Polycystic ovary syndrome
Questions answered from the best available evidence
This resource is informed by the evidence-based guideline for the assessment and management of polycystic ovary syndrome (PCOS), authored by the PCOS Australian Alliance and auspiced by Jean Hailes for Women’s Health.

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Introduction

This booklet was designed to answer polycystic ovary syndrome (PCOS) related questions by drawing on the latest research evidence. PCOS is a condition that is challenging for women and their health professionals and remains poorly understood, leading to delays in diagnosis, inconsistent treatment and lack of support. To address this, an alliance of Australian PCOS experts and consumers formed to develop a definitive body of work that provides guidance to both health professionals and women with PCOS.

The result of this work is the first internationally available Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome, which will contribute to greater awareness of PCOS, a more consistent approach to early diagnosis and to effective treatment outcomes.

Project Director Professor Helena Teede led the guideline development and found the experience inspiring.

“Bringing together an internationally renowned multidisciplinary team of experts and consumers has led to the development of a guideline that should improve early diagnosis and clinical care in PCOS.”

This resource is based on the information contained in the Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome and provides the most reliable information currently available.

This booklet also contains:
• a glossary of PCOS related terms
• a table listing medical reference ranges
• a list of useful links for further information.

Please note that throughout this resource there are terms used such as: male type hormones, androgens and testosterone. We have chosen to use all three terms as they are commonly used in PCOS related resources. For the purposes of this resource the terms are used to mean the same thing. Androgens are male hormones and testosterone is one form of male hormones which are commonly in higher levels in women with PCOS.
Overview of the evidence-based guideline for the assessment and management of polycystic ovary syndrome

Background
Prior to the development of the current PCOS guideline, there was no accessible evidence-based guidance to inform women and guide health professionals in the assessment and management of PCOS. In 2008, Jean Hailes for Women’s Health facilitated a national meeting on PCOS, with 25 experts attending from the research, clinical and community sectors that established an independent PCOS Australian Alliance.

Need
Currently up to 70% of Australian women with PCOS remain undiagnosed and evidence indicates inconsistency in the assessment and management of PCOS, with insufficient focus given to psychological issues, lifestyle and prevention of chronic health conditions.

Development
The PCOS Australian Alliance embarked on a rigorous two-year project supported by Jean Hailes for Women’s Health, a national women’s health organisation, and funded by the federal government, to complete a comprehensive evidence-based guideline on polycystic ovary syndrome. This guideline was developed using internationally agreed methods for the development of evidence-based guidelines.
Translation, education & communication at Jean Hailes

Using the evidence-based guidelines on PCOS, Jean Hailes runs education programs and has developed a range of available resources including PCOS GP Tool, PCOS: All you need to know and Yarning about PCOS.

Visit jeanhailes.org.au for further information and to order free resources.
10 important points about PCOS

1. Adopting a healthy lifestyle is the most effective way to improve overall health for women with PCOS.

2. Early detection and prevention are vital to reducing the risk of long term health issues associated with PCOS.

3. A diagnosis of PCOS can be frustrating, however much can be done to treat PCOS and improve the lives of those affected.

4. Make informed health choices by learning as much as possible about PCOS.

5. Taking control of treatment by forming effective partnerships with health professionals contributes to improved health outcomes.

6. A lifelong outlook on PCOS is important to reduce the risk of long term health issues.

7. Prevention of weight gain is vital for all women with PCOS, and if overweight a small weight reduction (5-10% of current body weight), may significantly reduce PCOS symptoms and long term complications.

8. A minimum of 150 minutes per week of physical activity may greatly improve symptoms.

9. It is important to monitor emotional wellbeing and be proactive in seeking help and support.

10. Consult only reliable well researched sources of information.
Common PCOS questions

**What is PCOS?**

Polycystic ovary syndrome (PCOS) is a hormonal condition that can impact on physical and emotional health.

The name polycystic ovary syndrome is misleading as the primary problem is not the ovaries but rather is the effect of increased levels of hormones (chemical messengers) on the ovaries that causes symptoms. More specifically, these include higher levels of the male type hormones, androgens (including testosterone) and the hormone insulin.

**How common is PCOS?**

PCOS is more common than generally understood, affecting up to 1 in 5 Australian women of reproductive age. Specifically up to 18% of Australian reproductive aged women are affected, with even higher rates in some ethnic groups (for example, Indian, Asian and Indigenous women).

**Can PCOS be cured?**

Although there is no cure for PCOS the symptoms can be managed. PCOS is a lifelong condition and symptoms can change at different stages of life. During adolescence features may include menstrual irregularity, weight gain, acne and hirsutism. Over time, these symptoms may evolve into other health problems including infertility and metabolic complications such as diabetes.

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Health tip
Take every opportunity to move.
How is PCOS diagnosed?

There is no single feature that leads to a diagnosis of PCOS. A diagnosis is confirmed if two of these three features (without any other causes) are present:

1. Hyperandrogenism (higher levels of male type hormones in the blood)
2. Menstrual problems (e.g., lack of a period or irregular periods)
3. Polycystic ovaries (follicles) present on ultrasound.

*It is very important to know that symptoms of PCOS vary between individuals and according to age and life stage.*

To establish a diagnosis of PCOS, a doctor will take a number of factors into account including history of menstruation, symptoms of increased body hair or chronic acne, increased hormones levels through a blood test and a pelvic ultrasound. It is important to recognise that not all these investigations are necessary for a diagnosis of PCOS and therefore tests will be recommended based on individual symptoms.

