 2022; Soucie et al., 2021). This disconnect between PCCs' knowledge,

attitudes, and practice behaviors contributes to fragmented care and missed opportunities for timely intervention.

Lifestyle intervention is the first-line recommendation for addressing PCOS-related IR (Gautam et al., 2025). However, many clinicians lack formal training in the application of lifestyle medicine frameworks. The Six Pillars of Lifestyle Medicine—nutrition, physical activity, restorative sleep, stress management, avoidance of risky substances, and social connection—provide an evidence-based structure for managing chronic metabolic conditions such as PCOS (American College of Lifestyle Medicine [ACLM], 2022). Integrating these principles into primary care practice can improve PCCs' knowledge, attitudes, and behaviors, ultimately supporting more sustainable health outcomes.

Scope of the Problem

PCOS also represents a substantial economic burden. In the United States, annual costs related to PCOS complications such as Type 2 diabetes and stroke are estimated to exceed $3.9 billion (Yadav et al., 2023). These figures do not account for indirect costs such as lost productivity, infertility care, or mental health services. As prevalence continues to rise, timely diagnosis and comprehensive management are critical to public health (Lin et al., 2025). PCCs are on the front lines of PCOS care and are uniquely positioned to identify symptoms early, order appropriate testing for IR, and counsel patients on lifestyle interventions. However, without sufficient knowledge and confidence in management strategies, many PCCs remain underprepared to address the complexity of the syndrome. An evidence-based educational intervention introducing lifestyle-focused management strategies can bridge this gap. Such interventions have the potential to improve PCCs' knowledge, attitudes, and behaviors, enhance patient outcomes, and reduce long-term healthcare costs.

Finally, PCOS is a lifelong condition requiring individualized, patient-centered care. Women may have a diverse range of reproductive, metabolic, and emotional symptoms (Ismayilova & Yaya, 2022), and a one-size-fits-all approach is inadequate (Teede et al., 2023). By promoting shared decision-making and equipping clinicians with a holistic, evidence-based framework, lifestyle-focused educational interventions can enhance the consistency, quality, and outcomes of PCOS management in primary care (ACLM, 2022).

Summary of the Literature

Literature Search Process

A structured literature search was conducted to evaluate the clinical problem of IR in women with PCOS and the impact of lifestyle interventions led by PCCs. Ten (n = 10) articles were selected based on their relevance to the project's PICOT question and represent the most current, evidence-based studies on the topic. These articles focused on lifestyle medicine applications in PCOS management, including nutritional strategies, physical activity, stress reduction, sleep hygiene, avoidance of risky substances, and social support. Additional considerations included diagnostic criteria used (e.g., Rotterdam, NIH), participants' BMI, and PCOS subtypes.

The databases used included CINAHL Ultimate, MEDLINE, and the National Institutes of Health (NIH). Keywords included "PCOS," "insulin resistance," "lifestyle interventions," "knowledge," "practice behaviors," and "lifestyle medicine." Boolean operators and truncation strategies (e.g., "PCOS AND insulin resistance AND lifestyle interventions") were applied to broaden results. Quotation marks were used to retain phrase integrity (e.g., "insulin resistance"), and asterisks were employed to capture word variations. The search yielded 152 articles: 15 from CINAHL, 17 from MEDLINE, and 120 from NIH. After screening titles and abstracts, narrative

reviews, qualitative studies, and non-systematic articles were excluded. Ultimately, one article was retained from CINAHL, one from MEDLINE, and eight from NIH. A total of 10 articles met the inclusion criteria and were retained for review as seen in Figure 1.

Inclusion Criteria

Studies included participants with PCOS across all ages, races, and geographic locations. Eligible interventions incorporated one or more of the Six Pillars of Lifestyle Medicine: whole-food nutrition, physical activity, stress management, restorative sleep, avoidance of risky substances, and social connection. Studies addressing pharmacologic management or diagnostic tools were included only if combined with lifestyle approaches. Relevant outcome measures included metabolic (e.g., insulin sensitivity, weight), hormonal (e.g., testosterone, ovulation), reproductive (e.g., fertility), and psychosocial (e.g., anxiety, depression, quality of life) outcomes. Only full-text, peer-reviewed systematic reviews and meta-analyses published between 2020 and 2025 in English were included.

Exclusion Criteria

Excluded studies included those not focused on PCOS or IR, abstracts without full-text availability, cohort and case-control studies, observational research, editorials, opinion pieces, theoretical papers, qualitative or mixed-method studies, studies prior to 2020, non-human studies, and those evaluating surgical interventions for PCOS. Duplicates across databases were also removed.

Selection of Sources of Evidence

Full-text articles meeting the inclusion criteria were thoroughly reviewed. The final 10 studies exclusively comprised systematic reviews and meta-analyses that directly addressed the PICOT question. Articles were primarily sourced from CINAHL, MEDLINE, and NIH, with

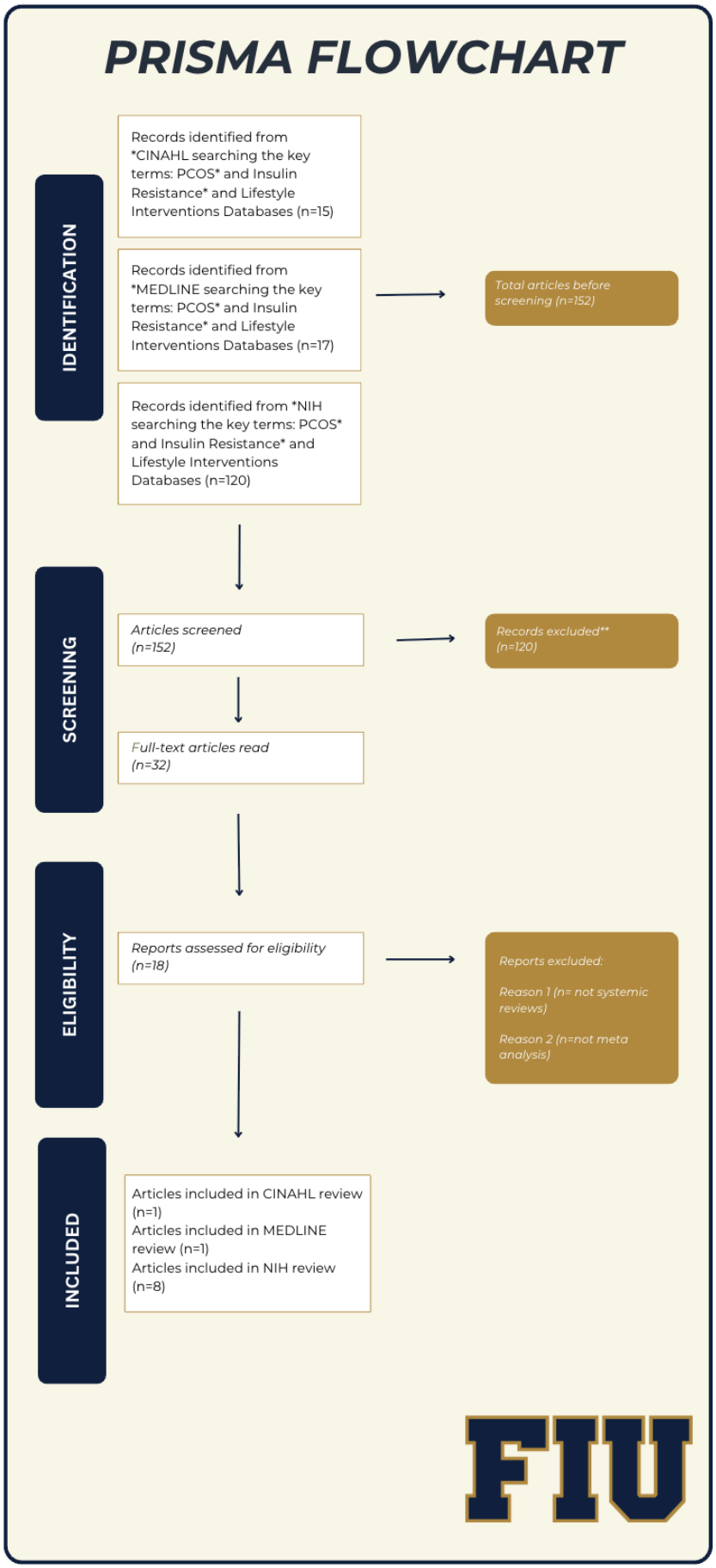
supplemental verification through Google Scholar to confirm access and relevance. According to Polit and Beck's (2021) Evidence Hierarchy Scale, these 10 articles represent Level I evidence, the highest quality available for intervention studies.

Synthesis of Results

The synthesis focused on studies with similar designs, outcomes, and intervention characteristics. Common outcomes included improvements in hormonal regulation, insulin sensitivity, menstrual regularity, weight loss, and quality of life. All studies involved women with PCOS undergoing lifestyle-based interventions. Only those aligned with the PICOT framework and offering actionable, non-pharmacologic strategies were included. Of 32 initially reviewed articles, 10 were retained for final analysis. The PRISMA flow chart created by Moher, Liberati, Tetziaff, and Altman (2009) was also used to illustrate the flow of information during the criteria selection process in Figure 1.

Figure 1

Criteria selection process


PRISMA FLOWCHART
IDENTIFICATION
Records identified from *CINAHL searching the key terms: PCOS* and Insulin Resistance* and Lifestyle Interventions Databases (n=15)
Records identified from *MEDLINE searching the key terms: PCOS* and Insulin Resistance* and Lifestyle Interventions Databases (n=17)
Total articles before screening (n=152)
Records identified from *NIH searching the key terms: PCOS* and Insulin Resistance* and Lifestyle Interventions Databases (n=120)
SCREENING
Articles screened (n=152)
Records excluded** (n=120)
Full-text articles read (n=32)
ELIGIBILITY
Reports assessed for eligibility (n=18)
Reports excluded:
Reason 1 (n= not systemic reviews)
Reason 2 (n=not meta analysis)
INCLUDED
Articles included in CINAHL review (n=1)
Articles included in MEDLINE review (n=1)
Articles included in NIH review (n=8)
FIU

Summary of the Literature: Evidence Related to the Clinical Question

Risk Factors

PCOS is a prevalent endocrine disorder among reproductive-aged women, marked by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology (Su, Chen, & Sun, 2025). IR is a core feature, contributing to metabolic disturbances and elevating the risk for Type 2 diabetes and cardiovascular disease. Treatment historically centers on irregular menses, acne, and hirsutism (Mann et al., 2025), with less focus on long-term risks like hypertension and cardiovascular disease. Many women remain unaware of these risks, missing opportunities for prevention (Kovell et al., 2021). PCOS is also associated with higher rates of depression, anxiety, bipolar disorder, and OCD, often presenting with greater severity (Yadav et al., 2023).

Cardiovascular Disease and Hypertension

Hypertension in PCOS has been linked to hyperaldosteronism, with studies reporting elevated aldosterone levels in affected women compared to age- and BMI-matched controls (Osibogun et al., 2020). Excess aldosterone can lead to sodium retention, contributing to high blood pressure (Cobb & Aeddula, 2023), a major risk factor for cardiovascular disease, the leading cause of death among women (Bird, 2022). Notably, it accounts for over one-third of maternal deaths and affects women across the lifespan (American Heart Association, 2023). Fortunately, up to 80% of cardiovascular disease cases are preventable through lifestyle modifications (Stampfer et al., 2021).

