Guidance on optimising nutrition for chronic wound healing

Good nutrition facilitates the wound healing process while malnutrition will delay, inhibit and complicate it. Many nutrients have a role to play in wound healing, working in isolation or in combination with others.

Fluids

Dehydrated skin is less elastic, more fragile and more susceptible to breakdown. Dehydration will also reduce efficiency of blood circulation, which will impair the supply of oxygen and nutrients to the wound. One of the main risk factors for dehydration is poor oral intake.

In long-term care, dehydration is one of the most common problems affecting good nutrition.

Protein

Protein deficiency results in impairment of the proliferative and remodelling stage of wound healing. It has also been reported that protein deficiency can cause impaired collagen synthesis, reduced wound strength and an increase in risk of infection due to a compromised immune system.

Also further losses may occur via wound exudate.

Energy

The main sources of energy for the human body – and for wound healing – are carbohydrates and fats. The main demand for energy from a wound is for collagen synthesis. Calorie needs for healing increase with increasing size and complexity of the wound.

Carbohydrate availability is essential to prevent protein from being converted into energy. In people with diabetes, monitoring (e.g. blood glucose levels, glycated haemoglobin) will be required.

Fats have a key role in the structure and function of cell membranes and are directly involved in cholesterol metabolism, the formation of inflammatory mediators, and clotting components. Adequate fats are also needed to prevent the body using protein for energy.

Vitamins

Many vitamins are involved in wound healing, the main one being vitamin C. Deficiency of vitamin A and Vitamin B complex will also have adverse effects on wound healing.

Vitamin C plays an important role in collagen synthesis and subsequent crosslinking, as well as the formation of new blood vessels. Adequate vitamin C levels help strengthen the healing wound. It also has important antioxidant properties that help the immune system, and it increases the absorption of iron.

Vitamin A increases the inflammatory response in wounds, stimulating collagen synthesis. Low vitamin A levels can result in delayed wound healing and susceptibility to infection. Supplementation with vitamin A requires caution, as there is a risk of toxicity

It is possible that vitamin E can reduce injury to the wound by controlling excessive free radicals. Contrary to popular opinion, there is limited evidence for the benefits of vitamin E in decreasing scar formation. There is also some evidence that suggests oral supplementation of vitamin E over 400mg/day has an increased health risk

Vitamin B complex is essential for carbohydrate metabolism and therefore energy production.

Minerals

Zinc, Copper and Iron are the main minerals in wound healing.

Zinc plays a key role in protein and collagen synthesis, and in tissue growth and healing. Zinc deficiency has been associated with delayed wound healing, reduced skin cell production and reduced wound strength. Zinc supplementation in people who are not zinc deficient generally has no benefit.

Insufficient dietary intake of zinc can be further exacerbated by zinc loss from excess wound drainage.

Assessing zinc deficiency can be difficult as serum/plasma levels may not be a true indication of zinc levels at the wound itself.

Iron is part of the system that provides oxygen to the site of the wound, therefore iron (haemoglobin) deficiency can impair healing. Iron deficiency can also result in impaired collagen production and strength of the wound. Iron absorption from non-meat sources can be enhanced with vitamin C consumed at the same meal

Zinc and iron compete for absorption, therefore if someone is receiving supplements of both, they should be given with meals but not at the same time.

