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NHS
Sherwood Forest Hospitals
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K.A.R.E.N.

King's Mill **A**djusting **R**egime for **E**ating **N**ormally

Refresher Course

QISMET CERTIFICATED

Handbook

K.A.R.E.N. Refresher Course Timetable

Aims of this session:

- To update your understanding and knowledge of carbohydrate counting and insulin dose adjustment.
- To update your practical carbohydrate counting skills
- To update you on the practical aspects of insulin therapy and blood glucose monitoring.
- To update your knowledge and understanding of overall management of type-1 diabetes, regarding insulin, hypoglycaemia, Ketone testing, sick day rules, effects of Alcohol and exercise, driving regulations travelling and long-term health complications.

Time	Topic	HCP
09:00	• Meet and greet • Define goals and expectations • Check insulin:carb ratios and correction doses	*DSN and Dietitian*
09:30	• What is Carbohydrate • Carbohydrate containing foods • Glycaemic index and food absorption • Steps to carbohydrate counting • Methods of carbohydrate counting	*Dietitian*
10:15	**Comfort Break**	
10:30	• Carbohydrate Reference tables • Reference tables activity	*Dietitian*
10:45	• Food Labels • 100g equation • Food label activity	*Dietitian*
11:00	• Difficult to measure foods • Weighing and calculating carbohydrate • Handy measures	*Dietitian*
11:30	• Using carbohydrate counting resources • Carbs and Cals picture portion activity.	*Dietitian*
11:45	• Carbohydrate counting recipes • Snacking advice • Alcohol advice	*Dietitian*
12:00	• Recap on exercise advice	*Dietitian / DSN*
12:15	• 'Know your Diabetes' Quiz • Q&A session	*DSN*
12:25	• Course evaluation • Diabetes Team contact details	*DSN*
12:30	**Course Finish**	*DSN and Dietitian*

This handbook contains activities which intend to help you understand how the food you eat and drink affects blood glucose levels (BGL).

Remember, this is only a guide and you should always consult you Diabetes Specialist Team for further support on adjusting your medication / insulin.

Contents

What is Carbohydrate Counting?

Different foods contain different amounts of carbohydrate. Carbohydrate counting can help you predict how your Blood Glucose Level (BGL) will behave and therefore help you dose insulin accordingly. It can help you to improve you diabetes control.

Carbohydrate counting will require extra time and motivation to weigh your food, read labels or look up values of carbohydrate in books or on the internet. It also requires regular blood glucose testing and reviewing of your BGL.

The benefits in the long term:

- Gives more choice of what you can eat or drink
- Being more flexible with what you eat and drink
- Gives flexibility in timing of your meals or snacks
- Gives you the ability to enjoy meals out
- Helps you achieve more BGL within your target range

