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Managing patients who are obese

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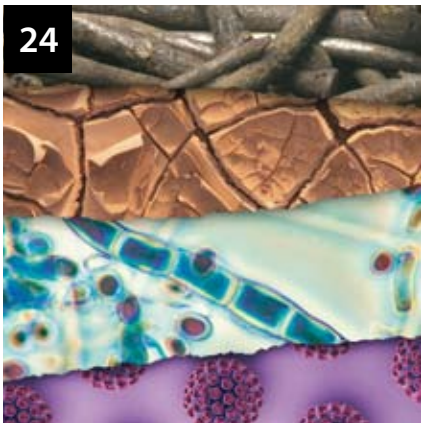

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Thanks for the words.

Without feedback from our readers our voracious vocabulary would be less verbose and we would be vexed to come up with verbs without you.

Wishing everyone a safe and joyous festive season

Here's to another great year of BPJ

The latest on IPIF

The aim of the Integrated Performance and Incentive Framework (IPIF) is for DHBs, PHOs, general practice teams and other primary care services to work together to plan and provide health services. The framework has been developed by the health sector with support from the Ministry of Health and is currently in a transitional phase. ***This update contributed by the IPIF team*** *looks at the development of the framework's system performance measures, with insights from some of the clinicians involved.*

"Babies who are delivered safely, born in the healthy weight range, begin life exclusively breastfed, and have all the early checks they need...now to me, that's a healthy start," says Dr Damian Tomic, following his recent work helping develop potential measures for the evolving Integrated Performance and Incentive Framework (IPIF).

It is expected that a group of potential measures anticipated to sit at the heart of an integrated health system will soon be presented to the Minister of Health.

Midlands Health Network Medical Director and Hamilton general practitioner, Dr Tomic, and Christchurch general practitioner, University of Otago Professor of General Practice, and Chair of Pegasus Health, Professor Les Toop, led teams of health sector representatives who refined the selected measures before they were endorsed by a Joint Project Steering Group in November.

Dr Tomic and Professor Toop have significant experience in their practices and have been involved in numerous national and international conferences focused on improvements for the health sector. They share the belief that IPIF is an exciting development which will enhance the care of patients. *"IPIF is going to have measures the country can be proud of,"* says Dr Tomic. *"It's about the steps needed for a healthy start, for healthy ageing, and more. I think we can all relate to that."*

By using system performance measures IPIF addresses equity, safety, quality and cost of services. The measures are made up of composite measures, the stepping stones for reaching the overall goal – all New Zealanders can access the health services they need in order to be healthy.

IPIF is currently in a transitional phase and five measures were selected to provide continuity with the PHO Performance Programme (PPP) which ended in June, 2014. These are:

- More heart and diabetes checks
- Better help for smokers to quit
- Increased immunisation for children at age eight months
- Increased immunisation for children at age two years
- Increased cervical screening

Behind the scenes work has continued on other possible measures to be added for 2015/16. Three different measures development groups met, with Professor Toop leading the Healthy Ageing Development Group, and Dr Tomic leading the Healthy Start Development Group. Compass Health CEO Martin Hefford led the Capacity and Capability Group, and Ministry of Health Chief Advisor Dr Peter Jones has supported all of the work.

Healthy start

Dr Damian Tomic: *"It was important from the beginning that we had coalface clinicians and staff involved. That way you get measures that are meaningful and real."*

Dr Tomic says there was wide engagement during the Healthy Start Measures Development Group workshops with Well Child/ Tamariki Ora providers, paediatricians, general practitioners, allied health staff, equity experts and nurses. He says this is a sign they were curious about IPIF and wanted to get it right.

"Some people working in the health sector are wary of measures, of targets. By inviting so many representatives it meant they could all see how their work will contribute, not only to meeting the measures, but the bigger picture of an integrated health system."

The aim of the Healthy Start measure is to improve integration of services, equity and health outcomes for pregnant women and newborns through to the first year of life. Measures being considered include:

- Pre-conception factors such as smoking status of women in the reproductive years
- Antenatal measures such as early registration with a Lead Maternity Carer (LMC) and maternal Body Mass Index (BMI) at presentation
- Birthing and new born factors such as gestational age at birth and early enrolment with a PHO
- First year of life factors such as breastfeeding

"Now to me, that's a healthy start. That's a conversation starter and something we can all aspire to. If you live in a region where this is currently not happening, you can look at the measures that are agreed on as driving change."

System Performance Measures

- Encourage better clinical integration using clinically meaningful indicators
- Align with the high-level goals of the health system

The first five measures fit with a Life Stages development approach: Healthy Start, Healthy Child, Healthy Adolescent, Healthy Adult and Healthy Ageing.

Eventually they will be complemented by measures relating to capacity and capability. All measures have a focus on equity of health outcome for everyone.

Component Measures

Each system performance measure will comprise several component measures – tangible stepping stones for achieving each system performance measure.

Contributory Measures

An exciting tool for district alliances will be a set of contributory measures they can use to inform their quality improvement programmes. Eventually there will be a contributory measures dictionary ensuring national consistency in data collection. Work is still being done in this area.

Healthy ageing

Professor Les Toop: *"Patients want their doctors and the rest of their health care team to focus on them as people, and not pieces of a jigsaw puzzle. The development of IPIF will hopefully help build an integrated system with the person or patient at the centre, firmly involved in decision making."*

Professor Toop is an advocate for professionalism, for independent high-quality general practice teams working collaboratively across the health system, and for the provision of evidence-informed education for primary care clinicians and for consumers. Having contributed to work on measures elsewhere in the country, he was asked by IPIF's Joint Project Steering Group co-chair Graham Scott to help develop potential system performance measures for 2015/16.