Type 2 Diabetes

As time progresses with PCOS, the body becomes more resistant to insulin, leading to Type 2 diabetes, a phenomenon known as IR. This is when their bodies produce insulin, a critical hormone for blood sugar regulation, but cells in the muscle, fat, and liver do not respond to

insulin as they should. As insulin becomes more resistant in the body, the likelihood of Type 2 diabetes rises and can then lead to many more deadly complications correlated to heart disease and stroke (Diabetes and Polycystic Ovary Syndrome (PCOS), 2024). Long-term, low-grade inflammation causes a rise in glucose levels in these patients, stimulating oxidative stress, resulting in IR. According to Wang et al. (2021), IR is a core pathophysiological feature of PCOS and a major contributor to long-term metabolic complications. Unfortunately, by the time most women with PCOS turn 40, more than half are diagnosed with Type 2 diabetes (Centers for Disease Control and Prevention [CDC], 2024).

Endometrial Cancer

Endometrial cancer is a type of cancer that forms in the lining of the uterus, which is referred to as the endometrium. It develops when cells in the endometrium grow out of control (American Cancer Society, 2019). It is the most prevalent gynecological cancer in the United States (American Cancer Society, 2019). Endocrinologic and metabolic abnormalities associated with PCOS may have complex effects on the endometrium, including increased expression of androgen and steroid receptors, which contribute to endometrial dysfunction (Johnson et al., 2023). Chronic anovulation in PCOS is a major factor in exposing the endometrium to prolonged unopposed estrogen, contributing to an elevated lifetime risk of endometrial cancer, which may be as high as 12–15% (Li et al., 2025). In a recent study, Li et al. (2025) developed a risk prediction model showing that premenopausal women with chronic anovulation, such as those with PCOS, face a significantly increased risk of developing endometrial hyperplasia and endometrial carcinoma due to prolonged exposure to unopposed estrogen.

Mental Health

Women who suffer from PCOS can have debilitating mental health issues such as anxiety, depression, and a negative body image due to increased abdominal fat that can impact how women perceive themselves (WHO, 2023; Yadav et al., 2023). Body image is a major issue that affects women with PCOS and has an impact on mental health. Body image issues involve preoccupation and dissatisfaction with the look of the body, including its shape, weight, and other traits (Rodgers et al., 2023). It is prevalent across the globe due to tremendous pressures to seek appearance ideals. With all these factors combined, women with PCOS may experience anxiety related to appearance, which can develop into depression due to difficulties achieving societal beauty standards (Smith et al., 2025). Some symptoms, such as infertility, obesity, and excessive hair growth on the face and legs, can result in societal stigma (World Health Organization [WHO], 2023). This stigma, along with the emotional burden, can affect various aspects of life, including family, relationships, employment, and community involvement (Smith et al., 2025; WHO, 2023). Ultimately, by addressing these psychosocial consequences, PCCs can help alleviate the significant morbidity associated with PCOS.

Knowledge Gaps

Further research and delivery of information by PCCs on PCOS women is warranted, as this patient population is extremely high-risk and yet profoundly understudied (Kovell et al., 2021). There is no one-size-fits-all approach for this patient population; therefore, this results in more dissatisfied women, as their needs and wants are not being met, which hinders their overall quality of life (Copp et al., 2022). There is a lack of information on women's health that can significantly impact healthcare disparities, and there is a notable scarcity of research funding (Brinton et al., 2022). Concerns surrounding the diagnosis and treatment of PCOS often stem from its complexity and variability in how it manifests in different women (Teede et al., 2023).

These challenges highlight significant opportunities for clinical education, particularly in understanding and applying evidence-based guidelines that address the reproductive, metabolic, and psychological aspects of PCOS. These knowledge gaps greatly influence the care and outcome of women with PCOS. These gaps will be discussed in the following paragraphs.

Gaps in Clinician Education and Practice

Research consistently highlights significant gaps in the diagnosis, management, and counseling of women with PCOS within primary care settings. A global survey by Teede et al. (2023) revealed that over 50% of healthcare clinicians reported low confidence in managing the metabolic and reproductive aspects of PCOS, particularly regarding lifestyle counseling. Additionally, studies indicate that up to 70% of women with PCOS remain undiagnosed or experience delayed diagnosis due to inconsistent application of diagnostic criteria by clinicians (Teedee et al., 2023; Wolf et al., 2022; Zhao et al., 2020).

Further evidence shows that while lifestyle modification is recognized as first-line therapy in PCOS management, it is frequently underutilized in practice. Dokras et al. (2021) found that fewer than 40% of clinicians routinely offer structured lifestyle counseling, citing barriers such as limited time, inadequate training, and lack of practical tools to guide patient education. Moreover, a systematic review by Johansson et al. (2020) identified a deficiency in clinician adherence to evidence-based guidelines, with many clinicians defaulting to pharmacologic management without integrating holistic, lifestyle-focused strategies.

These findings underscore a critical need for targeted educational interventions aimed at improving PCCs' knowledge, attitudes, and practice behaviors of lifestyle medicine principles in PCOS care. Enhancing PCCs' competency through structured education, this DNP Project aims

to address these documented gaps, promote earlier diagnosis, and ensure comprehensive, patient-centered care aligned with current guidelines.

Summary of the Literature: The Six Pillars of Lifestyle Medicine

"N.O.U.R.I.S.H."

In primary care settings, this project evaluates whether providing a structured educational intervention based on the Six Pillars of Lifestyle Medicine can improve PCCs' knowledge, attitudes, and practice behaviors regarding IR management in women with PCOS. To enhance the intervention's sustainability and clinical application, the NOURISH mnemonic (Nutrition, Ongoing Physical Activity, Unwind, Restorative Sleep, Intention to Avoid Risky Substances, Social Connection, Healthy Habits for Life) was integrated as a cognitive and communication tool.

Recent evidence supports the use of mnemonics to enhance knowledge retention and patient education. Mnemonic strategies have demonstrated positive effects on learning outcomes, clinical communication, and recall of complex health concepts (Kim & Park, 2024). Furthermore, structured mnemonics help guide clinician-patient communication, especially in lifestyle counseling and behavior change interventions, by providing a consistent and memorable framework (Schmid Mast et al., 2023).

Nutrition (NOURISH: Nutrition)

Nutritional counseling is a foundational element in managing PCOS, given its significant impact on IR, hyperandrogenism, and weight regulation. Evidence supports the effectiveness of low-glycemic index, anti-inflammatory, and Mediterranean-style diets in improving metabolic and reproductive outcomes in women with PCOS (Moran et al., 2022). PCCs can initiate conversations around nutrition by focusing on empowerment rather than restriction, using

prompts like, *"Have you noticed how certain foods affect your energy or symptoms?"* or *"Would you be interested in simple dietary changes that can support hormone balance?"* This approach opens the door for collaborative goal setting. Practical guidance should prioritize achievable steps, such as increasing the intake of whole foods, lean proteins, healthy fats, and fiber-rich vegetables, while reducing the consumption of processed carbohydrates and added sugars. Clinicians can also address common nutritional deficiencies in PCOS, such as vitamin D and omega-3 fatty acids, and recommend evidence-based supplements, including inositol (Unfer et al., 2022). Providing referrals to dietitians familiar with PCOS, offering meal planning resources, or recommending credible nutrition apps can further support patients in making sustainable dietary changes. By framing nutrition as a tool for hormonal balance and symptom management, PCCs can foster patient engagement and long-term adherence.

Physical Activity (NOURISH: Ongoing Physical Activity)

Regular physical activity is a critical lifestyle intervention for improving insulin sensitivity, regulating menstrual cycles, and reducing cardiometabolic risk in women with PCOS. Both aerobic exercise and resistance training have been shown to have significant benefits, independent of weight loss (Harrison et al., 2021). PCCs can effectively introduce this topic by asking, *"What types of movement do you enjoy, or feel you could realistically incorporate into your week?"* This patient-centered approach emphasizes enjoyment and sustainability over rigid exercise prescriptions. Practical recommendations include encouraging at least 150 minutes of moderate aerobic activity per week, combined with strength training exercises two to three times a week (ACOG, 2021). However, clinicians should reassure patients that any increase in physical activity, such as walking, yoga, or short home workouts, is beneficial. Suggesting strategies such as setting small, attainable movement goals, using fitness trackers for motivation, or partnering

with a friend for accountability can help enhance adherence. Emphasizing that consistency is more important than intensity helps patients view physical activity as a manageable and rewarding part of their PCOS care plan.

Stress Management (NOURISH: Unwind)

Psychological stress is highly prevalent among women with PCOS and has been shown to exacerbate IR, hyperandrogenism, and menstrual irregularities due to elevated cortisol levels (Cooney et al., 2020). PCCs play a critical role in addressing this often-overlooked component of PCOS care. Initiating conversations about stress can begin with simple, open-ended questions such as, *"How have you been managing stress lately?"* or *"Do you notice your symptoms worsening during stressful periods?"* These questions normalize discussions around mental health and allow PCCs to assess psychological burden without stigma. Evidence supports the integration of stress-reduction interventions, such as mindfulness-based stress reduction (MBSR), yoga, breathing exercises, and cognitive-behavioral therapy (CBT), as effective tools for improving both mental health and metabolic outcomes in PCOS (Stathopoulou et al., 2023). PCCs can offer practical tips, such as encouraging patients to engage in daily mindfulness practices (even 5-10 minutes), recommending apps for guided meditation, or suggesting gentle physical activities like yoga, which address both stress and physical inactivity. Additionally, educating patients about the physiological connection between chronic stress, cortisol dysregulation, and worsening PCOS symptoms empowers them to prioritize stress management as a core aspect of their treatment plan (Toscani et al., 2023). By proactively guiding these conversations and offering accessible strategies, PCCs can significantly enhance patient engagement and improve overall outcomes in PCOS care.

Restorative Sleep (NOURISH: Restorative Sleep)

Sleep disturbances, including poor sleep quality and obstructive sleep apnea (OSA), are common in women with PCOS and are strongly associated with worsening IR, weight gain, and hormonal imbalance (Zhang et al., 2021). PCCs can lead discussions on sleep by normalizing its role in metabolic health, asking questions like, *"How are you sleeping lately?"* or *"Do you feel rested when you wake up?"* Such inquiries can uncover sleep issues that may otherwise go unaddressed. When sleep concerns arise, PCCs should provide practical tips on improving sleep hygiene, such as establishing a consistent bedtime routine, limiting screen time before bed, reducing caffeine intake in the late afternoon, and creating a dark and quiet sleep environment (Grandner et al., 2022). For patients with risk factors such as obesity or daytime fatigue, screening for OSA is essential, with referrals for sleep studies made when indicated. Educating patients on the connection between restorative sleep and hormone regulation empowers them to prioritize sleep as a key component of PCOS management (Kulkarni et al., 2023). Simple tools, such as sleep tracking apps or relaxation techniques, can further support improvements in sleep quality and, consequently, metabolic health.