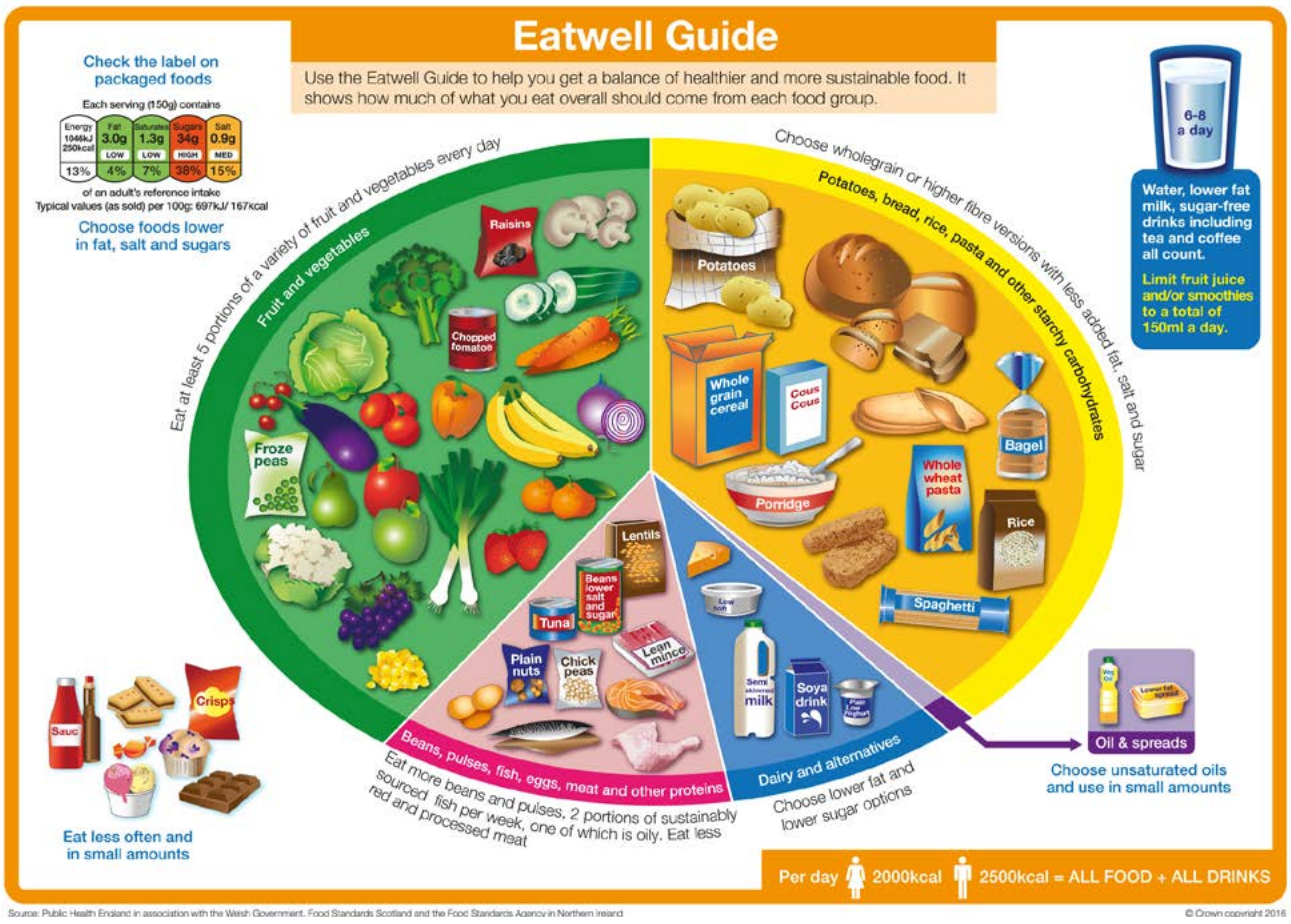
The first key step in carbohydrate counting is to be able to identify foods in your diet that affects your BGL.

Carbohydrates, fats and proteins are nutrients in foods and drinks that provide us with fuel for energy production. Carbohydrate (CHO) is a type of nutrient in food that affects your blood glucose level the most.

Think about foods that contain carbohydrate (e.g. the food that require insulin).
The Eatwell Guide on page 4 can help you with this.

A Balanced diet

The Eatwell Guide shows the five main food groups; fruit and vegetables, starchy foods, protein foods, dairy produce and fatty foods. It suggests the proportion that each of these food groups should contribute your diet. This will help you get a balance of a healthier diet.



Carbohydrates are present in most of these foods groups.

Sugary and starchy foods all contain carbohydrate. It is made up of a single or chains of types of sugar. The smallest 'chain' is called **glucose.**

Which foods contain carbohydrate?

Many foods are mixture of protein, fats and carbohydrates. The main carbohydrate containing foods are grouped below into sub categories.

Not all carbohydrate foods are equal in terms of the absorption rate and the effect it has on blood glucose.

Carbohydrate

Starches

Cereal Starch:

Bread **(all types - wholemeal, white, French, pitta, naan bread).**

Rice, Oats, pasta, Couscous, breakfast cereals, noodles.