IPIF system performance measures are being organised according to the Triple Aim* principles as well as life stages. *"I was really keen to work in the healthy ageing workgroup with help from elderly care experts in general practice and pharmacy, as well as secondary care clinicians working in elderly health care and general medicine. We also included a DHB analyst, planning and funding representatives and a number of academics,"* says Professor Toop.

The group met twice in Christchurch and Professor Toop says they worked quickly and efficiently on refining a number of the potential measures which had initially been identified by a national group and then screened by a team of Health Ministry analysts. He says successful measures needed to reflect "whole of system performance in elder person care". *"We were interested in measures that required integration and not simply the work of just one group. The suggested measures for 2015/16 due for presentation to the Minister clearly require the contribution of multiple organisations to overall achievement".*

Professor Toop says the aim of the healthy ageing measure is to improve integration of services, equity and health outcomes for older people. Examples of potential measures include the sector's ability to provide as much care as possible to people close to home (freeing up hospitals for those most in need), and system-wide safety issues such as polypharmacy.

He says the measures anticipate an environment of high trust, in which effective local relationships set the agenda for quality improvement. *"Unlike the PPP which happened almost exclusively within general practice, the recommended measures require system wide integration and collaboration. District alliances will be important enablers."*

Professor Toop says if IPIF fulfils its potential, built-up capacity will lead to effective clinical governance overseeing a much wider sweep of clinical activity than in the current scope of IPIF. *"IPIF is predicated on trust and responsibility. If we get this right, it will be of international importance as an alternative to traditional accountability frameworks."*

*__The Triple Aim__ is a healthcare improvement policy that was initially developed in the United States. It outlines a plan for better healthcare systems by pursuing three aims: improving patients' experience of care, improving the overall health of a population and reducing the per-capita cost of health care.

In New Zealand the policy has been adapted by the Health Quality & Safety Commission and is one of the key tenets of IPIF.

The way forward

Dr Peter Jones: *"Meeting the present and future challenges in health care requires a transformational change in how we get our great health professionals working together. IPIF aims to promote and support that change."*

Dr Peter Jones is Ministry of Health Chief Clinical Advisor, Sector Capability and Implementation. He is a practicing rheumatologist who worked for 15 years with the multidisciplinary team at Rotorua's QE Health. More recently he was Associate Professor of Medicine at the Waikato Clinical School, Auckland University.

Dr Jones has been working with the Ministry of Health since 2013 and is very grateful to the number of high-calibre health sector representatives who have contributed to the process of developing the 2015/16 potential measures. *"The co-development approach across its entire evolution is one of IPIF's strengths".*

Many people and organisations involved with the health system significantly contributed to the development of IPIF with an Expert Advisory Group releasing its report in February 2014. Later in the year sector representatives met again to consider the measures to be introduced in 2015. From there, a team of analysts drawn from DHBs, PHOs, and the Ministry of Health worked through the long lists of potential measures in the healthy start and healthy ageing life stages. Dr Jones says they assessed the feasibility and suitability for implementation of each measure based on data availability, timeliness for regular performance feedback, existence of agreed data definitions, and technical ability for the measures to be disaggregated by ethnicity and deprivation status. He says the measure development groups took the analyst's group assessments and considered each measure for the degree to which it reflected correlation with good clinical practice, system integration, transparency and meaningfulness. The groups also looked for evidence the measure would affect clinical outcomes, and echoed the Triple Aim.

"It was important to the process that the measure development groups consisted of leaders from the sector. They voiced the sector perspective ensuring decisions made were applicable in the workplace."

Dr Jones says it is likely that capacity and capability measures will be assessed as part of a business improvement and audit process, rather than as continuous data collection. Measures could include aspects of e-health, clinical pathways, spectrum of care via investment, workforce development, models of care, and fit for purpose infrastructure. At the same time the Health Quality and Safety Commission (HQSC) is working to develop a patient experience tool for primary care.

The Minister's decision on the new IPIF measures is expected by the end of the year.

For further information on IPIF and latest updates, see: **www.hiirc.org.nz/section/35484/integrated-performance-and-incentive-framework/**

"It was important to the process that the measure development groups consisted of leaders from the sector. They voiced the sector perspective ensuring decisions made were applicable in the workplace."

Managing patients who are obese:

Encouraging and maintaining healthy weight-loss

The mainstays of obesity management are simple and well known to health professionals: reduce sugar and saturated fat intake, eat more fresh vegetables and whole grain fibre and increase physical activity. The complexity lies in the psychosocial, cultural and economic barriers that people need to overcome in order to sustain the lifestyle changes required to achieve long-term weight-loss. "Fad" diets, myths and misinformation about weight-loss, and the difficulties of discussing obesity with patients, add to this challenge. Patients who do manage to lose weight should be followed-up regularly in primary care to encourage them to maintain their lifestyle changes. Currently no anti-obesity medicines are funded in New Zealand and there is a very limited role for their use in obesity management, although several new medicines have recently been licensed overseas. Bariatric surgery is the most effective and sustainable weight-loss treatment for select patients who are morbidly obese.

PART 1: Defining the scope of the problem

The obesity epidemic in New Zealand

The clinical significance of obesity cannot be overstated; along with increasing age it is the largest contributor to long-term morbidity in developed countries.[1] In New Zealand, one in three people (31%) are now obese (i.e. have a body mass index [BMI] ≥ 30 kg/m^2), and the prevalence appears to be increasing year-by-year.[2] Halting this epidemic requires wide-ranging social, economic and political change. However, people who are already obese require interventions and ongoing support from primary care.

A healthy dietary pattern and regular physical activity are the two cornerstones of obesity management. Patient engagement is critical in reversing weight-gain through behavioural change. It is therefore important not to offend patients when discussing obesity; the terms overweight or excess weight may be preferred by some patients.

