This article reviews **POLYCYSTIC OVARY SYNDROME (PCOS)** the most common endocrinopathy in women of reproductive age that is associated with insulin resistance and long-term risks of type 2 diabetes and vascular disease.

PCOS affects approximately 6.6% of adult women of reproductive age. The most common presentations are symptoms of androgen excess (acne, hirsutism, male pattern of hair loss), menstrual problems (oligomenorrhoea, amenorrhoea), obesity and problems with fertility. There is, however, other health risk that are associated with this condition.

**DIAGNOSIS OF PCOS**
Diagnosis of PCOS requires two of these three criteria (Rotterdam criteria):

1. Polycystic Ovaries on ultrasound and exclusion of other causes of androgen excess
2. Clinical and/or biochemical signs of hyperandrogenism
3. Oligo/Amenorrhoea

Your patient therefore does not need presence of ovarian cysts to be diagnosed with PCOS.

**PATHOPHYSIOLOGY**
The commonly asked question is what is the main driver for the reproductive and metabolic abnormalities in PCOS?

The pathophysiology of PCOS is not fully understood but the “egg” here is thought to be insulin resistance due to an insulin post-receptor defect. Hyperinsulinaemia subsequently stimulates secretion of androgens from ovaries and adrenals, reduces the amount of sex hormone binding globulin (SHBG) and this results in an increase in the level of circulating free androgens. Hyperinsulinaemia and hyperandrogenism suppress ovulation and contribute to obesity. Further weight gain fuels insulin resistance and thus a vicious circle is created.

**PCOS AND DIABETES**
40% of women with PCOS have impaired glucose tolerance and 10% have frank diabetes. It is therefore important to screen patients with PCOS on an annual basis for these complications. Women with PCOS with BMI>30 kg/m² are also at an increased risk of gestational diabetes and need to be screened for this in pregnancy. Obesity in PCOS poses an increased risk for obstructive sleep apnoea (OSA), which in itself is a risk factor for insulin resistance, type 2 diabetes and cardiovascular disease.

**PCOS AND CARDIOVASCULAR RISK**
Increased blood pressure in PCOS is thought to be due to sodium retention associated with hyperinsulinaemia and stimulation of the renin-angiotensin system by androgens. Observational data also suggests that the incidence and extent of atherosclerosis is also higher in patients with PCOS due to endothelial dysfunction, hyperlipidemia, hypertension and low grade inflammation. Screening for dyslipidaemia, hypertension, smoking cessation and weight reduction advice needs to be an integral part of initial consultation and subsequent follow up.

**TREATMENT OF PCOS**
The treatment of utmost importance is weight reduction, which has a domino effect on improving most of the presenting symptoms. This should be accompanied by treatment of modifiable risk factors and patient education. Weight loss reduces androgens and stimulates ovulation via the reduction in insulin resistance. Metformin (1gram twice daily) is the best available insulin sensitising agent used in obese and lean insulin resistant patients with PCOS to improve ovarian function, menstruation and possibly fertility as well as hyperglycaemia if relevant.
TREATMENT OF INFERTILITY
In addition to attempts to induce ovulation with weight loss and metformin, ovulation induction regimes may be indicated. This can include clomiphene (selective estrogen receptor modulator), that increases follicle stimulating hormone (FSH), which stimulates follicular growth or direct gonadotrophine preparations. Surgical procedures such as laparoscopic diathermy or laser drilling may restore ovulatory cycles but are rarely employed.

TREATMENT OF HIRSUTISM
Treatment of hirsutism is usually slow and in many cases ineffective. The oral contraceptive pill with an androgen receptor blocker (Dianette) is a preferred option. Efornithine cream (Vaniqua) is a topical preparation for facial hirsutism and is an inhibitor of an enzyme which plays an important role in cell division and proliferation in the hair follicle. It slows the facial hair growth and reduces the psychological burden of facial hirsutism. Other preparations that reduce the effect of androgens are androgen receptor blockers (cyproterone acetate, spironolacton, low dose dexamethasone) and 5 alpha-reductase inhibitors (finasteride).