Avoidance of Risky Substances (NOURISH: Intention to Avoid Risky Substances)

The avoidance of harmful substances such as tobacco, excessive alcohol, and endocrine-disrupting chemicals (EDCs) is a crucial yet often underemphasized aspect of managing PCOS. These substances are associated with worsened IR, increased androgen levels, and greater long-term metabolic risk (González et al., 2022). PCCs can effectively lead this conversation by framing it within the context of hormonal balance and metabolic health, using patient-centered language such as, *"Some everyday exposures can make it harder to manage PCOS—would you be open to discussing a few lifestyle adjustments that could support your hormones?"* This approach fosters openness without judgment. Practical counseling should include routine

screening for tobacco and alcohol use, followed by brief interventions or referrals to cessation programs when necessary. Additionally, PCCs can educate patients about EDCs—common in plastics, personal care products, and non-stick cookware—by offering simple, actionable tips like switching to glass or stainless-steel containers, avoiding microwaving food in plastic, choosing BPA-free products, and using fragrance-free or natural personal care items (Kim et al., 2023). Providing handouts or trusted resources, such as environmental health websites or guides on clean living, can further empower patients. By integrating these conversations into routine care, PCCs help patients recognize the impact of environmental and behavioral factors on PCOS, supporting long-term endocrine and metabolic health through informed lifestyle choices.

Social Connection (NOURISH: Social Connection)

Social isolation, stigma, and reduced quality of life are common experiences among women with PCOS, contributing to higher rates of anxiety, depression, and poor adherence to lifestyle interventions (Patten et al., 2021). Strong social connections, including emotional and perceived social support, are associated with better mental health outcomes, greater motivation, and more effective self-management of chronic conditions, through mechanisms such as enhanced resilience and empowerment (Holt-Lunstad, 2024; Lin et al., 2023). PCCs can lead this conversation by asking compassionate, open-ended questions such as, *"Who do you have around you for support as you manage your health?"* or *"Do you feel connected to a community or group that understands what you're going through?"* These prompts encourage patients to reflect on their social networks and identify areas where support may be lacking. When gaps are identified, PCCs can recommend practical strategies, such as joining PCOS-specific support groups—many of which are available online for greater accessibility—or participating in community wellness programs, group fitness classes, or mindfulness workshops that offer both

health benefits and social engagement. Encouraging patients to involve family or friends in their lifestyle changes, like cooking healthy meals together or exercising as a pair, can further reinforce accountability and emotional support. Additionally, PCCs should be mindful of signs of social withdrawal or mental health concerns and provide referrals to counseling or peer support services when appropriate (Hollinrake et al., 2021). By fostering conversations about social connection, PCCs empower patients to build supportive environments that enhance resilience, promote adherence to lifestyle modifications, and improve overall quality of life in managing PCOS.

Bridging the Gap in Lifestyle Medicine Among Clinicians

Despite the growing recognition of lifestyle medicine as a foundational component in chronic disease management, significant gaps remain in formal education across medical, nurse practitioner (NP), and physician assistant (PA) programs. A global survey by Lianov and Johnson (2022) reported that fewer than 25% of medical schools incorporate dedicated lifestyle medicine curricula, leaving future PCCs underprepared to implement evidence-based lifestyle interventions. Similarly, Dacey et al. (2021) found that NP and PA programs offer limited training in areas such as nutrition, physical activity counseling, and behavior change strategies, despite these being critical competencies for managing metabolic conditions like PCOS. As a result, practicing PCCs frequently report limited knowledge, attitudes, and practice behaviors in delivering lifestyle-based care. For example, a study by Howe et al. (2023) revealed that over 60% of PCCs felt inadequately trained to counsel patients on lifestyle modifications, citing lack of education and practical tools as key barriers. These findings underscore a clear educational gap, highlighting the need for targeted interventions—such as structured frameworks like N.O.U.R.I.S.H.—to equip PCCs with the knowledge, attitudes, and practice behaviors needed to

apply lifestyle medicine principles effectively in practice, particularly for complex, lifestyle-driven conditions like PCOS.

Summary of the Literature

Educating individuals about PCOS risks and evidence-based interventions to manage IR may enhance PCCs' knowledge base and confidence levels, ultimately leading to improved practice behaviors and positive patient outcomes. The literature consistently highlights significant gaps in clinician awareness, inconsistent application of diagnostic criteria, and underutilization of lifestyle medicine strategies. By addressing these gaps through targeted educational initiatives, clinicians are better positioned to offer timely, comprehensive care for women with PCOS. Therefore, the findings from this review provide a strong foundation for the QI framework guiding this project. An analysis of the individual studies from this review is summarized in Appendix A.

Quality Improvement Project

Purpose

The purpose of this QI project is to provide a structured, evidence-based educational intervention to enhance clinicians’ knowledge, attitudes, and clinical practices related to IR management in women with PCOS and assess changes in PCCs' knowledge, attitudes, and practice behaviors. The primary goal of developing this intervention, based on the Six Pillars of Lifestyle Medicine, is to equip clinicians with practical, guideline-based tools to support the early identification, patient counseling, and non-pharmacological management of IR. By addressing existing gaps in clinical knowledge, attitudes, and practice behaviors, this project aims to provide PCCs with a standardized, structured, evidence-based protocol specific to PCCs' responsibilities when caring for women with PCOS in primary care settings. This project also

aims to promote a holistic approach to health and well-being that emphasizes evidence-based lifestyle interventions when treating and managing women diagnosed with PCOS in primary care settings.

Clinical Question

In primary care settings (P), does providing a structured educational intervention on managing IR in women diagnosed with PCOS using The Six Pillars of Lifestyle Medicine as a framework (I), compared to no educational intervention (C), improve their knowledge, attitudes, and practice behaviors of PCOS care (O) over a two-week period (T)?

- **P**opulation: Primary care
- **I**ntervention: Education Intervention
- **C**omparison: None
- **O**utcome: Increase PCOS care
- **T**ime: Two-weeks

Goals

Goals that are specific, measurable, achievable, relevant, and time-bound (SMART) were used to provide a clear framework for setting project objectives, ensuring accuracy and accountability. (Stewart et al., 2024). The SMART framework also provided a means for assessing the success of project improvement efforts.

Specific

Deliver targeted evidence-based information and interventions on managing IR and PCOS using the Six Pillars of Lifestyle Medicine, which include nutrition, physical activity, stress management, sleep, social connections, and avoidance of risky substances to help guide PCCs in primary care settings.

Measurable

Evaluate pre- and post-intervention changes with a target of achieving a 25% improvement in knowledge, attitudes, and practice behaviors.

Achievable

This goal is achievable since PCCs can incorporate the information seamlessly into their practice and will not cause any major disruption to regular practice operations.

Relevant

The seminar will equip PCCs with the most current evidence-based information to effectively educate women with PCOS. It will also provide them with practical, evidence-based lifestyle changes that can improve their symptoms, support hormonal balance, and enhance overall well-being. This activity is intended to improve clinical practice.

Time

Two weeks will provide PCCs with the time to adjust and practice the intervention. It will also ensure that pre- and post-surveys are collected with enough time to analyze the findings.

Objectives

The primary objectives of this project were to develop and implement an evidence-based educational intervention aimed at enhancing PCCs' knowledge, attitudes, and practice behaviors related to the management of IR in women with PCOS. First, a structured educational PowerPoint presentation was created, grounded in the Six Pillars of Lifestyle Medicine, to introduce clinicians to lifestyle-centered approaches for PCOS management. Second, a pre- and post-test survey was developed to assess changes in PCCs' knowledge, attitudes, and practice behaviors following the intervention. Additional objectives included evaluating the effectiveness of the intervention through statistical analysis using paired t-tests, identifying knowledge and

practice gaps among PCCs regarding lifestyle-based PCOS care, and promoting sustainable clinical practice changes by encouraging routine screening for IR and the application of non-pharmacologic, guideline-aligned interventions. The overarching goal was to support primary care teams in delivering proactive, patient-centered care that addresses the root causes of metabolic dysfunction in women with PCOS. Additionally, by engaging PCCs in practice reform, this project helps to facilitate effective and meaningful clinical practice changes.

Definition of Terms

Polycystic Ovary Syndrome (PCOS)

Polycystic Ovary Syndrome (PCOS) is a hormonal disorder common among women of reproductive age, characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology (Teede et al., 2023). It is associated with metabolic disturbances such as IR, obesity, and an increased risk of cardiovascular disease (Dubey et al., 2024).

Insulin Resistance

Insulin Resistance (IR) is a condition in which the body's cells become less responsive to the hormone insulin, leading to elevated blood glucose levels (Lee et al., 2022). It is a central feature of PCOS and contributes to the development of Type 2 diabetes and other metabolic complications.

Lifestyle Medicine

Lifestyle medicine is a medical approach that uses evidence-based lifestyle therapeutic interventions, including nutrition, physical activity, stress management, sleep, social support, and avoidance of risky substances as a primary modality to prevent, treat, and often reverse chronic disease (American College of Lifestyle Medicine, 2023).

Lifestyle Intervention

Lifestyle Intervention is a structured program designed to promote healthy behaviors, including improved nutrition, increased physical activity, and weight loss. In the context of PCOS, lifestyle interventions are considered first-line treatment to improve insulin sensitivity and overall health outcomes.

Primary Care Clinician (PCC)

Primary Care Clinician (PCC) is a healthcare professional who practices general medicine and is often the first point of contact for patients. PCCs play a critical role in the early identification and management of PCOS in women.

Conceptual Underpinning

Theoretical Framework

This QI project is guided by Kurt Lewin's Change Theory, which provides a process-oriented model for implementing and sustaining behavioral change among PCCs. The theory includes three stages: unfreezing, changing, and refreezing (Lewin, 1951). In the context of this project, the unfreezing phase involved identifying knowledge gaps and inconsistent practice behaviors in the management of IR in women with PCOS. The changing phase was operationalized through a structured educational intervention that provided evidence-based content to enhance clinician knowledge, attitudes, and practice behaviors. The refreezing phase reinforced these changes by offering continued access to educational materials and encouraging sustained clinical application. Lewin's Change Theory is particularly well-suited for clinical education interventions, as it emphasizes the importance of both preparation for change and reinforcement of new behaviors. The structured nature of the model aligns with the project's goal, which is to enhance PCCs' knowledge, attitudes, and practice behaviors related to lifestyle-

based interventions for PCOS. By providing a clear sequence for implementation, Lewin's framework supports effective integration of new knowledge into daily practice (Burnes, 2020).

The integration of Lewin's Change Theory and the Lifestyle Medicine framework offers a comprehensive and evidence-based foundation for this project. Lewin's theory was selected to guide the behavioral change process among PCCs, ensuring that new knowledge and skills acquired during the intervention would be retained and translated into routine practice. Meanwhile, the Lifestyle Medicine framework provides the clinical substance necessary for managing PCOS through sustainable, patient-centered strategies.

Research supports the need for enhanced education in lifestyle medicine across healthcare disciplines, especially among PCCs who are often the first point of contact for women with PCOS (Dacey et al., 2021; Lianov & Johnson, 2022). By combining an implementation-focused theory with a clinically relevant content framework, this project addresses both the educational process and the clinical competencies needed to improve outcomes in this patient population.