Floured products e.g. pastry, pizza bases, sauces.

Yorkshire puddings.

Vegetable Starch:

Potatoes.

Root vegetables **(yam, parsnips, turnip, sweet potato).**

Plantain.

Processed peas.

Foods with added sugar (Sucrose)

Table sugar, icing sugar, Jams, marmalades, honey, chocolate, sweets, ice cream, cakes, biscuits, sugary drinks, Milkshakes

Lactose-free milk

soya, rice, coconut, oat milk will all contain carbohydrate from starches.

Natural Sugars Fruit Sugar (Fructose)

Fruit (fresh, tinned dried, frozen).

Fruit Juice (natural unsweetened and sweetened).

Fruit Smoothies

Milk sugars (Lactose)

Milk cows / sheep / goat (full-cream, skimmed, semi-skimmed, pasteurised, homogenised or long-life).

Yoghurt.

Fromage Frais.

Custard.

Ice-cream.

Slowly absorbed carbohydrate foods:

Although the following foods do contain carbohydrate, they are absorbed very slowly and may not need to be matched with insulin, unless eaten in large quantities (>5g in CHO):

Pearl barley.

Peas, beans and lentils.

Starchy vegetables, including Sweetcorn, squash / pumpkin.

Nuts, Quorn, tofu, soya.

Foods with little or no carbohydrate

Protein	Plain meat, fish, eggs, cheese, nuts, seeds, Quorn, Tofu and Soya	Protein alone has little effect on blood glucose but some protein foods have carbohydrate added during processing: Cereal flour (sauces, sausages), breadcrumbs/ batter (fish fingers, chicken nuggets), pastry (meat pie, pasties, quiche, sausage roll)
Fat	Butter, spreads, oils, mayonnaise, cream	Fat has little effect on glucose levels after eating, but large amounts can slow the digestion of a meal and make your blood glucose levels raise more gradually and over a longer period of time. Examples of high fat meals which may have this effect include fish and chips, hamburger and fries, and Chinese, Indian or Italian meals.
High Fibre	Salad and most vegetables	These foods have a high fibre and water content and minimal amount of starch therefore have little effect on blood glucose. Fibrous foods can slow the absorption of glucose from other foods that are eaten at the same time preventing post meal spikes in blood glucose.
Sugar-free alternatives	Sugar-free drinks, no added sugar squash, artificial sweeteners	Artificial sweeteners – saccharin, acesulfame K, Aspartame, sucralose, Cyclamate are carbohydrate free. Sugar alcohols (polyols): erythritol, isomalt, maltitol, mannitol, sorbitol, xylitol) contain some carbohydrate but in much smaller quantities and not all of it is absorbed therefore are not counted when counting carbs.
Dairy alternatives	Unsweetened, Soya milk, almond milk	At 0.3g/100ml and 0.2g/100ml, unsweetened versions have minimal carbohydrate therefore even large volumes don't count. **COUNT OAT MILK - THIS IS COMPARABLE TO COWS MILK**

Glycaemic Index

When we digest carbohydrate-containing foods and drinks, the glucose chains are broken down and glucose is released into the blood.

? Do all carbohydrate containing foods have the same effect on your blood glucose level?

If no, what foods affect them differently and why?

Studies have found that different foods raise BGL at different rates. This is described as the glycaemic index (GI).

The harder your body has to work to digest food (break down glucose chains), the longer it will take for the glucose to get into the blood.

Foods that take longer to be digested has a low GI and foods that take quickly to be digested has a high GI.

Many things can affect the GI and therefore the time it will take for food and drinks to increase your BGL.

- Fibre content - soluble fibre e.g. beans, pulses, lentils are broken down very slowly
- Ripeness
- Cooking method
- Processing - orange juice will raise BGL quicker than a fresh orange
- Fat and Protein will take longer to break down

BUT...