PCOS is a common multisystem disorder and should be considered as an underlying diagnosis in pre-menopausal women with type 2 diabetes. Conversely, diabetes needs to be screened for in women with established PCOS. Even though the adverse health consequences associated with PCOS are substantial, most women are not aware of these risks. Early recognition and treatment of metabolic complications and patient education with emphasis on weight reduction should be the main focus for clinicians.

REFERENCES:
2. PCOS, insulin resistance and long-term risks for diabetes and vascular disease, British Journal of Diabetes and Vascular Disease, January/February 2009, vol./is. 9/1(15-18), 1474-6514 (January/February 2009), Sattar N
4. PCO, metabolic syndrome and contraception, European Journal of Contraception and Reproductive Health Care, May 2010, vol./is. 15/(33-34), 1362-5187, Scouby, S.Ob
Individually speciality areas achieved the following significant outcomes:

- **DMOP** Reduction in diabetes related delayed discharges, reduction in hypoglycaemia episodes and reduction in readmissions
- **EMERGENCY** Reduction in adverse incidents, detailed care plans prior to transfer to main wards and reduction in readmissions
- **RENAL** Optimised glycaemic control and reduction in readmissions
- **SURGICAL** Reduction in inappropriate use of intravenous insulin infusions, reduction in sepsis and reduction in adverse incidents

Collectively the above outcomes signify substantial positive financial outcomes and are estimated to equate to a saving of over two million pounds.

This saving has not only been calculated by DIPPS for PHT but has also been recognised and agreed by ‘think glucose’ nationally as a saving that could be made by all hospitals if they were to adopt similar working practices. The PHT specialist diabetes team were also winners of prestigious awards at both the regional and national Health and Social Care Awards in Acute Care 2010.

After completing the pilot PHT acknowledged the benefit of the DIPPS service and agreed for it to be continued. Currently, the service is being rolled out in orthopaedics and the specialist diabetes team has a long term aim to roll it out to the whole of PHT.

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**Support for Managing a New Diagnosis of Type 1 Diabetes**

When a patient presents with a new diagnosis of Type 1 diabetes we are able to provide a comprehensive pathway for care within the specialist diabetes centre. Once a decision has been made that the patient does not need admitting to hospital with diabetic ketoacidosis you can telephone our centre on **02392 286260** Monday to Friday 9am-4pm and we aim to see such patients within 24 hours of this call and often this will be the same day of referral.

The first appointment will take place with one of the diabetes specialists nurses (DSN) and lasts between 1-2 hours depending upon the patients needs. This appointment aims for the patients to:

- Understand the nature of Type 1 diabetes
- Feel confident to independently inject insulin
- Understand their initial management plan, including insulin dose adjustment, sick day rules, dietary advice and follow up plan
- Explore their emotions following their diagnosis of diabetes

Subsequently, follow up appointments are arranged with the DSN and telephone advice offered in between these appointments as required. In addition to DSN support patients are also offered an appointment to see the diabetes specialist dietitian within 4 weeks and the consultant diabetes specialist within 12 weeks.

We also provide access to a structured education programme to support them through their first year with type 1 diabetes. The aim of this programme is to increase contact time with a skilled diabetes team who will provide consistent information and help them to develop their problem solving skills in order to manage their diabetes independently.

Also, it offers them support from other individuals with newly diagnosed type 1 diabetes and this can provide emotional support in parallel with the support we can offer as health care professionals.

Currently the structured education programme consists of three sessions and some of the issues covered are as follows:

- Information about their insulin regimen and other regimens they may consider using in the future
- How monitoring their blood glucose levels can support their goals
- Dietary issues
- Information sources
- Complications of diabetes
- Provision for the future
- Practical issues such as driving, travelling and pre-conception are also covered.