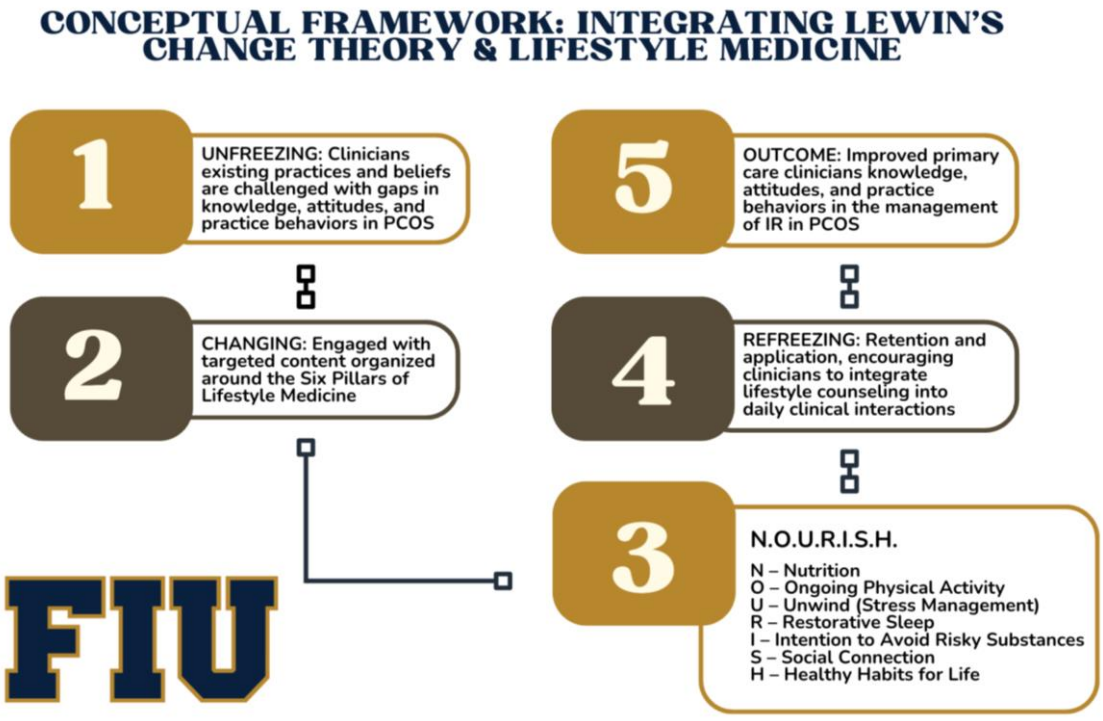
Conceptual Model

Figure 2 presents the conceptual model for this project. At the core is the educational intervention, which incorporates the structured stages of Lewin's Change Theory alongside the evidence-based principles of the Lifestyle Medicine framework. In the unfreezing phase, clinicians' existing practices and beliefs were challenged with current gaps in PCOS care, including the underdiagnosis of insulin resistance and the underutilization of lifestyle-based strategies. This phase aimed to create awareness and motivation for change. During the transition phase, participants engaged with a structured educational module centered on the Six Pillars of Lifestyle Medicine, which included practical strategies such as low-carbohydrate, ketogenic, or

ketovore dietary approaches (Morales et al., 2022). This content helped shift their attitudes and behaviors toward more proactive, root-cause–oriented care. Finally, the refreezing phase focused on stabilizing these changes by providing lasting tools, such as the N.O.U.R.I.S.H. mnemonic and a clinical brochure, to support integration into daily workflows. These resources helped reinforce learning, encourage consistent practice, and promote long-term behavior change. Overall, this conceptual integration ensures that the intervention is both meaningful and sustainable, ultimately supporting a more holistic, lifestyle-centered approach to managing PCOS in primary care settings.

Figure 2.

Conceptual model



Note: Figure 2 illustrates the conceptual framework integrating Lewin's Change Theory with the Six Pillars of Lifestyle Medicine using the N.O.U.R.I.S.H. mnemonic to guide clinicians through unfreezing, changing, and refreezing stages toward improved insulin resistance management in women with PCOS.

Methodology

Setting

This QI project was implemented at a primary care clinic that provides comprehensive women's health services, including preventive care, chronic disease management, and lifestyle counseling. The clinic serves a diverse patient population and offers an appropriate setting to evaluate the impact of primary care clinician education on managing IR in women with PCOS.

Participants and Recruitment

Participants included licensed PCCs, such as medical doctors (MDs), nurse practitioners (NPs), and physician associates (PAs), who were actively involved in the care of adult female patients at Lady's Care Center, with the assistance of the medical director and office manager. A total of 29 (n=29) PCCs participated in the study. All the participants were informed of the study's purpose, the voluntary nature of participation, and the confidentiality safeguards in place.

Design

The project followed a quasi-experimental research design. This project used a pre-test/post-test design to evaluate changes in knowledge, attitudes, and practice behaviors related to IR management in women with PCOS. The intervention consisted of a structured PowerPoint (PPT)-based educational session focused on the Six Pillars of Lifestyle Medicine: nutrition, physical activity, restorative sleep, stress management, avoidance of risky substances, and positive social connection. The intervention aimed to enhance PCCs' understanding of lifestyle-based strategies aligned with current PCOS guidelines.

Intervention

Informed consents were obtained from all participants via Qualtrics. A 20-minute educational presentation was developed and delivered in-person to the participants during the staff lunch break. The PPT presentation included text, graphics, charts, and the latest information

on PCOS. The participants completed pre- and post-intervention surveys. Within the surveys, a demographic questionnaire was incorporated that assessed the PCCs' sex, age, educational level, and years of experience.

The pre-intervention survey assessed baseline knowledge, attitudes, and practice behaviors concerning PCOS and IR. After the intervention, the same survey was administered to evaluate changes across the domains. Having the pre- and post-surveys be the same helped establish the internal validity of the study, as the aim was to determine whether the intervention increased knowledge, attitudes, and changes in clinical practice.

Data Collection

Surveys were completed individually and were expected to take 15-20 minutes to complete. Participants were then provided with a PowerPoint educational presentation, which lasted approximately 20 minutes. Two weeks after the educational session, all 32 participants (n = 32) were invited to complete the post-intervention questionnaire via an electronic link. The post-test was identical to the pre-test and was also expected to take approximately 20 minutes to complete. A total of 29 participants (n = 29) successfully completed the post-survey.

Data Analysis and Management

Descriptive statistics were used to summarize participant demographics. Paired t-tests were conducted to compare pre- and post-intervention scores across knowledge, attitudes, and practice behaviors. Analyses were performed using SPSS (version 27), with statistical significance set at $p < 0.05$. All data was stored on a password-protected, encrypted system accessible only to the project lead to ensure data integrity and confidentiality.

Protection of Human Subjects

This project received approval from the Institutional Review Board (IRB) at Florida International University. Informed consent was obtained from all participants prior to their involvement. Participation was voluntary, and individuals were informed of their right to withdraw at any time without penalty. All data were anonymized, and no identifying information was linked to the participants' responses. No identifiable private information was collected from the participants.

Benefits

The primary benefit of this intervention was the enhancement of PCCs' knowledge, attitudes, and practice behaviors regarding lifestyle-based management of IR in women with PCOS. The session aimed to equip clinicians with practical, evidence-based tools to apply lifestyle medicine principles more effectively in routine care.

Risks

The risks associated with this project were minimal. The primary concern was the potential for selection bias due to the voluntary nature of participation. No patient data was collected, and participation posed no direct risks to patients. Self-reported measures may have introduced response bias, though participants were assured that their responses were confidential and would be used solely for quality improvement purposes.

Results

This quality improvement project evaluated whether a structured educational session could influence PCCs' knowledge, attitudes, and reported practice behaviors related to PCOS and lifestyle medicine. Thirty-two clinic staff members were invited to participate in the intervention, and all attended the session. Of these, 32 completed the pre-intervention survey,

while 29 completed the post-intervention survey. Therefore, data sets were collected from a total of 29 (n=29) participants. Responses were matched using unique identifier codes; unmatched surveys were excluded from analysis. Paired pre- and post-survey data from 29 participants were analyzed using descriptive statistics and paired t-tests. The results assessed changes in PCCs' understanding of IR, attitudes toward lifestyle counseling, and reported use of guideline-based, non-pharmacologic interventions for PCOS.

Demographics

Table 1

Participant Demographic Data

	Count (n=29)	**Percentage (%)**
Gender		
Male	11	37.9%
Female	18	62.1%
Age		
18-24	3	10.3%
25-34	6	20.7%
35-44	8	27.6%
45-54	4	13.8%
55-65	8	27.6%
Ethnicity		
White	4	13.8%
Hispanic or Latino	15	51.7%
Black or African American	5	17.2%
Asian	4	17.2%
Native American or Pacific Islander	0	0.00%
Other	0	0.00%
Highest Level of Education		
High School	3	10.3%
Associate's degree	4	13.8%
Bachelor’s Degree	10	34.5%
Master’s Degree	4	13.8%

Doctoral Degree	4	13.8%
Other	4	13.8%
Occupation		
Fill in the blank:		
Nurse Practitioner	7	24.1%
Medical Doctor	4	13.8%
Registered Nurse	8	27.6%
Medical Assistant	5	17.2%
Front desk	5	17.2%
Title		
Fill in the blank:		
NP	7	24.1%
MD	4	13.8%
RN	8	27.6%
MA	5	17.2%
MR	5	17.2%

Participant Sample

The participants' demographic data are summarized in Table 1. Out of the 29 participants in the matched pre- and post-intervention sample, 18 (62.07%) were females and 11 (37.93%) were males. Regarding age distribution, 3 (10.34%) participants were between 18 and 24 years old, 6 (20.69%) were between 25 and 34, 8 (27.59%) were between 35 and 44, 4 (13.79%) were between 45 and 54, and 8 (27.59%) were between 55 and 64 years old. 15 participants (51.72%) identified as Hispanic/Latino, 5 (17.24%) as Black/African American, 4 (13.79%) as White, and 5 (17.24%) as Asian.

In terms of educational background, 3 (10.34%) participants had a high school diploma, 4 (13.79%) held an associate degree, 10 (34.48%) held a bachelor's degree, 4 (13.79%) had a master's degree, 4 (13.79%) held a doctoral degree, and 4 (13.79%) were licensed medical doctors (MDs). The sample included a range of clinical and administrative roles. Participants' current occupations included 8 (27.59%) registered nurses (RNs), 5 (17.24%) front desk or

medical receptionists, 5 (17.24%) medical assistants (MAs), 7 (24.14%) nurse practitioners (NPs), and 4 (13.79%) medical doctors (MDs). In terms of professional titles, 7 (24.14%) participants were nurse practitioners (NPs), 8 (27.59%) were registered nurses (RNs), 5 (17.24%) were medical assistants (MAs), 4 (13.79%) were medical doctors (MDs), and 5 (17.24%) were medical receptionists (MRs).