For women taking the contraceptive pill doctors may suggest stopping the pill for three months (another form of contraception is required during this time for sexually active women), and then assess for PCOS.

**Health tip**

Park the car away from the shopping centre.
Diagnosis and young women

Diagnosing PCOS in young women is more difficult in the first one to two years of menstruation, as it is common to have irregular cycles during that time. If cycles are still irregular two years after commencement of menstruation, then PCOS should be considered.

Also, polycystic appearance or polycystic ovaries (PCO) on ultrasound is not specific for PCOS and can occur in up to one third of women. PCO on ultrasound is particularly common in young women, is not reliable for diagnosing PCOS and is not generally recommended for this purpose in young women. Furthermore, if women are not sexually active, an internal pelvic ultrasound is not advised as it involves the use of an ultrasound probe inserted into the vagina. Hence, diagnosis is based on the other features of PCOS in younger women.
Personal story

I knew there was something different about me but I could not find a GP who could tell me exactly what I had. I noticed that I have facial hair and had very bad acne but I thought this was just my family history, diet and because I was not doing enough exercise. Now I understand that these symptoms are part of having PCOS and that lifestyle is vital. If I have realistic goals, eat well and exercise regularly, I will feel a lot better about myself. (Natalie, 27)

Health tip
Drink mostly water and minimise high caloric drinks such as soft drink, sports drinks and alcohol.
Features associated with PCOS

It is important to emphasise that a diagnosis of PCOS does not necessarily mean these features will develop in all women with PCOS due to the high variability and the individualised nature of this condition.

Features include:

- acne
- excess body and facial hair (hirsutism)
- emotional distress, anxiety and depression
- challenges with body image and increased risk of eating disorders
- scalp hair loss (alopecia) in the central part of the scalp
- reduced fertility
- oligomenorrhea (irregular bleeding) or amenorrhea (no menstrual period)
- oligoovulation (infrequent ovulation) or anovulation (absent ovulation)
- higher risk of diabetes in pregnancy and adult onset prediabetes or type 2 diabetes
- greater heart disease risk factors including higher cholesterol levels
- acanthosis nigricans (dark patches of skin, tan to dark brown/black; located on the back of the neck, skin creases; velvety to the touch)

Women with PCOS have increased risk of weight gain. Weight gain exacerbates PCOS and weight loss improves PCOS, however it remains unclear if PCOS itself causes weight gain. More research is needed in this area.
Health professionals

At different stages in a women’s PCOS journey, the support of a number of health professionals may be needed including:

- General practitioner (GP) – for diagnosis and ongoing partnership in management
- Dietitian – to assist with weight management, goal setting and healthy eating
- Mental health professional (eg psychologist, counsellor) – to assist in dealing with some of the emotional issues that can accompany PCOS
- Endocrinologist – a medical doctor who has specialist knowledge of hormones, reproductive health and long term PCOS complications
- Gynaecologist – a medical doctor who has specialist knowledge of women’s reproductive health and fertility
- Exercise physiologist – a specialist who can assist with body movement and exercise and healthy activity

Following diagnosis, a personalised management plan is important and is usually developed by the GP and/or specialist in consultation with the health care team.

Health tip

Combine exercise and pleasure by doing it with a friend or partner.
History of PCOS

In 1935, two gynaecologists (Stein and Levanthal) noticed a set of symptoms in women that included menstrual difficulties, acne, facial hair and weight gain. They named the condition polycystic ovary syndrome after observing cyst-like changes on the ovaries. It is now clear that these ovarian changes are not cysts, but follicles or eggs arrested in mid stage of development. Hence the name “PCOS” is now being reconsidered by international experts and women’s health groups. It is also recognised that these ovary changes occur because of hormonal disturbances, and are not causal in PCOS.

Causes of PCOS

The exact cause of PCOS remains unclear, but both genetics and lifestyle contribute.

*Diagram 2. Factors contributing to the development of PCOS*
PCOS and hormones

In women with PCOS both insulin and male type hormones are usually within the higher range of normal or above normal and contribute to variable health impacts.

Diagram 3. High insulin levels increase testosterone contributing to the features of PCOS

Reproduced with permission from the Royal Australian College of General Practitioners.
**Insulin resistance**

Insulin has many actions in the body but is primarily the hormone responsible for stabilising glucose (sugar) in the blood. This is achieved by linking to a receptor on the cell in a similar way to a key unlocking a door. Once insulin links in, the cells respond by allowing glucose to pass from the blood into the cells, thereby decreasing blood glucose levels. In up to 80% of women with PCOS, the cells become resistant to insulin, that is, the “key” (insulin) links with the “lock” (receptor) but the cell does not respond and blocks the entry of glucose into the cell. This scenario is known as insulin resistance.

In an attempt to compensate for the lack of glucose in the cell, the body signals the brain to produce greater quantities of insulin. When insulin levels are high they have adverse effects throughout the body including on the ovaries and in the liver. Over time even higher levels of insulin are ineffective and in some women, glucose levels in the blood may rise leading to prediabetes and type 2 diabetes. Insulin resistance can occur in women in all weight ranges.

*Diagram 4. Illustration of normal insulin function and insulin resistance*

**Health tip**

Make one small step towards a healthier lifestyle every day.
Features of insulin resistance include weight gain, cholesterol changes, abnormalities in ovary function and many other health problems. Excess weight and inactivity increase the severity of insulin resistance. Insulin resistance is a strong risk factor for associated conditions such as type 2 diabetes, cardiovascular disease, and metabolic syndrome (see section on metabolic health).