Obesity is becoming the norm in some communities

More than two out of three (68%) Pacific adults and almost half (48%) of Māori adults were reported to be obese in 2012/13.[2] Of particular concern is the early age of onset of obesity in these groups. More than one in four (27%) Pacific children and almost one in five (19%) Māori children are obese.[2] As obesity becomes more prevalent there is the danger that it is becoming accepted as the new norm in society. This means that some parents may not recognise that their children's health is being adversely affected by their weight.

Obesity is also associated with deprivation. People living in the most deprived communities in New Zealand are one and a half times more likely to be obese than people living in the least deprived communities.[2] Children living in deprived areas are three times more likely to be obese, once age and ethnicity is accounted for.[2] This is at least in part because the vegetables, fruit and meat that have the highest nutritional quality are usually associated with the highest costs, while nutrient-poor foods cost considerably less.[3]

Obesity affects everyone

Excess weight is the most prevalent cardiovascular risk factor in New Zealand.[4] Adipose tissue in people who are obese is strongly linked to the development of type 2 diabetes.[5] People who are obese have an increased risk of coronary heart disease, heart failure, atrial fibrillation, ventricular arrhythmias and sudden death.[4] Compared to having a body weight in the healthy range, a person who is obese can be expected to die two to four years earlier and a person who is morbidly obese (i.e. a BMI ≥ 40 kg/m^2) can be expected to die eight to ten years earlier.[3]

The consequences of obesity place an enormous strain on the health system due to its causal relationship with type 2 diabetes, hypertension, osteoarthritis, obstructive sleep apnoea, dyslipidaemia, gastro-oesophageal reflux disease, non-alcoholic fatty liver disease and many forms of cancer.[4] The majority of people who are obese have at least one other long-term condition, resulting in a 30% increased cost in health care, compared with healthy-weight peers.[3]

The mechanisms of obesity-related damage

People who are obese often develop insulin resistance and, as this progresses to type 2 diabetes, their cardiovascular risk is increased due to the complex interaction of hyperglycaemia, hypertension, dyslipidaemia and other atherosclerotic

Body mass index and waist circumference

Body mass index (BMI) is the most common way to clinically consider weight in relation to height. This is calculated by dividing the patient's weight in kilograms by their height in metres squared. Calculating BMI can be a useful entry point for educating patients about the health risks of obesity. Given the increasing prevalence of obesity some patients may not consider themselves to have a weight-related health problem. The risk of morbidity and mortality is lowest for patients who are in the healthy weight range:[3]

- < 18.5 kg/m^2 – underweight
- 18.5 – 24.9 kg/m^2 – healthy weight
- 25.0 – 29.9 kg/m^2 – overweight
- ≥ 30.0 kg/m^2 – obese*

* Healthy people with a high amount of muscle mass, e.g. athletes, may be classified as obese using BMI cut-offs.

Waist circumference may also be used by health professionals to assess the risk of health complications in adults:[3]

- The risk of long-term disease is increased at ≥ 80 cm for females and is high at ≥ 88 cm
- The risk of long-term disease is increased at ≥ 94 cm for males and is high at ≥ 102 cm

There may be differences in the threshold for risk across populations of different ethnicities for waist circumference.[3]

The health risks of excess weight in children and adolescents are generally assessed using age-related cut-off values because they are continuing to grow.[3]

For further information see: "Addressing weight issues in young people and families in New Zealand", BPJ 45 (Aug, 2012).

processes.[4] However, obesity also causes damage to the body's cardiovascular system via a range of other mechanisms. Coronary atherosclerosis is likely to begin, or be accelerated by, changes in: sympathetic tone, circulating free fatty acids, intravascular volume (which increases vascular wall stress) and inflammation.[4] The pro-thrombotic state of people who are obese then makes the onset of coronary events more likely.[4]

Visceral fat increases risk more than peripheral fat

The term "obese" does not describe where on the body adipose tissue is stored. People can store fat in their periphery, e.g. hip, thigh and buttock, or as visceral fat in and around the organs such as the liver, resulting in central obesity. Visceral fat deposits have a greater negative influence on an obese person's health than their total amount of adipose tissue.[5] Stable peripheral fat is considered less of a health risk because the body is more able to utilise triglycerides from the peripheral fat reservoir during periods of exercise, fasting or starvation than from visceral fat stores. Visceral fat is more metabolically active and more readily converts triglycerides into free fatty acids for release into the blood stream. Increased visceral fat therefore results in higher levels of free fatty acids being delivered to the liver, causing increased output of hepatic glucose and very low-density lipoprotein (VLDL), as well as reducing the liver's response to insulin.[5] This explains why excess visceral fat is known to correlate with the development of insulin resistance while subcutaneous fat does not.[5]

PART 2: What is a healthy diet?

Dietary patterns: we are still what we eat

Unintentional weight gain often motivates people to diet to lose weight. What is common across all diets that result in weight loss is that a person must reduce their energy intake, and then adhere to this restriction, for the diet to be successful. The amount of energy intake each person requires each day to achieve weight loss varies depending on age, sex, body weight and level of physical activity. To lose weight, daily energy intake needs to be less than daily energy expenditure. When eating a healthy diet a female requires approximately 8400 kJ (2000 calories) per day to maintain her weight and a male requires approximately 10 500 kJ (2500 calories) per day.[6]

People will often experience weight loss when they begin a new dietary pattern as they are paying more attention to what they eat, eat less overall, and often exercise more. However, most diets are not successful long-term as body weight is regulated by complex homeostatic neural and endocrine processes that guard against weight loss, but do not protect against weight gain.[1] It is therefore generally easier for people to gain weight than to lose it. It is reported that approximately 80% of people who intentionally achieve weight loss of ≥ 10% regain that weight within one year.[7] This means that people who diet frequently often end up in a cycle of unintentional weight gain, followed by intentional weight loss and then unintentional weight gain; this is referred to as weight cycling.[7] Patients who have developed excessive guilt and feel "hopeless" about previous patterns of unintentional weight-gain may benefit from a brief explanation of weight cycling. Continued contact with a health professional increases the likelihood that patients will be able to maintain weight-loss over the long term.