Pre- and Post-Intervention Results

Knowledge

The participants' pre-intervention survey mean score for knowledge related to PCOS was 3.6 (SD = 0.52). After the educational intervention, the post-intervention mean score increased to 4.9 (SD = 0.28), representing a 36.1% change. A summary of the knowledge-related survey items is provided in Table 2. As shown in Table 2, participants demonstrated changes in specific areas of knowledge following the intervention. For example, the proportion of PCCs who self-rated as "familiar" or "very familiar" with the long-term cardiometabolic risks associated with PCOS increased from 45.8% to 79.6%, a 33.8% change. Correct identification of evidence-based lifestyle guidelines for managing IR in PCOS increased from 48.3% to 86.2% (+37.9%). Familiarity with non-reproductive symptoms such as anxiety and insomnia increased from 41.3% to 82.7% (+41.4%). Additionally, the proportion of clinicians who reported regularly applying PCOS-related knowledge in clinical practice increased from 28.6% to 75%, representing a 46.4% rise. These findings reflect changes in PCCs' understanding of PCOS pathophysiology, clinical presentation, and lifestyle-centered management strategies. Detailed item-level responses are provided in Table 2.

Table 2

Participant's Knowledge about IR and PCOS Pre- and Post-Intervention Scores

`	**Pre-Intervention (%)**	**Post-Intervention (%)**	**% Change**
How familiar are you with current evidence linking PCOS to long-term cardiovascular and metabolic risks?			
Not familiar at all	6.9	0.0	6.9 ↓
Slightly familiar	13.79	3.45	10.34 ↓
Somewhat familiar	34.48	13.79	20.69 ↓
Familiar*	31.03	41.38	10.35 ↑
Very familiar*	13.79	41.38	27.59 ↑
To what extent do you apply this information in clinical practice?			
Never	10.34	0.0	10.34 ↓
Rarely	17.24	0.0	17.24 ↓
Occasionally	34.48	10.34	24.14 ↓
Regularly*	24.14	41.38	17.24 ↑
Consistently*	13.79	48.28	34.49 ↑
How familiar are you with non-reproductive symptoms of PCOS (e.g., anxiety, depression, insomnia)?			
	6.9	0.0	6.9 ↓
Not familiar at all	17.24	3.45	13.79 ↓
Slightly familiar	41.38	10.34	31.04 ↓
Somewhat familiar	20.69	44.83	24.14 ↑
Familiar*	13.79	41.38	27.59 ↑
Very familiar*			
How familiar are you with the most current pharmacologic treatments for insulin resistance and hyperandrogenism in PCOS?			

Not familiar at all	10.34	0.0	10.34 ↓
Slightly familiar	20.69	3.45	17.24 ↓
Somewhat familiar	31.03	13.79	17.24 ↓
Familiar*	24.14	44.83	20.69 ↑
Very familiar*	13.79	37.93	24.14 ↑
How familiar are you with current dietary and lifestyle recommendations for managing PCOS?			
	3.45	0.0	3.45 ↓
Not familiar at all	10.34	0.0	10.34 ↓
Slightly familiar	31.03	6.9	24.13 ↓
Somewhat familiar	34.48	37.93	3.45 ↑
Familiar*	20.69	55.17	34.48 ↑
Very familiar*			

Note: % Change= Percent Change, *= Correct answer, ↑ = Increase in percent change, ↓ = Decrease in percent change

Two-Tailed Paired Samples t-Test

A two-tailed paired samples t-test was performed to assess whether the difference in knowledge scores from pre- to post-intervention was statistically different from zero. The effect size, Cohen's *d*, was 2.63, indicating a large magnitude of change. The result was statistically significant at the alpha level of 0.05, $t(2) = -8.26$, $p = 0.014$. The t-statistic fell outside the 95% region of acceptance (–2.920 to 2.920), supporting the rejection of the null hypothesis. The results of the paired samples t-test are summarized in Table 3, and a visual representation of the pre- and post-intervention knowledge scores is presented in Figure 3.

Table 3

Two-Tailed Paired Samples t-Test for the Difference Between Pre-Intervention and Post-Intervention Knowledge of IR and PCOS Scores

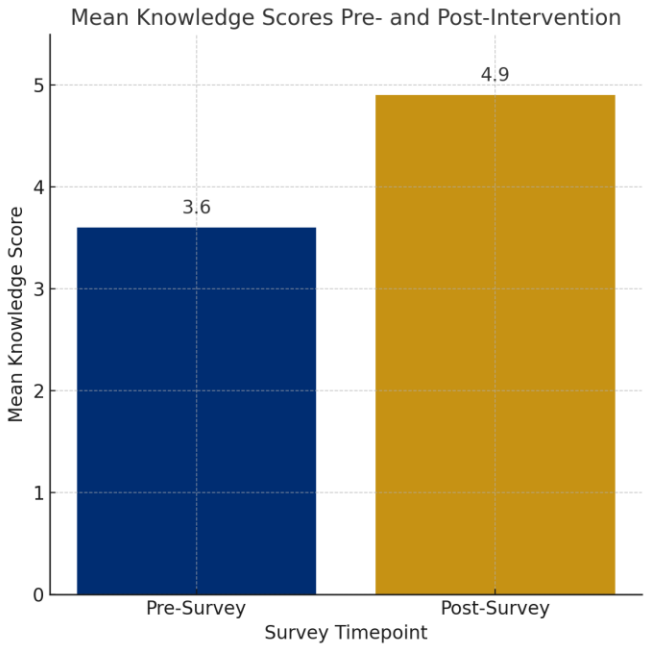
Pre-intervention	**Post-Intervention**

M	*SD*	*M*	*SD*	*t*	*p*	*d*
3.6	0.52	4.9	0.28	-8.26	0.014	2.63

Note: n = 29. Degrees of Freedom for the t-statistic = 50. d represents Cohen's d, effect size.

Figure 3

The Means of Knowledge of IR and PCOS Pre- and Post-Intervention



Note: Comparison of the pre-test and post-test mean scores, 3.60 and 4.90, respectively.

Attitude

The participants' pre-intervention mean score for attitudes related to the use of lifestyle interventions in PCOS care was 3.5 (SD = 0.48). After the educational intervention, the post-intervention mean score increased to 4.9 (SD = 0.22). This reflects a 40% improvement in PCCs' attitudes. A paired-samples t-test revealed a difference in mean scores, $t(2) = –8.26$, $p = 0.014$. As shown in Table 4, changes were observed across multiple attitude-related survey items. For example, the average self-rated ability to counsel patients on lifestyle interventions increased from 3.5 to 5.0. The belief that addressing lifestyle factors is part of the PCC role rose from 3.4 to 4.9. Perceived preparedness to guide patients through behavioral changes increased from 3.1

to 5.0, a 61% change. These findings reflect shifts in attitudes toward integrating lifestyle medicine into routine PCOS care. A detailed breakdown of responses is presented in Table 4.

Table 4

Participant's Attitude about IR and PCOS Pre- and Post-Intervention Scores

Question	Pre-Intervention (%)	Post-Intervention (%)	% Change
How strongly do you agree that lifestyle changes (e.g., diet, physical activity, sleep) are essential in managing PCOS?			
Strongly Disagree	6.9	0.0	6.9 ↓
Disagree	10.34	0.0	10.34 ↓
Occasionally	27.59	6.9	20.69↓
Regularly*	34.48	41.38	6.9 ↑
Consistently*	20.69	51.72	31.03 ↑
How confident are you in counseling patients on lifestyle interventions for PCOS?			
Not confident	10.34	0.0	10.34 ↓
Slightly confident	13.79	0.0	13.79 ↓
Somewhat confident	34.48	10.34	24.14 ↓
Confident*	27.59	34.48	6.89 ↑
Very confident*	13.79	55.17	41.38 ↑
How often do you address emotional and psychosocial concerns when counseling women with PCOS?			
Never	3.45	0.0	3.45 ↓
Rarely	13.79	3.45	10.34 ↓
Occasionally	34.48	17.24	17.24 ↓
Often*	31.03	37.93	6.9 ↑
Always*	17.24	41.38	24.14 ↑

I feel that addressing lifestyle factors in PCOS management is within my professional role and scope of practice.			
Strongly Disagree	3.45	0.0	3.45 ↓
Disagree	6.9	0.0	6.9 ↓
Neutral	27.59	6.9	20.69 ↓
Agree*	41.38	34.48	6.9 ↓
Strongly Agree*	20.69	58.62	37.93 ↑
I believe that incorporating lifestyle medicine into PCOS care improves long-term patient outcomes.			
Strongly Disagree	0.0	0.0	0.0 –
Disagree	6.9	0.0	6.9 ↓
Neutral	20.69	3.45	17.24 ↓
Agree*	48.28	37.93	10.35 ↓
Strongly Agree*	21.14	58.62	34.48 ↑
I feel adequately prepared to address behavioral change in women with PCOS.			
Strongly Disagree	10.34	0.0	10.34 ↓
Disagree	17.24	3.45	13.79 ↓
Neutral	34.48	13.79	20.69 ↓
Agree*	24.14	37.93	13.79 ↑
Strongly Agree*	13.79	44.83	31.04 ↑

Note: % Change= Percent Change, *= Correct answer, ↑ = Increase in percent change, ↓ = Decrease in percent change

Two-Tailed Paired Samples t-Test

A two-tailed paired samples t-test was conducted to assess whether the difference in PCC attitude scores before and after the intervention was statistically significant. The observed effect size, as measured by Cohen's *d,* was 2.63, indicating a large magnitude of change between the

pre- and post-intervention scores. The result of the test was statistically significant at $\alpha = 0.05$, $t(2) = -8.26$, $p = 0.014$. The t-statistic exceeded the 95% region of acceptance (–2.920 to 2.920), allowing for rejection of the null hypothesis. These results are presented in Table 5, and a visual comparison of mean scores is displayed in Figure 4.

Table 5

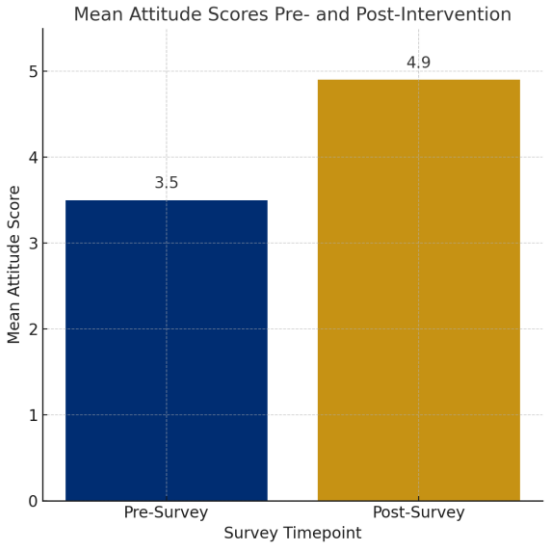
Two-Tailed Paired Samples t-Test for the Difference Between Pre-Intervention and Post-Intervention Attitude of IR and PCOS Scores

Pre- intervention		***Post-Intervention***				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
3.5	4.8	4.9	0.22	-8.26	0.014	2.63

Note: n = 29. Degrees of Freedom for the t-statistic = 50. d represents Cohen's d, effect size.

Figure 4

The Means of Attitude of IR and PCOS Pre- and Post-Intervention



Note: Comparison of the pre-test and post-test mean scores, 3.50 and 4.90, respectively.