For further information on this service please contact us at the specialist diabetes centre on **02392 286260**

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**Anita Thynne**  
Lead In-Patient Diabetes Nurse Specialist

**Jo Buchanan**  
Advanced Diabetes Practitioner
About one third of people with diabetes will develop kidney failure. Medications such as ACE inhibitors and other blood pressure medications are commonly used to delay progression of CKD. Dietary modifications have been shown to delay progression of CKD. Dietary requirements will change as CKD progresses, in stages 1-4 the focus is on prevention of deterioration of renal function and in stages 3-5 the focus shifts towards controlling levels of urea, potassium and phosphate accumulating in the blood.

### Dietary Modifications
- Modification of protein intake.
- Optimize glycaemic control
- Modify salt intake
- Weight management
- Lipid control

### As for stages 1&2
- Modification of phosphate &/or potassium if levels raised
- Monitor appetite and nutritional status.

### As for stage 3
- Modification of potassium, phosphate if raised
- Fluid restriction & modified salt intake
- Increased requirement for protein
- Glycaemic control
- Monitor nutritional status

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Glomerular Filtration Rate (GFR, ml/min/1.73M²)</th>
<th>Dietary Modifications</th>
</tr>
</thead>
</table>
| 1     | Kidney damage (e.g. protein in the urine) with normal GFR | 90 or above | • Modification of protein intake.  
• Optimise glycaemic control  
• Modify salt intake  
• Weight management  
• Lipid control |
| 2     | Kidney damage with mild decrease in GFR | 60 - 89 | As for stages 1&2  
• Modification of phosphate &/or potassium if levels raised  
• Monitor appetite and nutritional status. |
| 3     | Moderate decrease in GFR | 30 - 59 | As for stage 3  
• Modification of potassium, phosphate if raised  
• Fluid restriction & modified salt intake  
• Increased requirement for protein  
• Glycaemic control  
• Monitor nutritional status |
| 4     | Severe reduction in GFR | 12 - 29 | As for stage 3  
• Modification of potassium, phosphate if raised  
• Fluid restriction & modified salt intake  
• Increased requirement for protein  
• Glycaemic control  
• Monitor nutritional status |
| 5     | Kidney failure | <15 | As for stage 3  
• Modification of potassium, phosphate if raised  
• Fluid restriction & modified salt intake  
• Increased requirement for protein  
• Glycaemic control  
• Monitor nutritional status |

### 1) GLYCAEMIC CONTROL STUDIES
1) Glycaemic control Studies have shown that intensive diabetes management delays progression of nephropathy in Type 1 and Type 2 diabetes (1,2) and improves outcomes. Dietary management alongside hypoglycaemics and insulin can help to achieve this. In view of the complexity of glucose management in this group (related to variable insulin resistance, risk/benefit calculations for certain drugs and reduced clearance of insulin) it is recommended that people with diabetes with a GFR of <45 are referred for assessment by the renal-diabetes service at the Diabetes Centre unless their diabetes is controlled by diet alone. Glycaemic control remains an important consideration at each stage of CKD.

### 2) PROTEIN MODIFICATION
Dietary protein intake at all stages of CKD appears to have an important impact in this population. Two meta-analyses (3,4) have reported reduction in albuminuria and stabilization of kidney function with dietary protein intake at the Recommended Daily Allowance (RDA) level. Nutrition surveys indicate that most people eat protein in excess of the RDA. Benefits of limiting protein intake are more evident in type 1 than type 2 diabetes, but fewer studies have been done in the latter population. Evidence also suggests that people with diabetes and CKD should avoid high protein diets.

If dietary protein is limited, adequate caloric intake must be maintained by increasing calories from carbohydrates and/or fats. Once a person is at CKD stage 5 protein requirements will increase. Competing needs for nutritional management of hyperglycaemia among other factors can make reduction of protein intake challenging so low protein diets should always be planned with the support of a dietitian experienced in kidney disease.