Which type of diet is best?

The cornerstones of good dietary advice remain much the same as they have for years: reduce sugars and saturated fat, while increasing whole grain cereals and fibre.

There is no difference in the weight-loss efficacy of diets with different macronutrient compositions, e.g. low carbohydrate diets or low fat diets (although there are adverse nutritional outcomes associated with some of these diets).[9] This means that a person will lose weight on any diet that they are able to stick with, as long as energy consumption is less than energy expenditure. Therefore, the best health advice for people is that they eat a balanced and nutritious, calorie-reduced diet.

However, many people's views on weight management are influenced by myth and misinformation. This is because studies reporting on the effectiveness of "fad diets" often follow participants for short periods, i.e. less than six months, and compare participants on the fad diet to participants eating a diet containing large amounts of highly processed rice and potato.[10]

Diets that contain foods rich in fibre from wholegrains, legumes, fruit and vegetables have been shown to be not only associated with weight loss but to protect people against type 2 diabetes, cardiovascular disease and colorectal cancer.[10] Systematic reviews have found that an increase in diet quality, in keeping with international dietary guidelines, is consistently associated with 10 – 20% reduction in morbidity.[3]

How much weight loss is recommended?

Healthy weight loss needs to be based on regular dietary patterns and physical activity. A rate of weight loss of 1 to 4 kg per month is recommended, with the goal of achieving a 10% reduction from initial weight within the first year, and a 10 – 20% reduction from initial weight over one to five years.[3] A daily energy deficiency of approximately 2500 kilojoules (kJ), or 600 calories, is recommended for most people to achieve a satisfactory rate of weight loss.[8] This equates to five slices of bread per day, or 2.5 cups of cooked rice or pasta.[3]

What is new in dietary advice?

What has changed in recent years is that international guidelines now allow people more choice in the relative amounts of macronutrients they can consume each day to achieve their daily energy intake. This means that nutritional guidelines can be translated into diets as diverse as the Mediterranean diet, with a relatively high amount of energy derived from unsaturated vegetable oils, to Asian-style diets which contain a relatively high carbohydrate energy intake. Recent Australian Dietary Guidelines recommend that the acceptable macronutrient energy intake ranges are:[3]

- 45 – 65% of total energy intake from carbohydrate
- 20 – 35% of total energy intake from fat
- 15 – 25% total energy intake from protein

Diets with energy intake levels outside of these ranges, e.g. low carbohydrate diets, increase the risk of inadequate micronutrient intake, especially if people avoid fruit.[3] However, for people who are obese and who also have diabetes, a diet that contains a relatively low intake of energy from carbohydrates, but still within the recommended energy intake range, may be preferable.[11] Slowly digestible carbohydrates, e.g. whole grain bread, lentils, legumes and nuts, are ideal sources of carbohydrates for these people.

Dietary patterns that use fat as the main source of energy intake are associated with increased lipid levels, which is a risk factor for heart disease. A large cross-sectional study in Sweden found that in 2004, following positive media support for low carbohydrate-high-fat diets, there was a corresponding population-wide, increase in cholesterol levels, while BMI levels remained unaltered.[12]

The jury is out on diets involving severe energy restriction

Intermittent fasting involves restricting energy intake to approximately one-quarter of that needed to maintain a steady body weight on one or two days a week. There are very few human studies that have investigated this dietary pattern, therefore it is not possible to make clinical recommendations regarding its effectiveness or long-term effect on nutritional status. One study compared weight-loss and changes in other health markers after six months between a diet restricted to 2266 kJ (approximately 540 calories) per day, two days a week, with normal energy intake on the remaining five days, compared with a constant energy intake of 6276 kJ (approximately 1500 calories) per day for the same time period. Both dietary patterns were found to be equally effective in achieving weight loss, and improving insulin sensitivity, markers of cardiovascular disease, e.g. blood pressure, and breast cancer risk markers (central obesity is associated with an increased risk of postmenopausal breast cancer).[13]

Very low energy diets, i.e. with daily energy intake limited to less than 2500 kJ (approximately 600 calories), are associated with rapid weight loss of up to 20% of baseline and corresponding improvements in glycaemic control, blood pressure and cholesterol.[1] These diets typically involve meal replacements which are adjusted to suit individual protein and nutrient requirements. Very low energy diets are generally restricted to periods of eight to twelve weeks,[1] e.g. prior to bariatric surgery (Page 18), and require supervision by health professionals with experience in weight-loss as patients may experience dehydration, headaches, dizziness, fatigue, heartburn, hypoglycaemia, constipation, altered menstrual cycles and asymptomatic gallstones.[14, 15]

"Going against the grain" is a commentary by University of Otago health researchers on low carbohydrate-high fat diets, published in the Lancet in October, 2014 (Volume 384, Issue 9953).

Which foods should people enjoy daily?