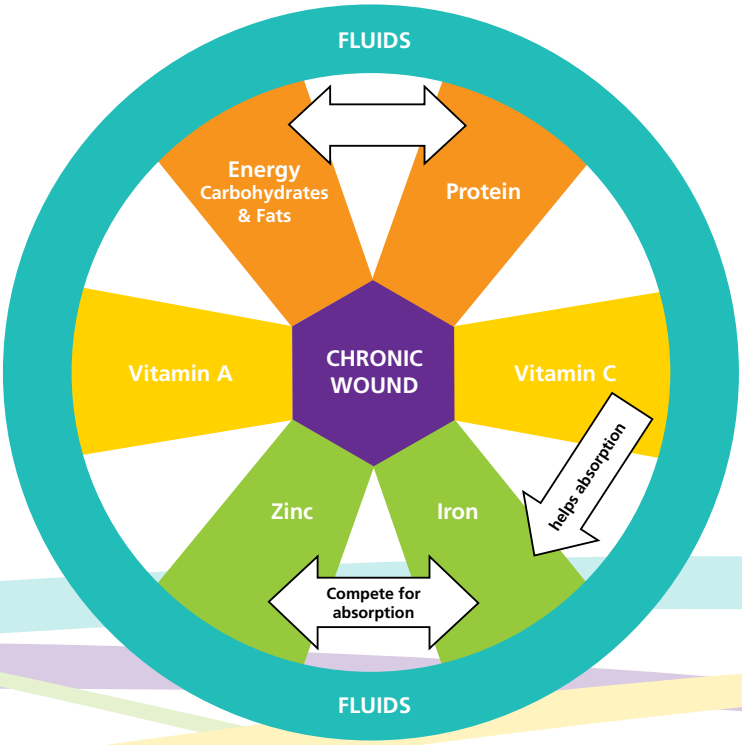
Other supplements of vitamins and minerals, however, should be avoided as this can be detrimental to the patient, affecting absorption and metabolic interactions and, ultimately, impair nutritional status.

Diabetes

People with diabetes need adequate energy for wound healing, but tight glycaemic control is also important. For this reason regular blood glucose monitoring is needed, whether diet alone/ oral hypoglycaemic agents or insulin is the current therapy. These may need adjusting while the wound is healing.

Obesity

It is not appropriate for people with wounds to follow diets that limit intake, such as diets to reduce cholesterol or weight and diets that avoid entire food groups such as carbohydrates. People with vegetarian or vegan diets, food allergies, or on dialysis need careful consideration and in these situations it is recommended that you seek the help of a dietitian.



Example of wound management guidelines

Role of nutrition in wound healing

CHARACTERISTIC	RATIONALE
Ensure optimum nutrition (EPUAP Guidelines)	Aids wound healing, maintains immune function and decreases the risk of infection. Malnutrition and clinically proven deficiencies are associated with delayed wound healing and increased complications
Ensure varied and balanced nutritional intake	Provide all the essential nutrients needed for wound healing
Specific nutrients associated with wound healing include	Adequate calories; protein; vitamins: A, B, C, D, E; minerals: Iron, Zinc, Selenium
NUTRITION SCREENING	
All patients at risk of pressure ulcers or with chronic wounds should be screened	To detect those at nutritional risk
Use Validated Screening Tool	For example: • MUST (BAPEN 2003) • Locally agreed screening tool e.g. Adapted Waterlow OR Braiden score • NHSSB Nutrition Risk Scoring Tool (Nursing & Residential Homes)
Consider Intrinsic factors	Check Haemoglobin (Hb) levels, check serum Albumin, ensure good glycaemic control (patients with Diabetes). Possible referral to diabetic nurse specialist.
Consider Extrinsic factors	Assess nutritional status
NUTRITION STATUS Consider nutritional status in ALL patients at risk of pressure ulcers or with chronic wounds	
Assess nutritional status	
(EPUAP) Guidelines	Check Haemoglobin (Hb) and Albumin levels Ensure adequate calorie intake Ensure adequate protein intake i.e. 2 portions protein foods/ day Adequate minimum fluid, i.e. 8-10 cups/day (1.5litres) Daily dietary Vitamin C (Ascorbic acid)
Use of vitamin and mineral supplements (Food Standards Agency: Safe upper levels for vitamins and minerals, 2003)	Avoid vitamin and mineral supplements unless serum levels checked and/ or recommended by GP/Dietitian Avoid supplements in excess of 1000mg/day Vitamin C (Ascorbic acid) and 50mg/day Zinc
High risk patients	• Weight loss, Protein Energy Malnutrition (PEM), poor oral intake • Post surgery, malabsorption (IBD) • High exudates wounds • Diabetic patients, IGT, IFG • Chronic leg ulcers, prolonged healing wounds • Home enteral feeding
Screen for undiagnosed Diabetes	In all patients with: Venous and arterial leg ulcers Chronic wounds and leg ulcers slow to heal Ensure referral to Dietitian on diagnosis of Diabetes
Referral to dietitian	For individual nutritional assessment refer to Dietitian via GP / Consultant