### 3) SALT
Tight blood pressure (BP) control is important to prevent diabetes complications (2). There is compelling evidence suggesting that a high salt intake is a cause of hypertension and a risk factor for kidney damage. For this reason dietary sodium reduction to 100mmol (6g salt /day) is recommended. In practical terms this is no salt added at the table or in cooking and restriction of high salt foods such as cheese and convenience foods. Refer to Solent Voice Volume 13 for further guidance.

### 4) WEIGHT
As well as its impact on insulin resistance and thus glycaemic control weight gain is associated with increase in blood pressure. A meta-analysis of 25 studies showed that for each Kg weight loss BP fell by 1mmHg (5). Therefore in patients with body mass index above 30 kg/m2 weight loss should be considered.
5) LIPIDS
Raised lipid levels are common in both diabetes and kidney disease. As CVD is 5 times more common in the diabetes population than the non-diabetic population and cardiac events are the leading cause of death in renal patients control with medications and dietary measures is recommended.

6) POTASSIUM & PHOSPHATE
As GFR reduces blood levels of potassium and phosphate rise. Recommendations are the same for people with or without diabetes and dietary manipulations are a well accepted means of controlling levels. Potassium levels rising above 5.5mmol/l indicate the need for a low potassium diet. ACE inhibitors and some other blood pressure medications can raise serum potassium levels which needs to be considered when commencing or changing doses. Phosphate binders may be needed in patients from CKD stage 3 or 4. As potassium and phosphate restrictions impose further dietary constraints on a person a key focus of nutritional therapy is discussion of alternatives to foods that are being limited.

7) REDUCED APPETITE
As CKD progresses build of waste especially urea and other factors often lead to reduced appetite which, if not recognised and addressed may compromise nutritional status. Poor nutritional status on commencement of dialysis has been shown to be a strong predictor of poor survival on dialysis. Modified protein diets with adequate calorie provision from carbohydrate and fat are known to reduce uraemic symptoms and improve appetite. Altered eating patterns along with reduced insulin clearance can increase incidence of hypos and affect insulin requirements.

8) FLUID RESTRICTION
Fluid restrictions are often required once a person reaches CKD stage 5 or sometimes earlier if a patient has resistant oedema. Hyperglycaemia can make adherence extremely challenging.

References
PROGRAMME OF FREE PROFESSIONAL EDUCATION AND TRAINING OPPORTUNITIES 2010/11
SUPPORTED BY: NHS EDUCATION SOUTH CENTRAL
VENUE: REES HALL, SOUTHSEA TERRACE, SOUTHSEA PO5 3AP

- **TO BE CONFIRMED**
  - **DIABETES FOR THE NON-REGISTERED HEALTHCARE PROFESSIONAL**
    - 0900 - 1300

- **18TH MARCH 2011**
  - **DIABETES CARE FOR THE HOUSEBOUND RESIDENTIAL + CARE HOMES**
    - 0930 – 1630

- **TO BE CONFIRMED**
  - **DIABETES PHARMACOLOGY**
    - 0900 - 1300

- **12TH & 13TH MAY 2011**
  - **LIVING WITH DIABETES**
    - 0900-1700
    - & 0900-1300
    - (ATTENDANCE REQUIRED AT BOTH SESSIONS)

- **9TH & 23RD JUNE 2011**
  - **EFFECTIVE CONSULTATION AND CARE PLANNING**
    - 0900-1800
    - (ATTENDANCE REQUIRED AT BOTH SESSIONS)

- **TO BE CONFIRMED**
  - **CHRONIC DIABETIC COMPLICATIONS**
    - 0900 – 1800
    - & 0900 – 1300
    - (ATTENDANCE REQUIRED AT ALL SESSIONS)