A dietary pattern that includes a wide variety of nutrient-dense foods is more likely to provide health benefits for people than a restricted diet. Table 1 provides examples of recommended foods from which to create a healthy daily eating pattern. People who regularly chose water as a drink will substantially reduce their risk of weight gain and diet-related chronic disease.[3] The recommended daily intake of fluids in a healthy adult is 2.1 – 2.6 L per day and it is preferable that the majority of this come from plain water, however, individual requirements may vary considerably with temperature and level of physical activity.[3] Rarely, excessive water consumption may cause hyponatraemia.[3]

Foods that should only be eaten occasionally

Foods containing saturated fat, foods with added salt or added sugar and alcohol should be considered discretionary and their intake limited, by all people, and especially by those who are attempting to lose weight.[3] Consuming these foods regularly is associated with obesity, cardiovascular disease, some cancers, type 2 diabetes and other long-term conditions.

High-fat foods containing butter, cream, cooking margarine, coconut and palm oil should be replaced with foods containing predominantly polyunsaturated and monounsaturated fats, such as oils, spreads, nuts and avocado.[3] Foods containing high levels of trans fat, e.g. cakes and cookies, potato and corn chips, and fried food, should be avoided due to the association between trans fat and heart disease. Consumption of drinks containing sugar such as sugar-sweetened soft drinks, cordials, fruit juices, vitamin waters and energy and sports drinks should be limited.

It is important to acknowledge that eating discretionary foods can contribute to the overall enjoyment of eating, particularly during social activities and family celebrations. It can be very difficult for people to reduce their consumption of these types of food if they are attending many social events or if family/whānau members take offence if food is not accepted. If families/whānau can be encouraged to talk about diet and issues of weight then nutritious foods may be served instead of high-fat foods. Explaining that these foods are energy dense and require significant increases in physical activity to "burn up" the additional energy is one way of achieving this.[3]

Table 1: Healthy eating guidelines for all adults[3]

Food group	Recommended food intake	Mechanism of benefit	Comment
Vegetables	Eat plenty of vegetables of different types and colours. At least five servings of vegetables per day, at 75 g per serve (half a cup of cooked broccoli, 1 cup leafy vegetables). Most patients can be advised to increase their intake of vegetables by at least one-third.*	Vegetables contain specific nutrients associated with health benefits, e.g. potassium and magnesium decrease blood pressure. High fibre in vegetables positively influences cholesterol levels. The antioxidant properties of vitamins found in vegetables, e.g. C and E, reduce inflammation, haemostasis and atherosclerotic plaque formation.	Increased consumption of a variety of vegetables reduces energy intake and increases water consumption. It is probable that each additional daily serve of vegetables is associated with a reduced risk of coronary heart disease and stroke. Individual studies report a reduced risk of dementia associated with a high vegetable intake.
Fruits	Eat at least two serves of fruit per day, at 150 g per serve (one medium size apple or two apricots). Most people can be recommended to approximately double their intake of fruit.*	Vitamin and minerals present have specific mechanisms of benefit and phytochemicals, e.g. carotenoids and bioflavonoids, have antioxidant properties which reduce the risk of cardiovascular disease.	Consumption of fruit is associated with a reduced risk of weight gain, coronary heart disease and stroke. Individual studies report a reduced risk of dementia associated with a high intake of fruit.
Grain foods	Eat at least four to six serves of grain foods per day. Choose mostly wholegrain breads, cereals, e.g. oats, and brown rice over less nutritious white rice, white bread, pasta and noodles.	Health benefits are partially provided by complex carbohydrates resistant to digestion in the small intestine which may be protective to the colon. Dietary fibre, B group vitamins, vitamin E, iron, zinc, magnesium and phosphorus are also present in grain foods depending on the source and the degree to which they are commercially processed, e.g. oats contain β-glucan which binds to bile salts causing the liver to increase breakdown of cholesterol, whereas wheat does not. In general, wholegrains contain more nutrients and phytochemicals in the bran and germ parts than refined grains where the bran and germ have been removed.	Wholegrain and/or high cereal foods are associated with a reduced risk of weight gain, cardiovascular disease and type 2 diabetes.
Lean meats and vegetarian alternatives	Lean meats, poultry, fish, eggs and plant-based alternatives such as tofu, beans, nuts and seeds. Processed and cured meats may have high levels of saturated fat and added salt therefore are not included in this group. They should only be eaten occasionally and in small volumes.	This is a very broad food group and the health benefits vary depending on the food. Generally, an important source of protein, as well as iodine, iron, zinc and other minerals and essential fatty acids. Eating nuts and seeds reduces heart disease and is not associated with weight gain if total energy is controlled.	Eating fish more than once a week is associated with a reduced risk of stroke, cardiovascular disease and dementia in older adults. Red meat should be eaten in moderation as consumption in quantities greater than 100–120 g per day is associated with an increased risk of colorectal cancer.
Milk, yoghurt and cheese	This group also includes calcium-enriched soy, rice and oat drinks. Choose mostly reduced fat options. Other dairy foods such as butter, cream and ice cream are not included in this group and should only be eaten occasionally and in small quantities.	Calcium in these foods is highly absorbable and may be preferable to calcium supplements. Calcium may reduce cardiovascular risk by affecting vascular endothelial function. Protein, iodine, vitamin A, vitamin D, riboflavin, vitamin B12, zinc and other bioactive substances present in milk products may also provide health benefits.	Consumption of milk, yoghurt or cheese is associated with improved bone density and a reduced risk of ischemic heart disease, myocardial infarction and stroke. Low fat dairy food is associated with reduced risk of hypertension. It is probable that more than one serve per day of these foods, especially milk, is associated with a reduced risk of colon cancer.