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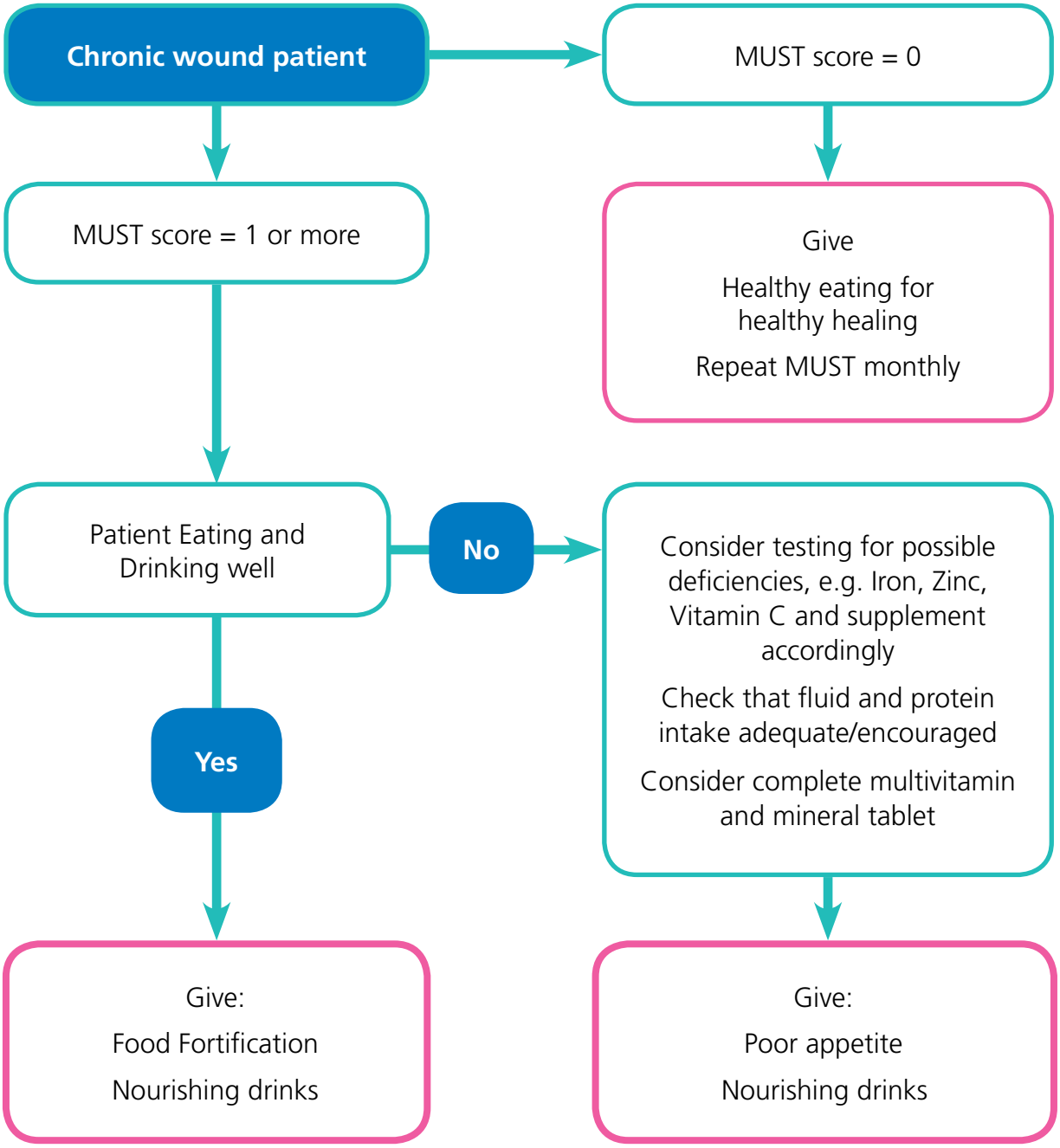
Pathway for nutrition support information in the chronic wound patient



MUST: Malnutrition Universal Screening Tool.
Freely available at www.bapen.org.uk/musttoolkit.html

Healthy eating for healthy healing

Good nutrition is very important to help any wounds heal, whether you have pressure sores, leg ulcers or wounds from an operation. In fact, a lack of certain food stuff can slow down the healing process.