It is still the quantity rather that the type of carbohydrate that is important when considering the impact on your BGL, however you may want to alter the way you dose the insulin needed for the particular meal.

Instead of a standard insulin injection, you may want to consider splitting the insulin dose, e.g. 50% before you eat and 50% when you finished your meal.

Methods for Carbohydrate Counting

There are different methods of calculating the carbohydrate content of food and you will learn more about this and have lots of practice in your group.

- Using carbohydrate reference tables/books
- Reading food labels
- Weighing foods
- Carbs & Cals book or mobile phone app. There are other apps available - please discuss these with your Dietitian
- Using standard measures e.g. cups, spoons, plates
- Hand measure
- Looking on the internet

Useful tools

- Food weighing scales – digital if possible
- Calculator
- Pen
- Food list
- Carbohydrate reference tables
- Computer

Keep everything ready for you to use in the kitchen to save time when dishing out food.

Carbohydrate Reference Tables

Carbohydrate reference tables list popular foods and drink with a typical size or serving weight (g). It provides the amount of carbohydrate, in grams, in the suggested serving size.

They also list the amount of carbohydrate per 100g of the product – useful if you don't have the food label at hand.

Example from Carbohydrate reference tables

Food Type	Typical Portion	Weight of portion (g)	CHO (g)	CHO/100g
Apple - fresh	1 fist size	170g	17g	10g
- stewed no sugar	6 tbsp	85g	8.5g	10g
- juice	Small carton	200ml	21.2g	10.6g

1. Use the carbohydrate reference tables to calculate the carbohydrate in the following;

Wheat biscuits x 2 biscuits =

Milk 200ml =

Orange juice 200ml =

Total carbohydrates =

2. Now try to look up what you had this morning for breakfast:

TIP: Make a note of the foods you eat regularly to save you looking it up again.

Food Labels

Many food manufacturers supply information on the label about the carbohydrate content of that food. For carbohydrate counting you use total carbohydrate which includes all added, natural sugars and starch as all of these will break down into glucose.

The information can be shown as either per 100g or per portion. If you use the value per 100g, then you will need to know the weight of the portion you are eating and you can then calculate the amount of carbohydrate in your portion.

You may find the information per portion more useful, but remember that your portion size may not match that recommended by the manufacturer.

Deep pan meat feast pizza 390g

Nutrition **Typical Values** (oven cooked as per instructions)	**Per 100g**	**Per 1/2 pizza**	**% adult RI Per 1/2 pizza**
Energy kJ	1016	1990	-
Energy kcal	241	473	24%
Fat	7.4g	14.5g	21%
of which			
- saturates	3.1g	6.1g	31%
- mono-unsaturates	2.9g	5.6g	-
- polyunsaturates	1.1g	2.2g	-
Carbohydrate	31.7g	62.1g	24%
of which			
- sugars	3.5g	6.9g	8%
- starch	28.2g	55.3g	-
Fibre	2.2g	4.3g	-
Protein	10.9g	21.4g	43%
Salt	0.86g	1.68g	28%

This is an example of a label with nutritional information from a pizza. It gives information both per 100g and for ½ of the pizza. The information at the top of the label tells you the whole pizza weighs 390g).

If you ate the whole pizza how much carbohydrate would you have? ..... g

There are 2 ways of working this out:

½ pizza = 62.1g CHO **OR** 100g = 31.7g, the whole pizza = 390g

Therefore 62.3 x 2 = 124.2g Therefore 31.7 x 3.9 = 123.6g

Use the laminated food labels provided to calculate the amount of carbohydrate in each of these suggested servings.

Food item	Serving size	CHO content (g)
Yoghurt breaks	2 slices	.....
Tortilla wraps	1 wrap	.....
Lasagne	250g portion	.....
Chips	1/4 bag	.....
Muesli cereal	75g portion	.....
Pizza	1 whole	.....
Pork and Kale Soup	1/3 pot	.....

If a food has a label then use it, as it will be more accurate than any book/app.