* Based on Australian population data

PART 3: The importance of exercise

Include physical activity in all weight-loss interventions

Many people prefer to diet as their only way of reducing weight. However, a combination of energy restriction and increased physical activity is more effective at reducing and managing weight than energy restriction alone. Active energy expenditure accounts for 20 – 40% of total energy expenditure, depending on the amount of physical activity a person does and the amount of body mass they must move when performing the activity.[3]

Overcoming barriers to physical activity

Motivational interviewing is one technique that health professionals can use to encourage patients who are obese to exercise. Part of this approach involves expressing empathy and acknowledging that issues such as self-perception of body shape are potential barriers to participation in exercise for some people. A number of studies have reported that people who are obese find it especially difficult to exercise in the company of experienced gym members.[16] In particular, females who are obese are reported to experience more social anxiety about their physique than normal-weight females.[16] Strategies may need to be devised to overcome these barriers. One simple suggestion is to encourage people who are overweight to exercise together.[16] General practices can facilitate networking amongst patients who would like to exercise with others. Alternatively, walking groups can also be found via social media or enquiring with the local DHB or PHO.

Increasing patient self-efficacy encourages behaviour change

Self-efficacy, i.e. the extent to which a person believes in their ability to achieve goals, is an important determinant of success when people first begin to exercise.[16] Self-efficacy is known to be highly situational and one person may have high self-efficacy for one activity, e.g. weight training, but a low self-efficacy for another, e.g. aerobics.[16] Patients can be encouraged to engage in exercise that they are confident they can succeed at. However, if a person has a lot of previous experience with an activity then their technique will be efficient and they will use less energy when performing this task.[17] Therefore it is important that people also attempt activities that they are not familiar with.

Any physical activity is good activity

Patients can be encouraged to replace sedentary activity with physical activity that is either productive or that they are interested in. For example, establishing a vegetable garden will involve exercise as well as providing an inexpensive source of food for the family/whānau. If people are required to perform sedentary tasks for long periods at work then a standing desk or walking during lunchtime are two strategies for increasing energy expenditure.

Weight-bearing exercise is more effective at reducing BMI than non-weight-bearing exercise, i.e. where the body is supported against gravity. For example, walking or jogging uses up to 30% more energy than swimming or cycling for the same period of time.[17] Encouraging patients to think of ways they can walk more is a good entry point for discussions about weight-bearing exercise. For example, parking further away from the supermarket entrance or getting off the bus one stop early.

Encourage patients to extend their exercise goals as they notice their fitness improving as this will increase energy expenditure. For example, a patient may begin with walking to the shops for a daily paper, then using the stairs at work, before attempting light jogging once their fitness is sufficient.

Appropriate footwear should be worn by people who are walking or running for any distance, particularly people with diabetes. Exercise such as resistance training should begin with easily manageable resistance and slowly increase as strength and fitness improve.

Set cardiovascular as well as weight-based goals

When setting goals with patients who want to lose weight it is important that there is an emphasis on improving cardiovascular fitness, as well as losing weight. People who improve their cardiovascular fitness, even with little or no change in BMI, show improvements in blood pressure, glucose metabolism and blood lipid profiles.[18] Some people may find this information provides added motivation to their exercise programmes.

It may be helpful to also explain to patients that performing resistance-based activities, e.g. many gym-based exercises, may increase their muscle mass and therefore weight-loss may be less than expected.

Making exercise a permanent part of daily life

Goal-setting and self-monitoring increases the likelihood that behaviour change will be maintained.[16] Daily physical activity can be monitored by the use of a pedometer which can then be recorded in a diary or graphed. Software applications for mobile phones are also available that map the distance a person covers when they are walking. Fitness trackers can be worn on the wrist and record movement and sleep patterns, as well as providing analysis of the information that is collected through a mobile phone application, e.g. correlations between sleep patterns and activity levels during the day.

People who have social support for exercise are more likely to maintain levels of increased physical activity and to achieve long-term weight loss.[16] This may take the form of group walking or team sports.

Exercise has many benefits beyond weight loss, such as improvements in joint health and sleep quality, and reductions in stress, depression and chronic pain.[16]

Information is available for patients on how to be active everyday from: **www.health.govt.nz/your-health/healthy-living/food-and-physical-activity/obesity**

Regular contact with patients is beneficial

Regular contact with a health professional increases the likelihood that patients will be able to maintain a healthy lifestyle following weight loss. This contact may be as brief as a five to ten minute meeting every two weeks at a weigh-in, and other than being supportive and enthusiastic, no specific training is required by the health professional. A New Zealand study recruited 200 females aged 25 – 70 years who had intentionally lost at least 5% of their initial body weight in the previous six months.[19] Following a consultation with a nutritionist, when they were given educational material about healthy eating, and a meeting with an exercise consultant, patients were randomised to either a simple nurse-led support programme or an intensive programme led by a dietician and exercise consultant. Over a two-year period both weight maintenance programmes were found to be equally effective and in many cases patients were able to further reduce their weight, waist circumference and amount of body fat.[19] Many participants in this study reported that an important reason for its success was the regular weigh-ins and support offered by the nurse.[19] This psychosocial component of treatment may explain why support groups such "Weight Watchers" or "Jenny Craig" report anecdotal success in supporting weight loss.

Green prescriptions issued by health professionals can improve motivation and adherence to physical activity, particularly for females.[16] Significant improvements in physical activity at 12 and 24 month follow-ups were found among 1000 "less active" females aged 40 – 74 years who were provided with written advice to be physically active along with telephone support for nine months.[20]

How much physical activity is recommended?

It is recommended that all people, regardless of their weight, do at least 30 minutes of moderate exercise on most days of the week. Moderate exercise can be described to patients as, "breathing a bit harder, but able to hold a conversation." Patients who are motivated to gain additional benefits can extend the amount of time that they are active for or increase the intensity of the activity. The recommended thirty minutes a day of physical activity can be achieved in smaller portions, e.g. ten minute bursts.