Practice Behavior

In this quality improvement project, the participants' pre-intervention mean score for practice behaviors related to PCOS management was 2.8 (SD = 0.57). Following the educational intervention, the post-intervention mean increased to 4.7 (SD = 0.31). Survey items related to lifestyle counseling, metabolic screening, and behavior-focused care are summarized in Table 6. Prior to the intervention, 28% of PCCs reported "often" or "always" screening women with PCOS for IR or metabolic syndrome. This increased to 84% post-intervention, reflecting a 56% change. The percentage of participants who reported applying the Six Pillars of Lifestyle Medicine in PCOS care increased from 31% to 93%. Similarly, those consistently offering lifestyle counseling rose from 38% to 96%. These results indicate a shift in clinical practice behaviors following the educational session. Detailed item-level response data is provided in Table 6.

Table 6

Participant's Practice Behavior about IR and PCOS Pre- and Post-Intervention Scores

Question	Pre-Intervention (%)	Post-Intervention (%)	% Change
How often do you screen women with PCOS for insulin resistance, metabolic syndrome, or diabetes risk?			
Never	6.9	0.0	6.9 ↓
Rarely	20.69	3.45	17.24 ↓
Occasionally	31.03	10.34	20.69 ↓
Often*	27.59	41.38	13.79 ↑
Always*	13.79	44.83	31.04 ↑

How often do you provide lifestyle counseling (e.g., diet, exercise, stress, sleep) during PCOS visits?			
Never	10.34	0.0	10.34 ↓
Rarely	13.79	0.0	13.79 ↓
Occasionally	34.48	6.9	27.58 ↓
Often*	24.14	44.83	20.69 ↑
Always*	17.24	48.28	31.04 ↑
How often do you address sleep hygiene when discussing PCOS symptoms and management?			
Never	13.79	0.0	13.79 ↓
Rarely	20.69	3.45	17.24 ↓
Occasionally	34.48	13.79	20.69 ↓
Often*	20.69	41.38	20.69 ↑
Always*	10.34	41.38	31.04 ↑
How often do you evaluate and discuss stress or recommend mindfulness techniques for PCOS?			
Never	10.34	0.0	10.33 ↓
Rarely	17.24	0.0	17.24 ↓
Occasionally	41.38	6.9	34.48 ↓
Often*	20.69	48.28	27.59 ↑
Always*	10.34	44.83	34.49 ↑
How important do you consider diet and nutrition in PCOS management?			
Not important at all	0.0	0.0	0.0 –
Slightly important	6.9	0.0	6.9 ↓
Moderately important	27.59	3.45	24.14 ↓
Very important*	41.38	34.48	6.9 ↑
Essential*	24.14	62.07	37.93 ↑
How helpful do you think physical activity is for managing PCOS symptoms?			

Not helpful	0.0	0.0	0.0 –
Slightly helpful	3.45	0.0	3.45 ↓
Moderately helpful	31.03	6.9	24.13 ↓
Very helpful*	44.83	37.93	6.9 ↑
Extremely helpful*	20.69	55.17	34.48 ↑
How important do you believe social support (e.g., family, peer groups) is in helping PCOS patients adhere to lifestyle changes?			
Not important at all	3.45	0.0	3.45 ↓
Slightly important	10.34	0.0	10.34 ↓
Moderately important	34.48	10.34	24.14 ↓
Very important*	31.03	34.48	3.45 ↑
Essential*	20.69	55.17	34.48 ↑
How confident are you in applying the Six Pillars of Lifestyle Medicine to manage PCOS?			
Not confident at all	10.34	0.0	10.34 ↓
Slightly confident	20.69	3.45	17.24 ↓
Moderately confident	34.48	6.9	27.58 ↓
Very confident*	20.69	41.38	20.69 ↑
Extremely confident*	13.79	48.28	34.49 ↑
How do you prioritize treatment approaches in PCOS management?			
No consistent approach	10.34	6.9	3.44 ↓
Primarily medical (pharmacologic) treatment	20.69 34.48	3.45 24.14	17.24 ↓ 10.34 ↓
Exclusively lifestyle-focused Primarily lifestyle interventions with some medications*	24.14 10.34	37.93 27.59	13.79 ↑ 17.25 ↑
Balanced medical and lifestyle approach*			

Note: % Change= Percent Change, *= Correct answer, ↑ = Increase in percent change, ↓ = Decrease in percent change

Two-Tailed Paired Samples t-Test

A two-tailed paired samples t-test was conducted to determine whether the difference in practice behavior scores related to PCOS care before and after the intervention was statistically significant. The observed effect size, as measured by Cohen's *d*, was 3.61, indicating a substantial change in scores. The result was statistically significant at the $\alpha = 0.05$ level, $t(2) = -8.26$, $p = 0.014$. The t-statistic fell outside the 95% region of acceptance (–2.920 to 2.920), which supports the rejection of the null hypothesis. These findings are reported in Table 7, and a visual representation of the pre- and post-intervention mean scores is displayed in Figure 5.

Table 7

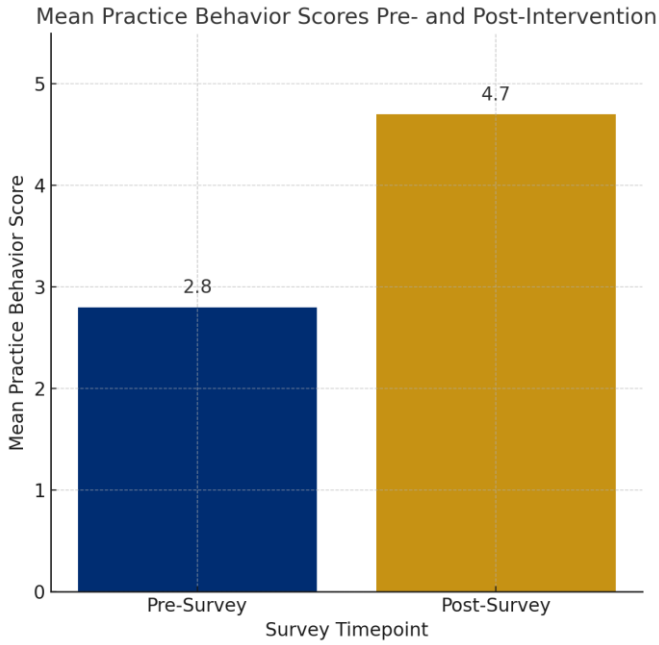
Two-Tailed Paired Samples t-Test for the Difference Between Pre-Intervention and Post-Intervention Practice Behavior of IR and PCOS Scores

Pre-intervention		***Post-Intervention***				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
2.8	0.57	4.7	0.31	-8.26	0.014	3.61

Note: n = 29. Degrees of Freedom for the t-statistic = 50. d represents Cohen's d, effect size.

Figure 5

The Means of Practice Behavior of IR and PCOS Pre- and Post-Intervention



Note: Comparison of the pre-test and post-test mean scores, 2.80 and 4.70, respectively.

Discussion

Following data analysis, changes were observed in mean scores for attitudes and practice behaviors, which increased to 4.9 and 4.7, respectively. These results represent a 40% increase in attitudes and a 67.9% increase in practice behavior scores following the educational session. The proportion of participants who reported counseling patients on lifestyle changes increased by 43%, and 61% more participants reported feeling adequately prepared to support behavioral change in women with PCOS. After the intervention, 84% of participants reported consistently screening for IR, compared to 28% pre-intervention. The frequency of lifestyle counseling rose by 70%, and screening for stress during visits increased by 76%. These results indicate that PCCs demonstrated changes in self-reported clinical behaviors and attitudes related to PCOS management through the use of lifestyle-based strategies. The findings also suggest that educational interventions may influence alignment with best practices and existing national guidelines.

Knowledge gaps were also identified in the pre-intervention data, particularly in the application of pharmacological treatment and the understanding of non-reproductive symptoms associated with PCOS. Before the intervention, 45.8% of participants rated themselves as "familiar" or "very familiar" with the cardiometabolic risks associated with PCOS, compared to 79.6% post-intervention—a 33.8% increase. Less than half of the participants reported applying this knowledge consistently in clinical practice prior to the intervention. Familiarity with evidence-based lifestyle recommendations increased by 37.9%, and awareness of the broader symptomatology of PCOS, including its mental health impact, increased by 41.4%. These findings demonstrate that while many PCCs have a general awareness of PCOS, targeted educational interventions may help strengthen their ability to apply clinical knowledge and use lifestyle medicine approaches in practice. Continued reinforcement through clinician education may support longer-term implementation of guideline-based care in primary care settings.

Limitations

Although this quality improvement project was conducted across multiple primary care offices, which enhanced its reach and applicability, several limitations should be acknowledged. One limitation was variability in clinician scheduling and engagement. Participants worked at different clinic sites, each with unique workflows and time constraints, which may have affected how thoroughly they engaged with or applied the educational content. Additionally, the brief time frame between intervention and post-survey completion limited the ability to assess long-term behavioral change. While changes in practice behaviors were noted, a two-week follow-up may not have been sufficient to evaluate sustained implementation.

The use of self-reported data may also introduce response bias, as participants could have reported higher knowledge, attitudes, or practice behaviors due to increased awareness or

perceived expectations following the intervention. Moreover, although the survey was designed to assess relevant domains, it was not a previously validated tool, which may influence the reliability of the outcome data. Another consideration is the interdisciplinary makeup of participants, including NPs, MDs, medical assistants, and front desk staff. As a result, some survey items may not have been equally relevant across all roles. While this interdisciplinary approach reflects the structure of real-world primary care teams, future studies may benefit from tailoring assessment tools or stratifying findings by role.

Implications to Practice

The findings from this quality improvement project highlight the value of structured, evidence-based education in improving the knowledge, attitudes, and clinical behaviors of primary care clinicians (PCCs) in the management of PCOS. By equipping clinicians with lifestyle-focused strategies, this intervention reinforces the essential role that PCCs play in identifying and managing metabolic dysfunction early. At an organizational level, the observed improvements in screening and counseling behaviors suggest that even brief interventions, like the one used in this project, can promote more proactive, holistic care for women with PCOS. Although this project spanned just two weeks, its positive outcomes suggest the potential for broader application through phased implementation models in clinical settings. For example, practices could adopt this intervention as part of a 3-month pilot program, followed by structured reinforcement at 6 and 9 months, integrating lifestyle medicine into routine clinical education, staff onboarding, and workflow optimization. Regular booster sessions, refresher modules, or embedded electronic health record (EHR) prompts could help sustain and scale behavior change.

Beyond clinical behaviors, this project underscores the importance of interdisciplinary collaboration in PCOS care. Engaging the full primary care team, including MDs, NPs, nurses,

medical assistants, and front office staff in a shared educational experience fostered a unified understanding of lifestyle medicine principles. This improved team alignment not only enhanced consistency in patient messaging but also supported the integration of lifestyle recommendations into everyday workflows. These results suggest that successful practice transformation requires both individual clinician knowledge and coordinated, team-based efforts. Normalizing lifestyle counseling as a routine part of care may lead to better outcomes, higher quality of care, and reduced long-term costs associated with insulin resistance and chronic metabolic conditions.