Food labels can be used for information about dishes where there is no labelling, such as a packaged Chinese meal from the supermarket to help you assess a takeaway meal.

It is important to get Carbohydrate counting right!

Each 10g can raise BGL by 2-3mmol/L.

So, if you underestimate by 20g, then this may mean you BG levels will be 4-6mmol/L higher than you expected.

Alternatively, overestimation could lead to a hypo.

Weighing

It is useful to weigh portions sizes initially to get an accurate assessment of the carbohydrate content of foods such as cereals, potato, pasta and rice.

The formula below is very useful to calculate the CHO value of your portion:

What would you give if your ratio is 1 units to 15g CHO?

$$\frac{\text{amount of CHO per 100g}}{100} \times \text{Weight of food in grams} = \text{amount of CHO}$$

Weigh a portion of the following food and calculate the grams of CHO in that portion.

Food Type	Weight of food	CHO per 100g	CHO (g)	g CHO in portion
Rice				
Pasta				
Cereal				

Be aware of using the right value e.g. either cooked or dry weight foods. Pasta and rice absorbs water when cooked, therefore the cooked portion weighs more. On the other hand a baked potato loses water and shrinks in size after cooking.

Using cups / plates / spoons and bowls

Food labels can be used for information about dishes where there is no labelling, such as a packaged Chinese meal from the supermarket to help you assess a takeaway meal.

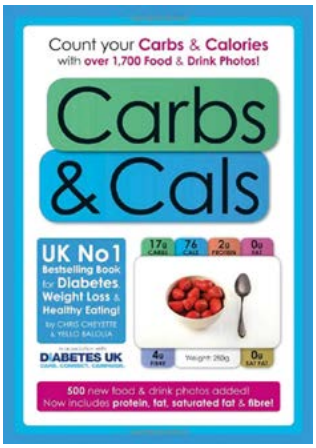
Picture books

Picture books like the Carbs & Cals can be a really useful tool. The pictures are useful indicators of portions sizes, especially for food that are sometimes difficult to estimate or weight e.g. when eating out.

It is available in a book (A4 and pocket size) from Amazon, WH Smith or Diabetes UK.

It is also available as an app on your phone.

The picture book will provide images of different portion sizes of food with the correlating CHO value.



Use the Cabs & Cals book to look up the carbohydrate content of what you ate for lunch yesterday.

Now try this again with your evening meal last night.

TIP: If you are using the book/app to estimate portion sizes, it is **VERY IMPORTANT,** where possible, to also weigh the food to check that your portion is what you think it is!

Carbohydrate counting using Recipes

Tuna and Tomato Pasta Bake

Ingredients

Makes 4-6 portions

500g raw pasta (which makes approximately 1000g or 1kg cooked pasta)
1 large onion, chopped
500ml milk
4 tbsp flour
150g mature cheddar, grated
1/2 tsp mustard powder
400g tin sweetcorn
1/2 tin (200g) chopped tomatoes

Step 1: Identify the ingredients containing carbohydrate.

Step 2: Use reference tables / food labels to calculate the grams of carbohydrate for each ingredient identified.

Step 3: Calculate the total grams of carbohydrate for the entire recipe.

Food Item	CHO (g)

Total Carbohydrate in recipe (g) =

Step 4: Divide this by 4 or 6, depending how many people you are serving, to find the gram CHO for 1 portion.

Step 5: Write this down for future reference in your recipe book.

Snacks

You would not need to have a snack to prevent hypoglycaemia if your basal insulin is correct. It will purely be based on personal choice of having a snack or not. Carbohydrate counting makes this possible.

If a snack contains less than 10g carbohydrate then you may not be required to inject any insulin, however please speak to your dietitian for individualized advice. If your blood glucose level is raised at your next meal time, you will have to consider a correction dose.

Try to avoid grazing, as this could make it harder to control blood glucose levels (this is because it can make it harder to know how much to correct at your next meal as the insulin could still be working to lower your blood sugar for up to 4 hours after your last snack). If you enjoy regular snacking between meals please discuss this with your Dietitian.