**Androgens**

Androgens, including testosterone are normally present in both men and women, but at much lower concentrations in women. It is a feature of PCOS to have higher levels of testosterone which is responsible for many of the PCOS related symptoms such as disrupted menstruation, reduced fertility, hirsutism (excessive body hair), acne and scalp hair loss (alopecia) affecting about 60–80% of women with PCOS. Some symptoms such as hirsutism are more severe in some women and may be genetically influenced.

*Health tip*

Remove snack foods from easy access (don’t buy them to keep at home).
Personal story

Having a very hairy face made me feel like I wasn’t a normal woman. I hid the fact that I had to shave my face every day and was too embarrassed to go out in the evening when my facial hair would be much worse. This really affected my relationships as I never wanted anyone to touch my face. I felt very self-conscious all the time however, laser therapy has really helped. While it hasn’t cured the facial hair completely it has reduced it and has taken away the constant worrying about looking so different. (Carolyn, 34)
Weight, PCOS and the importance of lifestyle

PCOS can occur in both slender and overweight women, however women with PCOS are at greater risk of being overweight or obese, with weight likely to be concentrated around the waist. It is currently not clear if biological factors are the main cause of this, however insulin resistance and imbalanced appetite hormones may contribute to weight gain in PCOS. If this is the case, this might suggest that some women with PCOS may be more likely to gain weight and have more difficulty in losing weight, however further research is needed in this area.

Lifestyle management including a healthy diet, smoking cessation, regular exercise and weight loss (if overweight) is recommended as the first and most effective treatment for women with PCOS. In women with PCOS with excess weight, a reduction of as little as 5% of total body weight has been shown to reduce insulin levels, improve menstrual function, reduce testosterone levels, improve hirsutism and acne, improve ovulation and fertility and improve psychological outcomes (see lifestyle section).

Health tip
If possible walk to work and go for a walk in your lunch break.
I used to feel that trying to lose weight was hopeless because no diet I tried helped. But after visiting a dietitian and working out what works for me, I feel I have more control over my weight and my hunger. I now know that the more active I am and the better I eat, the more I am able to maintain my weight. This is a great relief to me as now I don’t have to panic about my weight spiralling out of control. (Suzanne, 37)
Metabolic health

Metabolic syndrome
Metabolic syndrome is a cluster of signs and symptoms such as high blood pressure, increased abdominal fat, high glucose levels, high cholesterol levels and low HDL (good cholesterol). All of these risk factors significantly increase the risk of developing cardiovascular disease and diabetes. The risk of metabolic syndrome can be reduced by adopting a healthy lifestyle. Regular blood pressure and cholesterol checks are needed.

The frequency of these checks should be based on the overall diabetes and cardiovascular risk and should be discussed with a GP or specialist.

Metabolic features and diabetes risk
Gestational diabetes, prediabetes and diabetes (see glossary) are all much more common and occur at earlier ages in women with PCOS. Women with PCOS are five to ten times more likely to progress from prediabetes to type 2 diabetes, and are four to seven times more likely to develop diabetes, compared to women without PCOS. This increased risk applies to both slender and overweight women with PCOS but mainly affects those who are overweight. Excess weight is more common in women with PCOS, further increasing the diabetes risk.

Evidence shows that undergoing an oral glucose tolerance test (OGTT – see glossary) is the most appropriate test in women with PCOS to determine if a woman has gestational diabetes, prediabetes or diabetes. Other tests appear less accurate in younger women with PCOS.

This test is recommended every second year in all women with PCOS and annually in those who have additional risk factors such as increased weight, history of (including family history) diabetes, gestational diabetes and belong to a high risk ethnic group.
Cardiovascular disease (CVD)

Cardiovascular disease (CVD) is the leading cause of death in women in Australia and women with PCOS appear to be at increased risk with multiple risk factors that are known to cause CVD. CVD risk factors include high insulin levels in the blood, insulin resistance, high levels of cholesterol including the unhelpful fats (LDL) and lower levels of the helpful fats (HDL), and increased weight. Regular screening for risks factors is important in PCOS such as blood pressure, weight and cholesterol levels. CVD risk can be lowered by improving lifestyle and where needed by taking medications.

Reproductive health

Reproductive features are common in PCOS as they form the basis of the diagnosis. They include increased male type hormones with resultant excess body hair or hirsutism, abnormal egg development with reduced ovulation and reduced fertility.

Many women with PCOS will not have fertility problems however factors such as high levels of testosterone and insulin can affect menstrual cycles and prevent ovulation (see glossary). Ovulation can stop completely or it can occur irregularly, making it more difficult for women with PCOS to conceive naturally. Importantly excess weight and being over 35 years in combination with PCOS can further reduce fertility and some women with PCOS may also have a greater risk of miscarriage. Prevention of weight gain while young and planning to begin a family before the age of 35 can be very useful to ensure the best chance of being able to conceive.

For women who are experiencing difficulties conceiving there are a range of fertility treatments available (see treatment section).

Health tip

Avoid muesli bars and snack bars and eat fresh fruit instead.
Emotional wellbeing

Emotional issues related to PCOS are often not well recognised however a growing body of evidence has shown a strong relationship between PCOS and challenges to emotional health, with figures indicating that up to 64% of women with PCOS may experience some form of depression and over half may experience anxiety, at some time in their lives.