At the education and policy level, embedding lifestyle medicine into annual staff training, continuing education credits, and clinic-wide quality improvement initiatives could help standardize care delivery and promote adherence to national guidelines. Given that PCOS remains underdiagnosed and undertreated in many primary care settings, this project supports a shift toward prevention-based, team-centered care models that address root causes and promote sustainable change.

Conclusion

PCOS is a multifactorial endocrine disorder that substantially increases the risk for IR, cardiovascular disease, Type 2 diabetes, and psychological distress (Lim et al., 2019; Teede et al., 2023). Despite its prevalence, PCOS often goes unrecognized and undertreated in primary care settings (Deswal et al., 2020). Current clinical guidelines support the use of lifestyle interventions—such as medical nutrition therapy, physical activity, stress management, and sleep optimization—as first-line management approaches (ACOG, 2023; Teede et al., 2023). However, many PCCs report limited training and experience in implementing these strategies (Dacey et al., 2021; Lianov & Johnson, 2022).

Following participation in an evidence-based educational session, PCCs reported increases in knowledge, improved attitudes toward lifestyle counseling, and greater consistency in applying guideline-based screening and management strategies for PCOS. These findings support the integration of lifestyle medicine education into routine clinical training, particularly for teams serving women of reproductive age. As the prevalence of IR continues to rise (Wang et al., 2021), PCCs must be equipped with the tools to address root causes through preventive, whole-person care. This project demonstrates that brief, targeted educational interventions can influence clinical practice and help address gaps in the management of PCOS across diverse primary care settings.

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Appendices

Appendix A: Literature Review Matrix

Author/Date Level of Evidence	***Title***	***Framework***	***Research Question(s)/ Hypotheses***	***Methodology***	***Analysis & Results***	***Conclusions***	***Implications for Future Research***	***Implication for Practice***
Abdalla et al., 2022 Level 1 Evidence	Impact of pharmacological interventions on insulin resistance in women with PCOS: A systematic review and meta-analysis	Evidence-based practice framework	Evaluate effects of pharmacologic interventions on insulin resistance in PCOS	Systematic review of 58 RCTs using Cochrane tools and PRISMA guidelines	Metformin, pioglitazone, acarbose, and exenatide significantly improved FBG, FI, HOMA-IR; no impact on HOMA-B	Pharmacological agents improve IR but not beta cell function	Need for robust, large-scale trials comparing medication efficacy	Support personalized pharmacological plans with metformin/insulin sensitizers as first-line
Wang et al., 2021 Level 1 Evidence	Role of inflammation and oxidative stress in insulin resistance among PCOS women	Pathophysiological framework	Investigate inflammatory and oxidative mechanisms contributing to IR in PCOS	Meta-analysis of biochemical markers related to PCOS and IR	Chronic inflammation and oxidative stress are linked to increased IR in PCOS	Inflammation is a key contributor to metabolic dysfunction	Research needed on anti-inflammatory dietary and lifestyle interventions	Address IR using anti-inflammatory lifestyle practices like whole foods and omega-3s
Teede et al., 2023 Level 1 Evidence	Global clinician confidence and practice patterns in	Behavior change and educational theory	Assess clinician confidence in lifestyle	Global survey with over 1000 clinicians	>50% lacked confidence in managing	Significant gaps exist in clinician education and	Calls for targeted training programs and guideline	Educational interventions needed to enhance PCC lifestyle counseling competency

	PCOS management		counseling for PCOS	across specialties	PCOS; <40% use lifestyle counseling regularly	practice behavior	disseminatio n	
Dacey et al., 2021 Level 1 Evidence	Primary care delivery of lifestyle medicine: Barriers and opportunities	Lifestyle Medicine framework	Explore how PCCs deliver lifestyle medicine and barriers to integration	Review of implementati on studies in primary care	Identified time constraints, limited training, and lack of tools as barriers	PCCs want to use lifestyle medicine but need better infrastructure	Investigate scalable models for LM training in primary care	Encourage routine use of lifestyle medicine pillars in chronic disease care
Morales et al., 2022 Level 1 Evidence	Dietary strategies in PCOS: Ketogenic, low-carb, and anti-inflammatory approaches	Nutrition-focused clinical framework	Review efficacy of low-carb diets on PCOS and IR	Systematic review of dietary interventions in PCOS	Low-carb and ketogenic diets improved insulin sensitivity, ovulation, and weight loss	Diet plays a central role in managing metabolic and reproductive symptoms	Long-term studies needed on safety and sustainability of these diets	Recommend individualized nutrition plans for PCOS management
Lianov & Johnson, 2022 Level 1 Evidence	Physician education in lifestyle medicine: An international review	Educational theory and competency framework	Examine LM integration in medical training and outcomes	Review of LM education programs globally	LM education improves clinical competency and preventive care confidence	LM education is essential for chronic disease prevention	More global standardizati on of LM curriculum is needed	Train PCCs in LM principles to support sustainable PCOS care

Kovell et al., 2021 Level 1 Evidence	Delays and gaps in PCOS diagnosis and cardiovascular screening	Preventive care framework	Explore delays in CVD risk recognition in PCOS women	Clinical cohort data and retrospective chart reviews	Delays in diagnosis → missed opportunities for early CVD intervention	PCOS women under-screened for long-term cardiometabolic risks	Need prospective trials on early CVD prevention in PCOS	Screen PCOS patients early for hypertension, lipids, and glucose
Osibogun et al., 2020 Level 1 Evidence	Aldosterone levels and hypertension risk in PCOS	Endocrine framework	Evaluate aldosterone's role in hypertension among PCOS patients	Cross-sectional study comparing PCOS vs. control aldosterone levels	PCOS women had significantly higher aldosterone → linked to hypertension	Hyperaldosteronism may drive elevated BP in PCOS	Explore aldosterone inhibitors in PCOS management	Monitor BP and consider hormonal contributors in PCOS hypertension
Yadav et al., 2023 Level 1 Evidence	Psychiatric comorbidities in PCOS: A systematic review	Psychosocial framework	Assess prevalence of mood disorders in PCOS women	Systematic review of psychiatric outcomes	PCOS linked to increased rates of depression, anxiety, OCD	Strong mental health burden associated with PCOS	Further study on integrated PCOS and mental health care needed	Incorporate mental health screening and support in PCOS visits
Smith et al., 2025 Level 1 Evidence	Impact of stigma and body image on mental health in PCOS	Biopsychosocial model	Explore societal impacts on mental health in PCOS	Survey data + literature synthesis	Body dissatisfaction contributes to anxiety, depression,	Appearance-related stigma worsens PCOS quality of life	More research on body image interventions in PCOS needed	Emphasize compassion-based care and address body image in PCC visits

					low self-esteem			

Appendix B: IR and PCOS Pre- and Post-Survey Questions

Section I: Demographics

A. **Race or Ethnicity** (Please circle one):
White / Hispanic or Latino / Black or African American / Asian / Native American or Pacific Islander / Other
B. **Highest Level of Education** (Please circle one):
High School / Associate Degree / Bachelor's Degree / Master's Degree / Doctoral Degree
Other: _____
C. **Current Occupation: _____**
D. **Title (e.g., NP, MD, PA): _____**

Section II: Knowledge

1. How familiar are you with current evidence linking PCOS to long-term cardiovascular and metabolic risks?
    a. Not familiar at all
    b. Slightly familiar
    c. Somewhat familiar
    d. Familiar
    e. Very familiar
2. To what extent do you apply this information in clinical practice?
    a. Never
    b. Rarely
    c. Occasionally
    d. Regularly
    e. Consistently
3. How familiar are you with non-reproductive symptoms of PCOS (e.g., anxiety, depression, insomnia)?
    a. Not familiar at all
    b. Slightly familiar
    c. Somewhat familiar
    d. Familiar
    e. Very familiar
4. How familiar are you with the most current pharmacologic treatments for insulin resistance and hyperandrogenism in PCOS?
    a. Not familiar at all
    b. Slightly familiar
    c. Somewhat familiar
    d. Familiar
    e. Very familiar
5. How familiar are you with current dietary and lifestyle recommendations for managing PCOS?
    a. Not familiar at all
    b. Slightly familiar

c. Somewhat familiar
d. Familiar
e. Very familiar

Section III: Attitudes

6. How strongly do you agree that lifestyle changes (e.g., diet, physical activity, sleep) are essential in managing PCOS?
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
7. How confident are you in counseling patients on lifestyle interventions for PCOS?
    a. Not confident at all
    b. Slightly confident
    c. Somewhat confident
    d. Confident
    e. Very confident
8. How often do you address emotional and psychosocial concerns when counseling women with PCOS?
    a. Never
    b. Rarely
    c. Occasionally
    d. Often
    e. Always

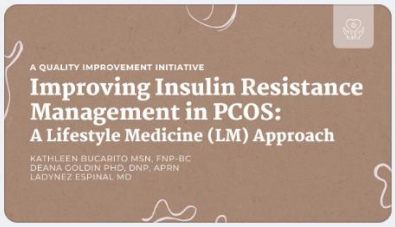
9. I feel that addressing lifestyle factors in PCOS management is within my professional role and scope of practice.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
10. I believe that incorporating lifestyle medicine into PCOS care improves long-term patient outcomes.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
11. I feel adequately prepared to address behavioral change in women with PCOS.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree

Section IV: Practice Behaviors

12. How often do you screen women with PCOS for insulin resistance, metabolic syndrome, or diabetes risk?
    a. Never
    b. Rarely
    c. Occasionally
    d. Often
    e. Always
13. How often do you provide lifestyle counseling (e.g., diet, exercise, stress, sleep) during PCOS visits?
    a. Never
    b. Rarely
    c. Occasionally
    d. Often
    e. Always
14. How often do you address sleep hygiene when discussing PCOS symptoms and management?
    a. Never
    b. Rarely
    c. Occasionally
    d. Often
    e. Always
15. How often do you evaluate and discuss stress or recommend mindfulness techniques for PCOS?
    a. Never
    b. Rarely
    c. Occasionally
    d. Often
    e. Always
16. How important do you consider diet and nutrition in PCOS management?
    a. Not important at all
    b. Slightly important
    c. Moderately important
    d. Very important
    e. Essential
17. How helpful do you think physical activity is for managing PCOS symptoms?
    a. Not helpful
    b. Slightly helpful
    c. Moderately helpful
    d. Very helpful
    e. Extremely helpful
18. How important do you believe social support (e.g., family, peer groups) is in helping PCOS patients adhere to lifestyle changes?
    a. Not important at all
    b. Slightly important
    c. Moderately important

    d. Very important
    e. Essential
19. How confident are you in applying the Six Pillars of Lifestyle Medicine in managing PCOS?
    a. Not confident at all
    b. Slightly confident
    c. Moderately confident
    d. Very confident
    e. Extremely confident
20. How do you prioritize treatment approaches in PCOS management?
    a. No consistent approach
    b. Primarily medical (pharmacologic) treatment
    c. Exclusively lifestyle-focused
    d. Primarily lifestyle interventions with some medications
    e. Balanced medical and lifestyle approach

Appendix C: PCOS and IR Presentation



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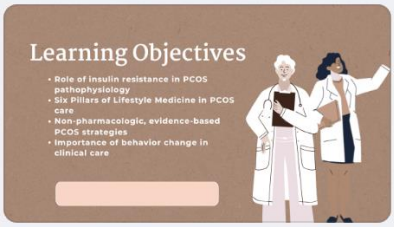