Timing of your snack needs to be considered.

If your snack is within one hour prior to your mealtime you could wait and add extra insulin to your next mealtime insulin (To reduce number of injections needed across the day).

It is 10am and a colleague is sharing doughnuts with all in the office. Your lunch is at 12:30pm. **What should you do ideally?**

TIP: Don't forget to count drinks if they have high carbohydrate content, e.g. lattes, milkshakes, hot chocolates.

Alcohol

What alcoholic drinks do you like?

What do you find happens to your BG levels after drinking alcohol?

Alcohol is made from the fermentation of either sugar or starch. Pure alcohol alone does not raise the blood glucose but any remaining unfermented carbohydrate or extra sugar or fruit can have an effect.

Alcohol itself, in large amounts can increase the risk of hypoglycaemia.

This is because alcohol is processed by the liver and interferes with the normal process of glucose release by the liver if blood glucose levels fall.

This effect of alcohol can last for up to twenty four hours.

The risk of a hypo can also increase if you are more active on occasions when drinking, e.g. after playing sport, dancing or sex.

Ways to prevent a hypo when drinking

- Don't drink on an empty stomach – eat something carbohydrate-based beforehand.
- Don’t carb count for alcohol – only the food that you eat.
- You may need to eat some starchy food during the evening to keep your blood glucose levels up.
- Tell the people you are with that you have diabetes and carry a medical ID.
- Have hypo treatment with you at all times
- Alternate alcoholic drinks with sparkling water, sugar-free lime and soda or diet drinks.
- Stick to your recommended daily units of alcohol.
- Eat a starchy snack before going to bed and drink plenty of water. You don’t need insulin with this starchy snack.
- Test BGL before drinking and if able, before bed.

Physical Activity and Diabetes

The response to exercise is very individual. Understanding what happens to your body during exercise will help you to manage your diabetes more effectively by avoiding hypoglycaemia (hypos), maintaining blood glucose levels and improving performance.

Planning ahead for exercise can help reduce the risk of hypoglycaemia and testing blood glucose levels before, during and after exercise can provide information about your body's response to exercise. You may find that your insulin doses and your food intake may need some adjustment.

What happens to the body during physical activity?

Glucose is used by the muscles to provide energy during exercise.

As exercise continues, glucose is taken up by muscles from the bloodstream, which causes blood glucose levels to fall. However, blood glucose levels are kept in a narrow range by the release of glucose from the liver.

During exercise, our body cells become more sensitive to insulin to efficiently take up glucose from the blood for extra energy production. A normal functioning pancreas would offset the fall in BG by reducing the amount of insulin being produced and increase production of glucagon and other hormones. This aids the release of glucose from the liver and thus preventing hypo.

In diabetes the insulin injected cannot be reduced once already circulating and as a result glucose is taken from the blood. The presence of insulin prevents the liver from releasing its own supply of glucose into the blood and results in a hypo.

As exercise continues further, other fuel sources become available e.g. fat from fat stores, which can be used by the muscles directly.

After exercise, insulin sensitivity continues to be increased to help the muscles to restore glucose used during activity.

Top tips for doing exercise

- Appropriate BGL on starting exercise are between 8-10mmol
- If BGL >13mmol without ketones, consider a small correction to 8-10 mmol
- Avoid exercise if ketones are present
- If BGL <8mmol prior to activity, you may want to take 10-15g CHO snack
- You may need additional carbohydrate during your exercise depending on the duration of the activity
- The insulin bolus for snacks/meals may need to be reduced before and/or after activity.
- Keep hypo treatment with you and keep hydrated