The reasons for the higher occurrence and severity of anxiety and depression in women with PCOS are complex with internal hormonal, metabolic and reproductive features such as increased insulin resistance, androgen levels, acne, hirsutism, increased obesity and infertility, likely to have an impact. Further potential contributors to depression and anxiety in PCOS include the chronic, complex and frustrating nature of PCOS such as a delayed diagnosis, dissatisfaction with treatment, feeling physically different to peers and repeated attempts at weight management can contribute to women feeling discouraged and may lead to a sense of helplessness. If this is not addressed it may progress to the early stages of anxiety and depression.

It is therefore important that women monitor their emotional health closely, be aware when feeling down and take proactive measures that may include seeking a referral to a mental health professional. Health practitioners may ask women with PCOS to complete questionnaires that provide information about their emotional health which may indicate that a referral to a mental health professional is recommended.

What is anxiety?

Anxiety is present when a person experiences extreme feelings of fear or worry, sometimes for no particular reason or after a stressful experience has occurred. A person experiencing anxiety may start to avoid situations or people and feel less able to cope. If anxiety goes on for a long period of time and interferes with daily life, it may require treatment.

Physical symptoms of anxiety may include:

- a racing heart or palpitations
- rapid breathing
- shortness of breath
- sweating
- dizziness
What is depression?

Depression is more than low mood and sadness at a loss and is a serious medical illness. People experiencing depression feel extremely sad, dejected and unmotivated. It is very important to recognise the signs of depression and seek help early. Women with PCOS often may not have clinically diagnosed depression, but may feel unsupported, sad, or isolated, and this is also important to recognise and address.

Other emotional challenges

Women with PCOS can present with a range of emotional challenges that include low self-esteem, poor body image, eating disorders and psychosexual dysfunction.

Body image

Body image is complex and is defined as the way a person may feel, think and view their body including their appearance. It is influenced by many factors including appearance, psychological factors, social and cultural influences that appear to affect the way women think and feel about their bodies. Body image is also impacted by the mental picture that individuals form of their bodies, their attitudes to physical appearance, understanding of health, physical fitness, body size, values and self-esteem.

Negative body image is more prevalent in PCOS with a recent study demonstrating that women with PCOS, compared with other women, had a greater negative body image. Women with PCOS may feel less physically attractive, healthy or physically fit and are less satisfied with their body size and appearance which impacts on thoughts and feelings of health, appearance, mood and physical fitness. PCOS features, in particular hirsutism and increased weight, appear to impact negatively on body image and may contribute to increased levels of anxiety and depression in some women.
Eating disorders

The prevalence of any eating disorder has been reported at 21% in women with PCOS with research suggesting that fewer than half with clinically significant eating disorders are identified. This may be related to ambivalence, secrecy and shame or the health practitioner’s knowledge, attitude and skill level in recognising and managing this disorder. Eating disorders in women with PCOS can include bulimia nervosa, anorexia nervosa, binge eating, purging, and strict dieting or fasting, and abnormal eating behaviour. Suggested links between PCOS and eating disorders include hormonal links as well as the impact of PCOS on self-esteem and body image. Women with PCOS have higher prevalence of risk factors for eating disorders including excess weight, depression, anxiety, low self-esteem and poor body image. There may also be more motivation for weight loss and prescribed and self-imposed dietary restriction in women with PCOS. Eating disorders affect women’s health and wellbeing and their capacity to participate in and contribute to society.

Psychosexual dysfunction

Psychosexual dysfunction refers to sexual problems or difficulties that have a psychological origin and evidence suggests that women with PCOS suffer from greater psychosexual dysfunction than women in the general population. Physical PCOS symptoms such as hirsutism, obesity, menstrual irregularity and infertility may cause loss of feminine identity and contribute to a feeling of being unattractive which may impact on sexuality. Women with PCOS also report less sexual satisfaction and lower sexual self-worth than women without PCOS and sexual dysfunction impacts more on relationships in women with PCOS.

Seeking help and support

Social support can be very important to both physical and emotional health as research suggests that women who feel supported are better able to manage their condition.

Support groups can be very helpful in providing a community of women who are experiencing PCOS. For those who are experiencing the emotional effects of PCOS, it is important to seek help early by requesting a referral to a mental health professional.
Associated health conditions

Evidence shows that women with PCOS are at risk of developing other conditions such as endometrial cancer and sleep apnoea. It is important to be aware of these risks so that preventative steps can be taken.

Endometrial cancer

Whilst endometrial cancer is rare in women with PCOS, women with PCOS who are not using hormonal treatment including the pill (or IUD) and who do not menstruate at least four times per year are at increased risk of endometrial cancer due to the build-up of endometrial lining in the uterus (this lining is shed during a period). Therefore the doctor may recommend hormone treatment such as progestins, or the oral contraceptive pill which will bring on bleeding and reduce these risks.

Sleep apnoea

Women with PCOS, particularly those who are overweight or insulin resistant, can also be at increased risk of developing sleep-disordered breathing or sleep apnoea. Sleep apnoea occurs when the upper airway is obstructed during sleep; this can be due to pressure from excessive fatty tissue in the neck partially blocking the airway causing snoring and altered breathing patterns during sleep which can lead to sleep loss, tiredness and reduced quality of daily life. If concerned about sleep apnoea, snoring, altered breathing patterns during sleep, discuss assessment and treatment options with a GP. Generally weight loss is a key treatment here also.