This information is to help you follow the best nutrition for the quickest healing.

If you are underweight, struggling to eat or have a poor appetite, ask your health professional for other diet sheets more suitable.

Food groups and key nutrients	Examples	Quantity	Why are these foods important?
Starchy Foods Energy B vitamins (wholegrain)	Bread, bagels, baguettes, toast, chapatti, pasta, rice, noodles, couscous, semolina, sago Cereals (barley, millet, rye, buckwheat…) Breakfast cereals, oats. Plantain, potatoes and potato products, sweet potatoes	At every meal (i.e. 3 times a day minimum) Choose wholegrain as much as possible as these have more B vitamins	Healing needs a lot of energy, mostly to repair the damaged tissue and make new skin B vitamins are essential to enable the body to use energy from food
Fruit and Vegetables Vitamin C Vitamin A Fluids	All fresh fruit and vegetables Pure fruit juice (i.e. NOT juice style drinks or squash) Dried fruit and vegetables (apricots, raisins, mushrooms…) Tinned or frozen fruit and vegetables (sweetcorn, peas, peaches, grapefruit…)	At every meal and snacks if taken A portion is about 1 handful. Aim for at least 5 handfuls/portions a day (1 or 2 with each meals, and/or 1 for snacks if taken)	Vitamin C plays an important role in making skin tissue, as well as new blood vessels Adequate vitamin C levels help strengthen the healing wound Vitamin C has antioxidant properties that help the immune system fight infections Vitamin C increases the absorption of iron (see below) A lack of Vitamin C therefore means your wound is slow to heal and is more likely to become infected Vitamin A boosts the making of skin tissue Low vitamin A levels can result in delayed wound healing and susceptibility to infection

Continued overleaf...

A healthy diet is a balanced diet

This picture shows you each food groups and what part they should play in your diet

Healthy eating for healthy healing

Food groups and key nutrients	Examples	Quantity	Why are these foods important?
Meat, Fish and alternatives Protein Zinc Iron Vitamin A	Meat, offal, poultry, game Eggs Fish, shellfish, sea food including frozen and tinned Beans and pulses (lentils, chickpeas, kidney beans, baked beans…) Nuts and seeds (peanut, peanut butter, tahini, sunflower seeds, almonds, ground almonds, brazil nuts…) Nuts make a good high protein/high energy snack Tofu, Soya, Quorn	3 portions each day: 1 portion= 3oz (90g)of red meat/ offal/oily fish/ poultry 5oz (140g) white fish/ shellfish 2 slices cold meat 2 small /1 large egg 5oz (140g) beans/pulses 1oz (30g) nuts/seeds 4oz (110g) soya/ tofu/ Quorn	Protein is essential for the maintenance and repair of body tissue. Low protein levels will cause a decrease in skin formation, slowing the wound healing process Iron helps provides oxygen to the site of the wound Low iron can also decrease skin formation and strength of the wound Vitamin C (found in fruit and vegetables) is needed to help absorb non-meat sources is helped by Zinc plays a key role in protein and skin formation, and in tissue growth and healing
Dairy Products Protein B vitamins	Milk All types of cheese (hard, soft, cream) Yoghurt, fromage frais, cottage cheese	3 portions each day 1 portion= 1/3pint (200mls) milk 1oz cheese 1 small yoghurt	Full fat dairy are a good source of energy (see below)
Foods high in fats and/or sugar Energy	Oils, butter, margarine Sugar, honey, syrup Cakes, biscuits, crisps, savoury snacks, chocolate	These foods should be eaten in addition to the foods above, not to replace them as they usually do not contain many vitamins and minerals.	Fats and sugar are the main source of energy for the body, which may be useful while you are healing Oils, especially olive and rapeseed oils are also good sources of essential fats and some vitamins
Fluids Choose decaffeinated versions if possible If you are diabetic, chose sugar free drinks	Water / flavoured water Juice Fizzy drinks Milk Tea / herbal teas Coffee Soups	Try to have 6-8 glasses/ day (about 1.5 litres) unless you have been advised otherwise for health reasons Have more if it is a hot day or if you are losing fluids from your wound	Dehydration can reduce healing ability since water is a major component of healthy skin. A large wound may lose a lot of fluid that need to be replaced