- **TO BE CONFIRMED**
  - **DIAGNOSIS, COMPLICATION, PREVENTION & SCREENING**
    - 1300 – 1700
    - (ATTENDANCE REQUIRED AT ALL SESSIONS)

- **TO BE CONFIRMED**
  - **LIFESTYLE & BEHAVIOUR CHANGE**
    - 0900 – 1800
    - (ATTENDANCE REQUIRED AT BOTH SESSIONS)

- **SUSPENDED**
  - AS PART OF INTENSIVE INSULIN MODULE
  - **BLOOD GLUCOSE MONITORING**
  - 0900 – 1630
    - (ATTENDANCE REQUIRED AT BOTH SESSIONS)

- **12TH & 19TH APRIL 2011**
  - **TRANSITIONAL CARE (INC. PREGNANCY)**
    - 0900 - 1300
    - (ATTENDANCE REQUIRED AT BOTH SESSIONS)

- **FOR COURSE DETAILS AND A REGISTRATION FORM:**
  - **CONTACT:**
    - Diabetic.professionaleducation@porthosp.nhs.uk
    - or visit our website
    - www.portsmouthdiabetes.com
The Portsmouth District Diabetes Network (PDDN) is organised and run by Sarah Moutter, Jane Egerton and Debbie Fishwick Diabetes Nurse Specialists with support from pharmaceutical companies. They are evening meetings held 4-5 times a year. This event was historically for Practice Nurses, we now welcome all healthcare professionals with a particular interest in Diabetes across Portsmouth and Hampshire PCTs and the acute trust.

In previous years we had speakers covering various topics such as podiatry, pregnancy, dietetics, current and new treatments for diabetes. If anyone has a particular interest they would like to share, or a topic they would like to see covered, please contact us via email.

Our next meeting is 6th April and held at the Hilton Hotel, Farlington. Title: Diabetes Treatment and Case Studies - Ask the Panel The panel consist of 2 DSNs, Sarah Moutter and Jane Egerton. 2 GPs, Dr J Hogan and Dr T Goulder.

The meeting starts at 6.30pm with supper at the Hilton Hotel.

Other dates in 2011 for your diary:
22nd June Speaker Dr D Meeking
14th September Speakers, Sarah Moutter DSN and Chris Hall DSM
9th November Speaker, Dr J Hogan
Please look out for the invitation to book a place. We hope you will join us.

Sarah Moutter
Sarah.moutter@porthosp.nhs.uk

Jane Egerton Community DSN
Jane.egerton@nhs.net

The Diabetes Centre at Queen Alexandra Hospital is undertaking a variety of clinical research projects. We are undertaking drug trials that involve the next generation drugs for the future treatment of diabetes. We are in the process of recruiting people to take part primarily those with type 2 diabetes, particularly those naïve to insulin therapy. We have enjoyed working with primary care on previous projects and are looking to strengthen our links with them in the future. If you would like to find out more please contact Sharon Allard or Elaine Hallatt

02392 286260
sharon.allard@porthosp.nhs.uk
elaine.hallatt@porthosp.nhs.uk

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Research Registrar

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davina.irish@porthosp.nhs.uk
Direct GP access to the following services is available. Emergency referrals we will aim to see within 24 hours and routine referrals will be seen within 4-6 weeks. These services are provided in addition to the traditional diabetes clinics operating at QAH, GWM and Petersfield Hospital. Referrals may be made through a conventional letter/fax or Choose and Book unless otherwise stated.