Health tip

When exercising focus on the benefits such as improved mood, weight maintenance and increased energy levels.
Treatment

This section provides information on treatment options for women with PCOS:

- lifestyle and PCOS
  - weight management, exercise and diet
- treatment of insulin resistance
- treatment of metabolic risk
- treatment of irregular menstrual cycles
- treatment of hirsutism
  - cosmetic and pharmaceutical approaches
- treatment of infertility
- general medical treatments
- alternative treatments
- hirsutism

Lifestyle and PCOS

Weight management, exercise and diet

Evidence clearly indicates that the most effective way to manage PCOS is by lifestyle changes such as being active, eating well and maximising emotional health. Reducing weight (if overweight) or weight gain prevention has been shown to reduce symptoms associated with PCOS. The following are strategies to assist with the adoption of a healthy lifestyle.

1. **Focus on preventing weight gain and monitor your weight**
   
   The first step in improving health is to prevent weight gain. Replace large plates and glasses with smaller ones (like our grandmothers had) as research shows this will lead to a reduced intake of food. Eat until full and do not be tempted to ‘clean the plate’.
   
   Weigh yourself regularly and monitor your weight. If your weight increases make a change to correct this.

2. **If overweight focus on reducing weight by 5% in the first instance**
   
   Weight loss of as little as 5% can have significant health benefits.
3. Move more every day in as many ways as possible

Get active! Walk or ride to the shops or to work when possible. Wear a pedometer to track steps and aim for at least 30 minutes of moderate to intense physical activity per day or ideally 10,000 steps per day.

4. Decrease saturated fat and eat more fruits and vegetables every day

Choose lower fat versions of foods, such as lean meats and low fat dairy foods, and increase intake of fresh fruits and vegetables.

5. Make long term plans for a healthier lifestyle

Evidence shows that a healthy calorie restricted diet is effective to assist weight loss. Steer clear of quick fix fad diets. Set a realistic health goal, make a plan, ask for support from family and friends and monitor progress.

6. Schedule activity

Schedule a walk in the morning when energy is generally higher. Even a 10 minute walk in the fresh air may increase energy and help performance during the day.

7. Eat breakfast and lunch every day

Eating breakfast helps reduce food cravings throughout the day and may be a good source of carbohydrates, vitamins, calcium and provides fibre for bowel health. Eat wholegrain cereal and bread, low fat milk and fruit. Avoid sweet, honey-toasted, and crunchy cereals. Consider healthy lunch options such as a sandwich with salad and lean meat or tuna, some fruit and some low fat milk, yoghurt or cheese for bone-strengthening calcium.

8. Don’t be afraid of carbohydrates

Don’t be too strict with carbohydrates as restriction may lead to tiredness in the afternoon. Bread and cereals, especially wholegrain varieties are important for nutrition and energy.

9. Eat regular meals slowly and eat only when hungry

Eat regular meals and healthy snacks and try to avoid eating when tired, alone, upset or anxious. Ideally, don’t eat at the computer or when doing other things as this may lead to overeating.

10. Plan ahead for changes to exercise and eating routines and set goals

Watch for times when eating and activity routine changes, such as during holidays. Plan ahead and maintain some exercise, such as walking, dancing, swimming, cycling or surfing. Include mainly healthy foods with the occasional treat during these times.
Exercise and PCOS

How much exercise should I do?

Evidence shows that 150 minutes per week, ideally 30 minutes per day is recommended for women with PCOS. This significantly helps to reduce PCOS symptoms, and the risk of developing other health problems such as diabetes. The addition of some more vigorous activity such as walking and swimming etc, at moderate to high intensity (to the point of feeling a bit flushed, breathing faster, and can’t sing or hold a conversation) coupled with intense activity like weight lifting, will be of greatest benefit.

1. Plan ahead
   Schedule physical activity into daily routine and try to stick to it. A commitment to being active needs to be long term and should become a normal part of everyday lifestyle. Recognise the barriers to activity and plan to overcome them, for example if time is limited try getting up earlier or walking during a lunch break.

2. Equipment
   It is not necessary to spend a lot of money to begin exercising. Start with a good pair of training shoes and comfortable clothes. Take a water bottle and don’t forget to wear sunscreen and a hat when exercising outside.

3. Get support
   The support and encouragement of family or friends will increase the chances of success in making lifestyle changes. Surveys show that women enjoy exercise more when accompanied by friends.

4. Choose an activity
   Before deciding on activities consider factors such as convenience of location, budget, pre-existing medical conditions and level of enjoyment.

Health tip
Reduce portion sizes - buy smaller bowls and plates.
5. Be creative
   Try something different; vary the type, location and time of activity to ensure boredom does not set in.

6. Keep at it
   Persistence is the key to maintaining an active lifestyle. Try to continue being active even when motivation is low. Make sure all equipment is ready and don’t pre-think exercise – just do it.

7. Set goals
   Set both short and long term goals to have something to work towards. Be realistic and start with small achievable goals and build up to a higher level of fitness.

8. Build in rewards
   Having an incentive can help to get motivated. A reward could be anything from buying a favourite magazine, getting a manicure or taking time for reflection.

9. Be aware of body signals
   Exercising is not about ‘no pain, no gain’. If an activity causes pain either slow down or stop altogether. Pain is a sign that something might be wrong, if it continues see a health practitioner.

10. Have fun
    Enjoyment is essential to maintain a long term commitment to being more physically active. Be selective in choosing activities, get involved in group activities and when possible exercise with friends.
Treatment of insulin resistance and metabolic risk

As previously discussed, insulin resistance is a primary underlying feature in most women with PCOS. It is linked to metabolic risks including diabetes and cardiovascular disease.