If you are losing weight, or if your appetite decreases, contact the health professional who gave you this sheet.

If you are diabetic, ensure your blood sugars are well monitored and your medications adjusted accordingly.

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Food Fortification

Adding more calories without adding volume

What is fortifying?

Fortifying is when small quantities of everyday foods, such as cream, milk powder or butter are added to a food or meal to increase the nutritional content, without increasing the portion size. This means every mouthful you eat will be more nourishing.

Why do I need to fortify my foods?

You may need to fortify your foods if you have a small appetite or can only manage small quantities of food. You may also need to fortify your foods if you're losing weight or unable to maintain your weight. If you would like to take a multivitamin please check with your pharmacist that it is complete in vitamins and minerals.

Fortified custard / porridge / milk pudding	Fortified soup
• 1 ladle of normal custard/porridge/milk pudding • 1 heaped tablespoon milk powder • 2 tablespoons double cream	• 1 ladle or mug of normal soup • 1 heaped tablespoon milk powder • 2 tablespoons double cream
Fortified milk	
• 1 pint (570mls) whole milk • 4 heaped tablespoons (60g) of skimmed milk powder When adding milk powder to food, mix milk powder with some milk to make a runny paste and add to remainder of pint, otherwise it may not mix well.	

Everyday foods you can add to meals or drinks to increase their calories:

For an extra 100-150 calories:

- Add two teaspoons of jam or honey to milk puddings
- Melt grated cheese (a small match box size) into soup
- Stir in a tablespoon of oil/butter/margarine to mash or other foods
- Add a tablespoon of double cream to a hot drink or over a pudding
- Add a tablespoon of green pesto to pasta or mash

For an extra 150-200 calories

- Blend a tablespoon of peanut butter or chocolate spread to a milkshake, or spread on biscuits
- Mix a tablespoon of desiccated coconut into porridge or a yoghurt
- Stir in a tablespoon of clotted cream to a dessert
- Mix in a tablespoon of mayonnaise to mashed potatoes or with eggs

Make the most of your food

- Eat a little of what you fancy
- Have at least three small meals a day
- Have nourishing snacks between meals
- Have one fortified dish at each meal
- Always choose full fat products
- Always choose full sugar products unless you have diabetes, in which case stick to low sugar alternatives

Nourishing Drinks

Getting more out of your fluids

If you're diabetic DO NOT use this sheet unless you are monitoring your blood sugars and have been advised to follow this by your diabetes health professional.

Why do I need nourishing drinks?

- You may have lost weight due to illness.
- You may need extra nourishment.
- You may have a poor appetite and find fluids easier to take.

When you are unwell, try to have nourishing drinks between your meals, such as milky drinks and fruit juice. Other drinks such as tea, coffee, Oxo, Bovril, diet fizzy drinks, packet soups and water, will fill you up without providing much energy. Choose full fat and full sugar drinks. The following suggestions provide extra energy and protein along with other essential nutrients. Try to have at least two of these drinks a day.