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>COMMENT</th>
<th>SERVICE PROVIDED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Access (URGENT)</td>
<td>Urgent cases eg new onset type 1 diabetes, mild DKA may be discussed with any member of the diabetes team. 92 286260</td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Usually seen within one week of referral. Please refer ASAP 9228 6000 x4553 or 4584 since early review is essential. The service also provides pre-pregnancy counselling for all diabetic women of child bearing age.</td>
<td>Mike Cummings, Sarah Moutter, Anita Thynne, Jeanette Head</td>
</tr>
<tr>
<td>Young Persons Clinic</td>
<td>Ages 15 onwards. Patients are triaged into this service by a member of hospital adult or paediatric diabetes team.</td>
<td>Partha Kar, Lisa Skinner, Anita Thynne</td>
</tr>
<tr>
<td>Cardiovascular Clinics</td>
<td>For diabetic patients with established CVS disease or who are at high CVS risk who require specialist advice (including patients with microalbuminuria)</td>
<td>Mike Cummings, Anita Thynne</td>
</tr>
<tr>
<td>Foot Clinic</td>
<td>Patients can be referred by any member of the community diabetes team, usually via podiatry. Urgent slots will be kept for urgent cases.</td>
<td>Darryl Meeking, Sharon Tuck</td>
</tr>
<tr>
<td>Erectile Dysfunction Clinic</td>
<td>For any diabetic patient that has not responded to oral therapy.</td>
<td>Mike Cummings, Sarah Moutter</td>
</tr>
<tr>
<td>Type 1 Diabetes Intensified Insulin Service</td>
<td>Goals-based 22-hour intensive insulin education package open for patients with type 1 diabetes using multiple daily dose insulin therapy, but who are unhappy with their achieved control. Access either by DSN referral or patient self referral (both by proforma to Caroline Parnell).</td>
<td>Iain Cranston, Lisa Skinner, Sue Beaden</td>
</tr>
<tr>
<td>Insulin Pump Service</td>
<td>Assessment / initiation and follow up service (as per NICE guidelines) for patients wishing to consider pump therapy (after education through the JIGSAW service).</td>
<td>Iain Cranston, Lisa Skinner, Sue Beaden</td>
</tr>
<tr>
<td>Low Renal Clearance Clinic</td>
<td>Assessment and follow-up for optimised metabolic management of patients with diabetes and renal impairment (eGFR 20-40) with liaison to renal services in-clinic.</td>
<td>Iain Cranston, Joanne Buchanan</td>
</tr>
<tr>
<td>Painful Peripheral Neuropathy Groups</td>
<td>One off group sessions examining the causes of and available treatments for painful peripheral neuropathy. Focus also on foot care and risks associated with sensory loss.</td>
<td>Jane Rowney</td>
</tr>
<tr>
<td>Desmond (Type 2) Education Sessions</td>
<td>Whole day group education sessions for people newly diagnosed with type 2 diabetes. Booked through the Diabetes Centre: 02392 286260 Portsmouth City, Tuesday – Friday. 01329 229422 Fareham &amp; Gosport, &amp; East Hampshire. Sarah Stiles</td>
<td>DSN Team</td>
</tr>
<tr>
<td>Exenatide Initiation Service</td>
<td>Medical assessment and then education in the use of Exenatide. Follow up for 6 months to ensure efficacy.</td>
<td>Iain Cranston, Sharon Allard, Sarah Moutter</td>
</tr>
</tbody>
</table>

The following services are also available following initial assessment / review by the specialist nursing team:

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>COMMENT</th>
<th>SERVICE PROVIDED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Insulin Groups</td>
<td>Insulin starts for patients with type 2 diabetes.</td>
<td>Rotational basis via specialty DSN team.</td>
</tr>
<tr>
<td>Basal Bolus Insulin Conversion Groups</td>
<td>For people with type 1 and type 2 diabetes who wish to change their insulin to a basal bolus regimen. Goals based programme with dietetic and nursing input focussing on carbohydrate counting. Accessed by proforma.</td>
<td>Anita Thynne, Sarah Moutter, Jeanette Head</td>
</tr>
<tr>
<td>Type1 Group Education</td>
<td>For those newly diagnosed with type 1 diabetes following their initial appointments.</td>
<td>Lisa Skinner</td>
</tr>
</tbody>
</table>

DESIGN MBD 02392 374556 - APRIL 2011 - REF 9076