It is important that women with PCOS have their blood sugar, fats and blood pressure checked regularly. One of the most effective ways to address insulin resistance in overweight women is weight loss. Maintaining a healthy weight will also help to control insulin resistance (see weight, PCOS and the importance of lifestyle section). Daily moderate exercise of 30 minutes or more increase the cells sensitivity to insulin and lowers insulin resistance even without weight loss. Metformin is a medication that also reduces insulin resistance. It is less effective than lifestyle change and is used second line to address insulin resistance in PCOS.

Regulation of menstrual cycles

Hormonal disturbances including insulin resistance and higher levels of male type hormones contribute to failure to ovulate and irregular cycles.

The following treatment options are effective to assist regularity of menstrual cycles:

- lifestyle change (5-10% weight loss of current body weight) if overweight
- oral contraceptive pill (low oestrogen doses, may be preferable)
- metformin (improves insulin resistance, ovulation and menstrual cycles)
- contraceptive pill or cyclic progestins

It is important to have a period at least four times per year as this has a protective effect on the uterus (see section on associated health conditions). For women with PCOS who have less than four periods per year, doctors may suggest the use of hormones to bring on a period such the contraceptive pill or cyclic progestins (eg 10mg medroxyprogesterone acetate for 14 days every two to three months).

Hirsutism - cosmetic and pharmaceutical approaches

Hirsutism is a symptom rather than a disease and is related to higher levels of testosterone in the blood. Hirsutism is excessive hairiness on women in those parts of the body where hair does not normally occur for example, the face or chest. It refers to a male pattern of body hair (androgenic hair) and the aim of treatment is primarily for cosmetic reasons.
Hirsutism treatment recommendations

- Cosmetic therapy (e.g., waxing)
- Pharmaceutical therapy

**Cosmetic therapy**

The recommended treatment for hirsutism is to cosmetically target the symptoms and can include waxing, depilatory creams, electrolysis, threading, eflornithine cream or laser therapy, all of which are effective approaches.

**Laser therapy** is recommended as a safe method to reduce excess body hair when used by a trained operator. Before commencing laser therapy it is important to ensure the operator has had sufficient training and experience to carry out the therapy effectively. Costs can be high and prices do vary so shop around to ensure rates are competitive. Also discuss a patch test before treatment to assess skin sensitivity and consider visiting a dermatologist or medically-supervised service if concerned.

Laser works best on those with dark hair and paler skin. If women have darker skin, a different wavelength laser therapy may be needed as darker hair absorbs the laser light more readily than lighter colours. This should be discussed before undertaking laser treatment. There are two types of laser therapies available for hair removal; laser (has a specific wavelength) and IPL (has a broad spectrum wavelength). Both are considered effective however, laser requires that the provider has undergone specific training.

**Eflornithine cream** (prescription only) can be temporarily used in conjunction with laser therapy and may result in a more rapid response (it works by reducing the effect of an enzyme needed for hair growth).

**Pharmaceutical therapy**

If cosmetic therapy is ineffective, inaccessible or unaffordable, then medical therapy may be an option. All forms of medical therapy take 6-12 months to reach optimal effectiveness.

- Primary therapy is the oral contraceptive pill (which acts to lowers androgen levels)
- Anti-androgen medication (as the name suggests, lowers androgen levels) must be used in combination with some form of contraception. Examples of anti-androgen medications are spironolactone or cyproterone acetate.
If fertility problems do occur, evidence shows that lifestyle changes, which include healthy food choices and exercise programs, are important. Weight loss (if overweight) of 5-10% (of current body weight) and regular exercise may significantly improve the chances of falling pregnant. If women are overweight, doctors may suggest a six month intensive diet and exercise program to decrease weight, increased fertility and optimise health for pregnancy. If after completing this program infertility persists, then medications to assist with fertility may be suggested by a GP or specialist (see treatment section for fertility treatments).
Clomiphene citrate is deemed first line medical fertility treatment in women with PCOS who are not ovulating or have irregular periods. It is used to assist ovulation (helps the egg to reach full maturity and to be released ready for fertilisation). Side effects can include stomach and bowel upsets, hot flushes, bloating, headache, dizziness, depression and breast discomfort. Sometimes ovarian hyperstimulation syndrome can occur and therefore treatment needs to be carefully monitored by a specialist. Twins are more common with clomiphene.

Metformin is used in general treatment of PCOS (see PCOS and medications). However it is also used in the treatment of infertility, where it is effective in addition to clomiphene when clomiphene citrate alone has not been effective. Metformin may also be used alone, but is not as effective as clomiphene.

Gonadotrophins are hormones that stimulate the hormones necessary for ovulation (follicle stimulating hormone and luteinizing hormone). They are usually given by injection under the skin and careful monitoring is essential when using these hormones to avoid a condition known as ovarian hyperstimulation syndrome (see glossary).

Medical and surgical fertility treatments

If infertility persists, the following surgical treatments may be considered: laparoscopic ovarian drilling, bariatric surgery (weight loss) and in vitro fertilisation (IVF).