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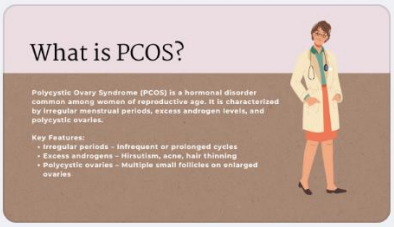

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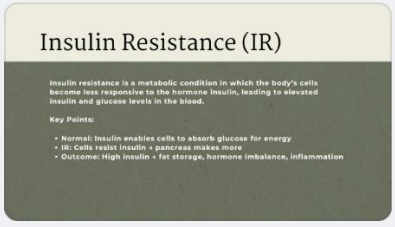

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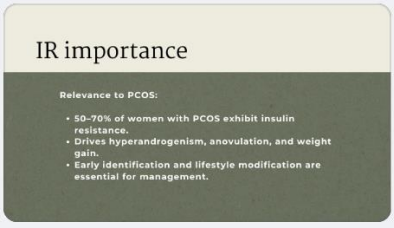

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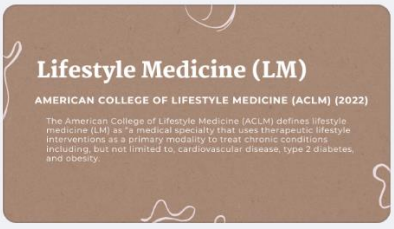

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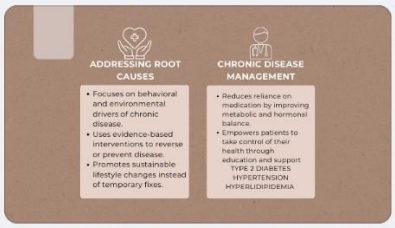

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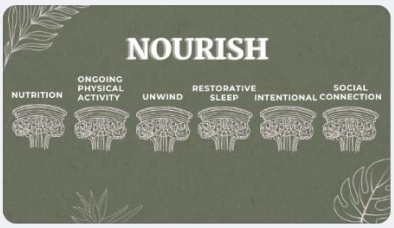

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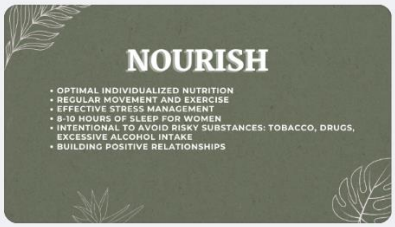

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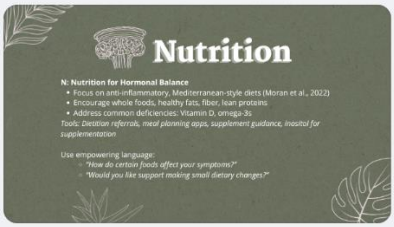

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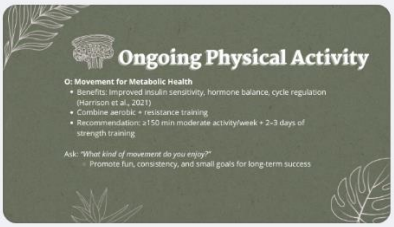

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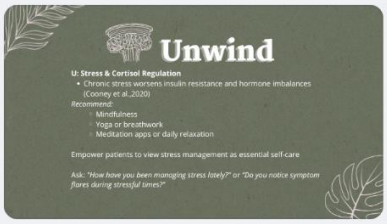

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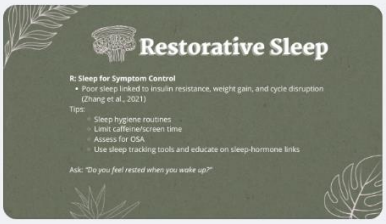

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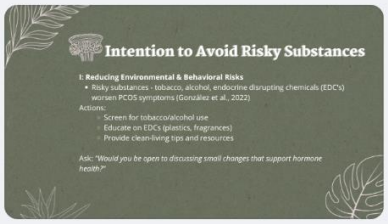

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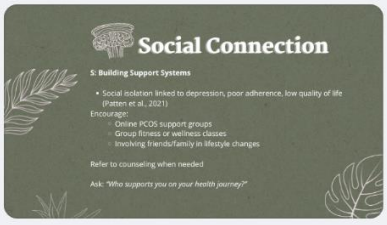

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Appendix D: Informed Consent Form

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CONSENT FORM

An Initiative to Improve Insulin Resistance in Women Diagnosed with Polycystic Ovarian Syndrome (PCOS): A Quality Improvement Project

Hello, my name is Kathleen Bucarito. You have been chosen to participate in a quality improvement project for Lady's Care Center.

PURPOSE OF THE PROJECT

The primary goal of this quality improvement project is to enhance clinicians' knowledge, attitudes, and clinical practices when treating adult women diagnosed with Polycystic Ovary Syndrome.

NUMBER OF PARTICIPANTS

If you decide to be in this project, you will be one of 30 clinicians of Lady's Care Center that have been selected to participate in this quality improvement project.

DURATION OF THE PROJECT

This project will run for about 2 months.

Participation in this study will take about 1 hour of your time.

The pre-test survey will be completed individually and is expected to take approximately 15-20 minutes. Following this, you will view a 20-minute educational PowerPoint.

2 weeks later, you will complete a post-test survey to assess knowledge retention and potential changes in clinical practices. The post-test will mirror the pre-test and is also expected to take

15-20 minutes.

PROCEDURES

If you choose to participate in the project, I will ask you to do the following things:

1. Complete the pre-test questionnaire.
2. View an educational PowerPoint that will be 20 minutes long.
3. Read an educational handout provided during the intervention.
4. Complete the post-test questionnaire 2 weeks after participation in the intervention.

RISKS AND/OR DISCOMFORTS

There are no foreseeable risks for participating in this study and participation in the project will not interfere with normal office performance.

BENEFITS

There are various foreseeable benefits for participation including improvement of clinicians' knowledge, attitudes, and practice behaviors towards PCOS-affected women and PCOS. It is expected that this study will benefit society by improving clinicians' understanding of the prevalence and scope of PCOS among adult women. This would ultimately improve the management, treatment and outcomes for this population in society.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study. Any significant new findings developed during the project which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this project, including the pre-test and post-test questionnaire, will be kept private and will be fully protected, provided by law. In any sort of report we might publish, we will not

include any information that will make it possible to identify you. Research records will be stored securely, and only the project team will have access to the records. However, your records may be inspected by authorized University or other agents who will also keep the information confidential.

USE OF YOUR INFORMATION

Your information collected as part of the project will not be used or distributed for future research studies even if identifiers are removed.

COMPENSATION AND COSTS

There is no cost or payment for participating in this project.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this project is voluntary. You are free to participate in the project or withdraw your consent at any time during the project. You will not lose any benefits if you decide not to participate or if you quit the project early. The investigator reserves the right to remove you without your consent at such time that he feels it is in the best interest. Please carefully read the entire document before agreeing to participate. You may keep a copy of this form for your records.

INVESTIGATOR CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this quality improvement project you may contact Kathleen Bucarito at (954)-479-4265, knava012@fiu.edu

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this quality improvement plan or about ethical issues with this project, you may contact the FIU Office of

Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this project. I have had a chance to ask any questions I have about this project, and they have been answered for me. I understand that I will be given a copy of this form for my records.

_____

Signature of Participant Date

_____

Printed Name of Participant

_____

Signature of Person Obtaining Consent Date

Appendix E: Recruitment Letter

Dear office staff,

My name is Kathleen Bucarito, and I am a student from the Graduate Nursing Department at Florida International University. I am writing to invite you to participate in my quality improvement project. This proposed quality improvement project seeks to investigate and synthesize the latest evidence on educational interventions for clinicians to gather information about their knowledge, attitudes, and practice behaviors towards PCOS-affected women and PCOS. You are eligible to take part in this project because you are invited by Lady's Care Center, and you provide or may provide care to PCOS-affected patients. I am contacting you with the permission of your office director and manager.

If you decide to participate in this project, you will be asked to complete and sign a consent form for participation. You will complete a pre-test questionnaire, which is expected to take approximately 15-20 minutes. Then, you will then be asked to view an approximately 20-minute-long educational presentation. 2 weeks after watching the presentation, you will be asked to complete the post-test questionnaire, which is expected to take approximately 15-20 minutes. *No compensation will be provided.*

Remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate, please click on the link provided (link for Qualtrix questionnaire). If you have any questions about the study, please email or contact me at knava012@fiu.edu or (954)-479-4265.

Sincerely,

Kathleen Bucarito, APRN, FNP-BC

Appendix F: Letter of Support

Letter of Support

Date: 1/10/2025

Deana Goldin, PhD, DNP, APRN

Clinical Professor

Nicole Wertheim College of Nursing & Health Sciences

Florida International University

Dear Dr. Goldin,

Thank you for inviting Lady's Care Center to participate in the DNP Project of Kathleen Bucarito. I understand that this student will be conducting this project as part of the requirements for the Doctor of Nursing Practice program at FIU. After reviewing the proposal of the project titled "An Initiative to Improve Insulin Resistance in Women Diagnosed with Polycystic Ovarian Syndrome (PCOS): A Quality Improvement Project", I have warranted her permission to conduct the project in this company. Education of clinicians has been shown to be one of the most effective strategies to improve the screening and diagnosis of various conditions and illnesses. This proposed quality improvement project seeks to investigate and synthesize the latest evidence on educational interventions for clinicians to gather quantitative information about their knowledge, attitudes, and practice behaviors towards PCOS-affected women and PCOS. There is clearly a need for a quality improvement that will consolidate all the available information on strategies for effective screening and diagnosis of Polycystic Ovarian Syndrome and its strong correlation to insulin resistance.

We understand that the project will be developed in our setting and will occur in about 2 months.

We are also aware of our department's participation in supporting the student to complete this project, including warranting the student access to our OB-GYN office, giving written consent, delivering the pre-test questionnaire, providing the educational intervention and two weeks after providing the post-test to the recruited participants. We will provide a peaceful environment to safeguard our participant privacy as well as adequate area to conduct the seminar teaching. The educational intervention will be classroom format, will last 15-20 minutes and an educational handout will be provided to each participant receiving the class. Any data collected by Kathleen Bucarito will be kept confidential and will be stored in a locked filing cabinet at our office.

We expect that Kathleen Bucarito will not interfere with the normal office performance, behaving in a professional manner and following the office standards of care. As the owner of Lady's Care Center, I support the participation of our OB-GYN department in this project and look forward to working with you.

Sincerely,

Ladynez Espinal, MD

Ladynez Espinal

Lady's Care Center

Appendix G: IRB Exemption Approval

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Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. Deana Goldin
CC: Kathleen Bucarito

From: Maria Melendez-Vargas, MIBA, IRB Coordinator

Date: March 14, 2025

Protocol Title: "A Quality Improvement Initiative to Improve Insulin Resistance in Women Diagnosed with Polycystic Ovarian Syndrome (PCOS)"

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-25-0109 **IRB Exemption Date:** 03/14/25
TOPAZ Reference #: 115208

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.

Special Conditions: N/A

3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

MMV/em