Activity	Duration	Suggestion
Gentle e.g. a gentle walk to the shops or walking the dog	Less than 30 minutes	• No insulin adjustment usually needed • Have hypo treatment with you
Medium e.g. bike ride or a brisk walk, gardening	30 minutes - 1 hour	• Extra 10-20g CHO without bolus depending on your BGL • Or reduce food bolus by 20-25% if activity 1-2 hours after a meal • Have hypo treatment with you
Prolonge/ Intense e.g. running, gym / fitness class, football	Up to 4 hours	• Reduce food bolus by 30- 50% prior to activity, 10-20% reduction at next meal • You will need 30-60g CHO during each hour of activity • Additional CHO following exercise
Prolonged e.g. cycle race, marathon run	More than 4 hours	• You may need to omit the food bolus prior to the exercise and take extra 30-60g CHO during each hour of exercise and extra CHO following • Reduction of 50% with food bolus after exercise if meal taken • Reduction of 10-20% on long acting insulin following exercise • Have hypo treatment with you

Know your Diabetes' Quiz

1. Which of the following are correct? Tick all that apply.

- [ ] A. It is important to rotate your injection sites
- [ ] B. Before injecting you must clean your skin with spirit
- [ ] C. Avoid using a site showing lipohypertrophy
- [ ] D. It is important not to inject too deeply
- [ ] E. Massage the site after injection

2. How long does insulin keep at room temperature? .....

3. Hypoglycaemia is classed as a blood glucose level below: .....

4. Name 3 causes of hypoglycaemia

1.
2.
3.

5. What would you use first to treat a hypo? Tick all that apply.

- [ ] A. Fruit juice
- [ ] B. Chocolates
- [ ] C. Diet coke
- [ ] D. Glucose tablets
- [ ] E. Fruit
- [ ] F. Sandwich

6. What guidelines do you follow in relation to hypoglycaemia and driving?

1.
2.
3.

7. Which of the following should you do if travelling by air? Tick all that apply.

- A. Keep your medication in your hand luggage
- B. Carry a repeat prescription
- C. Leave your insulin in you suit case
- D. Order a special diet
- E. Carry I.D and a letter from your diabetes team
- F. Carry carbohydrate snacks with you.

8. What is a correction dose? .....

9. Name 2 symptoms of high blood glucose levels.

1.
2.

10. What are ketones? .....

11. What do you do when your blood glucose level is over 14 mmols and you have a large amount of ketones in your urine or blood? Tick all that apply.

- A. Take your normal insulin dose at once
- B. Exercise to reduce your blood glucose levels
- C. Increase your fluid intake
- D. Take double your correction dose
- E. Eat some carbohydrate
- F. Check your blood glucose and ketone levels every 1-2 hours

12. What does a HbAlc blood test tell you? .....

13. Name 3 parts of the body that can be affected by long term complications related to your diabetes?

1.
2.
3.

Know your Diabetes' Quiz

14. Which of the following are important when discussing good foot care? Tick all that apply.

- A. Wash your feet regularly
- B. Have well-fitting shoes
- C. Do not walk bare foot
- D. Examine your feet for broken skin, colour change or swelling
- E. Attend regular foot screening
- F. Protect from a direct heat.
- G. All of the above

15. What should you have checked at your annual review? Tick all that apply.

- [ ] A. Eyes
- [ ] B. Feet
- [ ] C. Blood pressure
- [ ] D. Medication review
- [ ] E. Hba1c

Further resources

Type 1 DM general information

www.diabetes.org.uk

www.bda.uk.com

www.t1resources.uk

Carbohydrate counting

www.bidec-e-learning.com

www.carbsandcals.com

shop.diabetes.org.uk/products/carbs-count-e-book

Exercise

www.runsweet.com

www.excarbs.com

Technology

www.inputdiabetes.org.uk

Traveling

www.voyagemd.com

Diabetes Specialist Nurses:	**Tel:**
Elaine Higgins	Ext 3536
Vicki Leivers	Ext 6582
Kelly Coleman	Ext 4209
Georgina Hollingworth	Ext 2130
Abbey Needham	Ext 2128
Diabetes Specialist Dietitians	**Ext 6570**