Surgical options for fertility

Surgical options include laparoscopic ovarian drilling and bariatric surgery (to assist with weight loss). Laparoscopic ovarian drilling or gonadotrophins can be used for treatment of infertility in anovulatory women when clomiphene citrate and/or metformin are not effective.
Ovarian drilling by laparoscopy is a procedure in which probes are used to puncture small holes in the surface of the ovary resulting in re-establishing ovulation in some women. However it is not clear why this procedure works or for how long the effect lasts. It is also important to note that the results vary and that the procedure is associated with intra-operative and post-operative risks including the risk of the reduction of the number of available eggs. Laparoscopic ovarian drilling may be more cost effective than gonadotrophin therapy in the long term, as it results in fewer multiple pregnancies.

Bariatric surgery (weight-loss surgery) includes a variety of procedures performed to assist weight loss by reducing the size of the stomach with an implanted medical device (gastric banding) or through removal of a portion of the stomach (sleeve gastrectomy or biliopancreatic diversion with duodenal switch) or by resecting and re-routing the small intestines to a small stomach pouch (gastric bypass surgery).

Bariatric surgery can be used for treatment of infertility in anovulatory women with PCOS, with a BMI greater than 35kg/m² and where intensive lifestyle change (that has been tried for at least 6 months) has not been effective. Bariatric surgery is an effective weight loss measure and research in the general population demonstrates that weight loss improves fertility and addresses the maternal and neonatal complications associated with obesity.

In vitro fertilisation (IVF) is a process by which eggs are fertilised by sperm outside the body. The process involves hormonally controlling the ovulatory process, removing ova (eggs) from the woman’s ovaries and letting sperm fertilise them in a fluid medium.

The fertilised egg is then transferred to the woman’s uterus with the intent to establish a successful pregnancy. Most women with PCOS do not require IVF, however some couples may need this treatment, especially if other fertility factors exist or male factors are contributing. However, if needed in women who are overweight, weight loss prior to IVF is likely to improve success and result in healthier pregnancies.
PCOS and medications

In some instances doctors may recommend that some women with PCOS commence medications. This section provides an overview of some commonly used medications in the treatment of PCOS.

**Metformin** reduces insulin resistance and improves symptoms in PCOS. Benefits include:

- improves ovulation/cycles and can help with fertility (see reproductive health section)
- reduces insulin resistance and blood pressure
- reduces progression to diabetes
- may prevent weight gain but does not cause weight loss

Milder side effects such as gastrointestinal effects eg diarrhoea, can be avoided if the medication is commenced slowly. A specialist may recommend starting with 1 x 500mg tablet per day metformin and increase by 500mg per fortnight up to 1500mg–2000mg. Binge drinking should be avoided on metformin.

**Oral contraceptive pill (OCP)** are hormonal medications that are commonly prescribed for women with PCOS and have many actions such as:

- reducing male type hormones and reducing excess hair
- provides contraception
- endometrium protection (by inducing menstruation) and cycle regulation

Evidence indicates that most types of OCP are effective to reduce male hormone levels. Higher doses are usually indicated for women who consistently bleed mid-cycle; otherwise, lower doses may be preferable as they have fewer side effects. The OCP is an important treatment option with many beneficial effects in women with PCOS. It is important to note that there is some emerging evidence to indicate that the OCP may increase insulin resistance, more so with higher dose OCPs, hence further research is now being conducted in this area. Therefore, as the pill may increase insulin levels in some women, an oral glucose tolerance test (OGTT) should be undertaken after starting on the pill. Some women may also find that their mood is affected by taking the pill and those women may need to consult with their GP or specialist for an alternative treatment and/or alternate forms of contraception.
Alternative or natural therapies

Alternative or natural therapies are umbrella terms which describe a range of therapies that have been used for many years. Many are now the basis for about 25% of our most common and effective mainstream pharmaceuticals such as digoxin, which is a medication commonly used to treat various heart conditions and is derived from a plant called foxglove.

When considering alternative or natural therapies it is important to understand that the alternative medicine industry is not regulated and that many of the claims are not based on evidence. Also, many of the products recommended as part of natural or alternative therapies have often not been tested for either effectiveness or safety. Some may work, but it is important to recognise that in most cases, this is not known. Seek advice from a health professional or consult a registered integrative medical practitioner when considering alternative therapies. Ask about the evidence for any recommended product and be wary of excessive costs and health claims. If the practitioner providing the advice profits from the products being sold, this vested interest must be considered when making decisions around use of the product.

Conclusion

It is important to remember that effectively managing PCOS requires a lifelong focus which is aided by learning as much as possible about the condition. It is essential to understand the long term health risks associated with PCOS and to take preventive steps to reduce risk.

Some women describe PCOS as a physical and emotional roller-coaster ride at times and evidence tells us that women who are educated about the condition, who feel understood and supported, will cope far better than those who are not. Developing an effective working partnership with GPs and other health professionals will also help.