Banana Smoothie	Super Shake
• 200mls whole milk • 1 small ripe banana • 1 scoop ice cream / 1 tablespoon peanut butter • 1 teaspoon sugar Mash banana, add all ingredients, blend and serve chilled. Further ice cream can be added or try a teaspoon of honey for a sweeter taste.	• 200mls whole milk • 3 tablespoons (45ml) double cream • 1 scoop ice cream • 4 teaspoons milk powder • 2 teaspoons milk shake flavouring (e.g. Nesquick™/CrushaTM) or more to taste Blend for 15 seconds.
Malt Honey Milkshake	**Fruit Blast**
• 200mls whole milk • 1 tablespoon honey • 1 scoop ice cream • 1 teaspoon (5g) malted milk powder (e.g. HorlicksTM) or 1 tablespoon MiloTM. Blend.	• 100mls fresh fruit juice • 100mls lemonade • 1 scoop ice cream • 1 tablespoon sugar Mix together and serve chilled.
Yoghurt and Berry Smoothie	**Super Soup**
• Small pot of greek yoghurt • Handful of frozen berries • 1 small ripe banana • 150mls full cream milk Blend until smooth.	• 1 packet of cup-a-soup / powdered soup • 200mls of warmed whole milk • 4 teaspoons of milk powder • 2 tablespoons (30ml) double cream/grated cheese Mix together and serve warm

Ready made drinks: For example, Mars™, Yazoo™, Frijj™, Galaxy™, Aero™, Bounty™, Alpro™ flavoured milk can be bought from most supermarkets and convenience stores.

Over the counter supplement drinks: These are high energy and protein drinks that are available from most supermarkets and some chemists, without a prescription. There are two varieties those that are ready to drink straight from the tin, or powders that can be made up with whole milk before drinking.

- **Ready to drink** (for example, Nurishment™, Nutrament™, Supligen™)
  Serve these drinks chilled or over ice.
- **Powdered** (for example, Build Up™, Complan™)
  Make these according to the directions on the pack using whole milk. For extra calories add 2 tablespoons of double cream and ice cream. For a savoury option, Build Up soups are also available. Make up with whole milk. For extra calories add 2 tablespoons of double cream, a dollop of margarine/butter or some vegetable oil.

Poor Appetite

Making the most of your food

Food first:

Food is very important to maintain your health. It contains essential vitamins and minerals as well as protein to help the body repair itself and recover from illness. If you would like to take a multivitamin please check with your pharmacist that it is **complete** in vitamins and minerals.

Eating well also helps to maintain weight and to fight infections. However when you feel unwell you may not feel like eating – just when you need food the most!

If you're diabetic, please consult your diabetes health professionals about the monitoring of your diabetes and medication.

Poor appetite?

- Eat little and often – eat small meals every two to three hours
- Don't skip meals – if you can't manage a meal, have a milky drink instead, such as a milkshake or hot chocolate, plus a small snack
- If your appetite is better at certain times of the day, aim to eat more then
- Keep ready to eat snacks close to your chair, bed or in your pocket
- Serve smaller portions of your meal to prevent feeling overwhelmed – you can always have more
- Have a ready meal or cook extra portions of meals when cooking, and freeze them for use another day
- Drinking with meals can make you feel fuller sooner – have a drink when you have finished eating
- Too tired to cook? Choose ready-made oven/ microwave meals or tinned foods
- A small glass of alcohol 30 minutes before your meal may stimulate your appetite (ask your doctor/ pharmacist first to ensure it is suitable with any medications you might take)
- Get out if you can – fresh air can often help stimulate your appetite. Go for a brief stroll or simply go outside for a while. Eating in a well ventilated room can also help

Making the most of your food:

- Aim to have at least one pint of whole milk a day – either by itself or in drinks and puddings. To get extra nourishment mix four heaped tablespoons of dried milk powder with a small amount of milk to make a runny paste, then add it to the remainder of the pint of milk – this is called enriched or fortified milk
- For extra nourishment add cheese, cream or butter/margarine to vegetables, sauces, soups, and mashed potatoes
- Add extra sauces and gravies to meat, chicken and fish – for example, white sauce, parsley sauce
- Use mayonnaise, salad cream, cheese, egg or avocado in your meals and snacks
- Make puddings with enriched milk and add extra cream, honey or condensed milk
- Have a glass of fruit juice a day – add extra sugar and dilute with lemonade to make a longer drink
- Avoid diet and low calorie products at this time – you can return to these once you are back to normal eating patterns. Choose full fat products such as full fat milk and yoghurt
- Choose your favourite foods often – eating is to be enjoyed!