Further high quality evidence-based information about PCOS can be found at Jean Hailes for Women’s Health website (see useful links section). Jean Hailes for Women’s Health also provides a comprehensive assessment and management service for women with PCOS including education, lifestyle advice and support, specialist assessment/review and management plan development, which can be taken back to the GP and healthcare team.
Appendix 1: Glossary of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic exercise/activity</td>
<td>Any physical activity that produces energy by combining oxygen with blood glucose or body fat.</td>
</tr>
<tr>
<td>Anxiety</td>
<td>When fears or thoughts that are chronic (constant) and distressing interfere with daily living.</td>
</tr>
<tr>
<td>Anaerobic</td>
<td>The word ‘anaerobic’ literally means without oxygen. Anaerobic exercise means working at such a high level of intensity, that the cardiovascular system can’t deliver oxygen to the muscles fast enough. Because muscles need oxygen to continue exercising, anaerobic exercises only last for short periods of time.</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart.</td>
</tr>
<tr>
<td>Body image</td>
<td>The way a person may feel, think and view their body including their appearance.</td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>A calculated number used to discriminate between lean, overweight, obesity and morbid obesity, calculated from an individual’s height (kg) and weight (m). BMI = weight/(height)^2</td>
</tr>
<tr>
<td>Cardiovascular disease (CVD)</td>
<td>A condition that affects either the heart or major blood vessels (arteries) supplying the heart, brain and other parts of the body.</td>
</tr>
<tr>
<td>Depression</td>
<td>Depression is more than low mood and sadness at a loss and is a serious medical illness. A person with depression may feel extremely sad, dejected and unmotivated.</td>
</tr>
<tr>
<td>Diabetes type 2</td>
<td>When the pancreas makes some insulin but it is not produced in the amount the body needs and it does not work effectively. Type 2 diabetes results from a combination of genetic and environmental factors and risk is greatly increased when associated with lifestyle factors such as high blood pressure, overweight or obesity, insufficient physical activity, poor diet and the classic ‘apple shape’ body where extra weight is carried around the waist.</td>
</tr>
<tr>
<td>Hyperandrogenism</td>
<td>Clinical hyperandrogenism is characterised by hirsutism, acne and male pattern alopecia (baldness). Biochemical hyperandrogenism is characterised by excessive production and/or secretion of testosterone.</td>
</tr>
</tbody>
</table>
**Oral glucose tolerance test (OGTT)**
A test to determine the body’s ability to handle glucose.
After fasting overnight, the plasma glucose is tested by a blood test. After this test, the person receives 75 grams of glucose (100 grams for pregnant women). Usually, the glucose is in a sweet-tasting liquid that the person drinks. Blood samples are taken up to four times to measure the blood glucose. Evidence indicates this is a preferred method for women with PCOS.

**Ovarian hyper-stimulation syndrome**
Ovarian hyper-stimulation syndrome (OHSS) is a complication occasionally seen in women who take certain fertility medicines that stimulate egg production. It is a condition where too many follicles develop (following ovulation induction) which can result in marked abdominal swelling, nausea, vomiting and diarrhoea, lower abdominal pain and shortness of breath.

**Infertility (women)**
Infertility is the inability to conceive for a variety of problems that includes failure to ovulate, blockages in the fallopian tubes, and disorders of the uterus, such as fibroids or endometriosis.

**Interdisciplinary care**
An interdisciplinary care model is the collaboration between a woman with PCOS and a care team who have shared goals for her total wellbeing.

**Insulin resistance**
A rise in glucose occurs because the body can’t make enough insulin or the insulin produced is not working properly.

**Irregular cycles/oligomenorrhea**
When the duration of menstrual cycles are >35 or <21 days.

**Metabolic syndrome**
Metabolic syndrome is a set of clinical indicators such as high blood pressure, increased abdominal fat, high glucose levels and high blood fat levels. The presence of this condition significantly increases the risk of developing cardiovascular disease and diabetes.

**Ovulation**
Ovulation is the release of an egg from one of the ovaries.

**Prediabetes**
Where blood glucose levels are higher than normal, but not high enough to be classified as diabetes. Prediabetes includes impaired fasting glucose and impaired glucose tolerance.

**Quality of life (QoL)**
Quality of life, a subjective assessment of one’s emotional and physical wellbeing.
Appendix 2:  
List of PCOS related medical reference ranges

**Lipid profile**

Total cholesterol should be less than 4 mmol/L.

- Low density lipoprotein cholesterol (LDL-C) in women without additional cardiovascular disease risk factors, LDL-C levels should be less that 3.4 mmol/L
- In women with metabolic syndrome or type 2 diabetes, LDL-C levels should be less than 1.8-2.6 mmol/L or 1.8 mmol/L, respectively
- High density lipoprotein cholesterol (HDL-C) levels should be greater than 1.0 mmol/L
- Triglyceride levels should be less than 1.7 mmol/L

**Body mass index (BMI)**

Body mass index less than 18.5 kg/m² = underweight  
Body mass index between 18.5-24.9 kg/m² = healthy weight  
Body mass index between 25.0-29.9 kg/m² = overweight  
Body mass index greater than 30.0 kg/m² = very unhealthy weight

**Glucose reference range (fasting levels)**

- Normal range – between 4 and 6 mmol/L  
- Impaired fasting glucose – fasting plasma glucose: between 6.1 and 6.9 mmol/L  
- Impaired glucose tolerance – 2 hour glucose level: between 7.8 and 11 mmol/L  
- Type 2 Diabetes – fasting plasma glucose: greater than or equal to 7.0 mmol/L or 2 hour glucose tolerance test: greater than or equal to 11.1 mmol/L

**Waist circumference**

Waist circumference should be assessed using the following criteria:

- greater than 80 cm = increased risk of metabolic complications  
- greater than 88 cm = substantially increased risk of metabolic complications
Appendix 3: Useful links

Jean Hailes for Women’s Health
jeanhailes.org.au/health-a-z/pcos

Jean Hailes for Women’s Health: Evidence-based guideline for the assessment and management of polycystic ovary syndrome
jeanhailes.org.au/health-professionals/tools/

Diabetes Australia
diabetesaustralia.com.au

Dietitians Association of Australia
daas.asn.au/for-the-public/smart-eating-for-you

Heart Foundation: Know the risks