PART 4: Treatments of last resort

Pharmacological management of obesity

The objective of the pharmacological treatment of obesity, like diet and exercise, is to decrease the amount of energy that is consumed and/or to increase the amount of energy that is expended. However, many patients prescribed anti-obesity medicines have limited success in achieving clinically significant and sustained weight loss, without a substantial and ongoing commitment to lifestyle changes.

Anti-obesity medicines should be considered only as an adjunct to lifestyle interventions in patients with a BMI > 30 kg/m^2.[1] Currently none of the anti-obesity medicines have been shown to reduce mortality and the long-term safety of many of these medicines is largely unknown.[21]

Anti-obesity medicines currently available in New Zealand

In New Zealand the only medicines approved for use as anti-obesity agents are unsubsidised. Metformin is associated with clinically significant weight-loss in patients with type 2 diabetes and is fully-subsidised as an anti-diabetic medicine, however, it is not approved for use as an anti-obesity medicine (Page 18).

Orlistat is a selective inhibitor of pancreatic lipase and therefore reduces digestion and absorption of fat. A patient taking a maximum dose of orlistat, with a diet comprising 30% fat, may produce faeces with a fat content of 30%.[21] Orlistat is indicated as an adjunctive treatment of obesity in patients with a BMI greater than 30 kg/m^2.[22] Orlistat is contraindicated in patients with chronic malabsorption syndrome or cholestasis.[22] Treatment may impair the absorption of fat soluble vitamins and orlistat should be used with caution in patients with chronic kidney disease or volume depletion.[22]

Advise adults to take 120 mg of orlistat, immediately before, during, or up to one hour after each main meal; to a maximum of three times daily.[22] If a patient misses a meal, or they eat a meal that contains no fat, then the dose of orlistat should be omitted.[22] If a patient also requires a multivitamin then this should be taken at least two hours after a dose of orlistat or at bedtime.[22]

The adverse effects of orlistat can be significant and include fatty or oily stools and other gastrointestinal symptoms such as flatulence, cramps and bloating.[22] The presence of these may indicate that the fat content of the patient's diet is too high and can be used as encouragement to reduce their fat intake.[22] Other adverse effects include tooth and gingival disorders, respiratory infections, malaise, headache, menstrual disturbances, urinary tract infections and hypoglycaemia.[22]

After one year of treatment, patients can be expected to have lost approximately 3 kg of weight.[23] A systematic review of trials over one to four years found that orlistat increased the absolute percentage of patients who were able to achieve weight-loss of 5% of baseline by 21%, and weight-loss of 10% of baseline by 12%.[24] Orlistat was also found to reduce the onset of diabetes and to improve total cholesterol, LDL, blood pressure and glycaemic control, but increased gastrointestinal adverse effects and slightly lowered concentrations of HDL.[24]

Phentermine is a dopaminergic agonist that acts as an appetite suppressant. It is indicated as a short-term, i.e. 12 weeks or less, adjunctive treatment for weight loss in patients with a BMI greater 30 kg/m^2.[22] Phentermine is similar to amphetamine and is a class C controlled drug with abuse potential. Phentermine is contraindicated in patients with: pulmonary artery hypertension, severe cardiac disease, heart valve abnormalities or heart murmurs, moderate to severe arterial hypertension, cerebrovascular disease, hyperthyroidism, a history of psychiatric illness, glaucoma, a history of drug or alcohol abuse, or who have used a monoamine oxidase inhibitor within 14 days.[22] Serious cardiac valvular disease has been reported in patients taking phentermine in combination with fenfluramine or dexfenfluramine, and very rarely primary pulmonary hypertension has been reported in patients taking phentermine alone.[25]

What defines a weight loss medicine?

The US Federal Drug Administration (FDA) requires that for medicines to be approved for the treatment of obesity that they should produce a placebo-subtracted weight-loss of greater than 5% of baseline at one year, or that more than 35% of patients achieve a greater than 5% reduction in weight that is also at least twice that of placebo.[21]

The future of weight-loss medicines in New Zealand

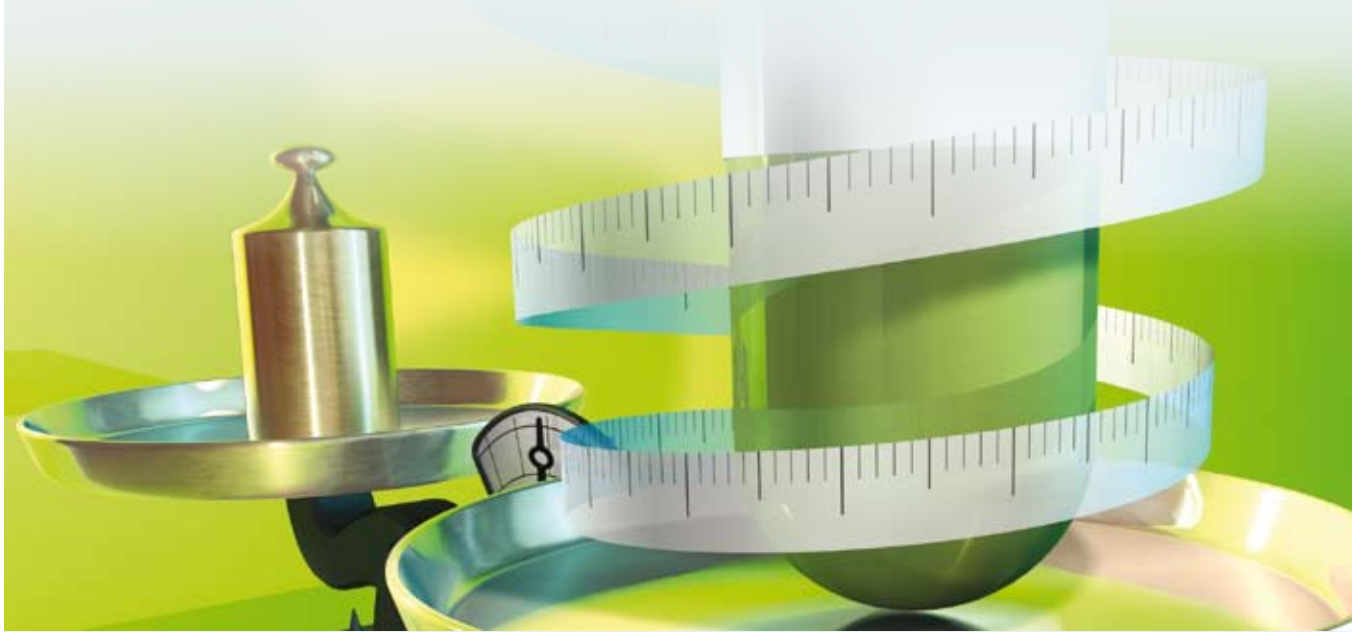
The following are not currently available as weight-loss medicines in New Zealand, but are used in other countries and may emerge as future treatment options:

Lorcaserin is a selective serotonin agonist that suppresses appetite without affecting energy expenditure.[21] In three clinical trials 38 – 48% of patients achieved at least a 5% reduction in body weight from baseline at one-year follow-up, and 16 – 23% of patients achieved at least a 10% reduction in body weight.[21] Lorcaserin is also reported to improve blood pressure, fasting glucose and lipid levels in patients who are overweight.[21] In 2012, the FDA approved lorcaserin as the first new weight-loss medicine since 1999.[21] It is recommended that patients should discontinue treatment if they have not achieved weight loss of 5% or greater than baseline after 12 weeks.[21]

Phentermine and topiramate in a fixed-dose combination suppresses appetite via phentermine's action, while topiramate induces satiety via an unknown mechanism. Topiramate use is associated with a diverse set of adverse effects including gastrointestinal symptoms, movement disorders and mood changes, e.g. depression or aggression.[22] Several studies have shown that using a fixed-dose combination of these two medicines for weight management results in improved tolerability and reduced addictive potential due to the low dose of each medicine being used, e.g. phentermine 3.75 mg.[21] In two trials the mean weight loss from baseline was approximately 10% after 56 weeks of treatment, and approximately two-thirds of patients achieved a weight loss of 5% or greater.[21] Systolic and diastolic blood pressure was also found to be decreased in patients by an average of 3 – 5 mmHg.[21] In 2012, the FDA approved the use of phentermine and topiramate as a weight-loss medicine with the proviso that prescribers receive specific training.[21] In the United States, women of childbearing age are required to take a pregnancy test before initiating treatment with phentermine and topiramate, and during every month of treatment, due to the increased risk of foetal abnormalities.[21]

GLP-1 (glucagon-like peptide 1) agonists are medicines which mimic endogenous incretins that are secreted from the gut following a meal as part of the satiety cascade. GLP-1 agonists act by increasing the secretion of insulin and decreasing glucagon secretion. International guidelines recommend that the GLP-1 agonist exenatide should only be continued in patients with type 2 diabetes who have experienced reductions in HbA_{1c} and at least a 3% reduction in initial bodyweight after six months use.[27] At doses higher than that used for the treatment of diabetes, weight loss of up to 10 kg has been reported in trials lasting for two years.[23] GLP-1 treatment is associated with several adverse effects, including a possible increased risk of acute pancreatitis and pancreatic tumours.

For further information see: "Improving glycaemic control in people with type 2 diabetes: Expanding the primary care toolbox", BPJ 53 (Jun, 2013).



Phentermine can be prescribed at 15 – 30 mg, once daily, in the morning.[22] Patients should be advised to contact a health professional immediately if they experience symptoms such as breathlessness, chest pain, fainting, swelling in the lower limbs, or a decreased ability to exercise.[22] Prescribers are recommended to consider withdrawing treatment of phentermine at 12 weeks if the patient has lost less than 5% of their pre-treatment bodyweight.[22] Treatment beyond 12 weeks with phentermine may be considered for patients who are continuing to lose weight,[25] if they are able to be monitored for signs of dependence (see below).

There are a limited number of trials assessing the effectiveness of phentermine for weight loss and the majority of these were conducted in the 1980s. Patients taking phentermine who are eating a calorie restricted diet can expect to lose 2 kg of bodyweight after 12 weeks and approximately 3.5 kg of bodyweight at six months.[26]

Due to the pharmacological similarities between phentermine and amphetamine there is considerable concern that phentermine has addiction potential. Patients who are prescribed phentermine should be regularly monitored to ensure they are taking the medicine appropriately and have not developed signs of aberrant behaviour. It may be helpful to establish a treatment agreement with patients before phentermine is initiated, so that the patient has clear expectations about the goals and end-points of treatment. It is recommended that general practitioners document the patient's previous attempts at weight loss before considering prescribing phentermine.

Metformin is well known as the first-line medicine in the treatment of many patients with type 2 diabetes. Metformin decreases hepatic gluconeogenesis, improves insulin sensitivity and is able to decrease glucose absorption in the intestine.[21] As many people who have diabetes are also overweight there have been a number of studies investigating the effectiveness of metformin as an anti-obesity medicine, although it is not approved for this indication. Metformin is reported to result in significantly greater weight-loss in patients with diabetes compared to placebo or lifestyle interventions alone, and this weight loss is able to be maintained over a period of at least ten years.[21]

For further information on metformin dosing and adverse effects refer to the New Zealand Formulary.

Bariatric surgery is a last-line option for select patients

Bariatric surgery is a reasonably safe treatment option for people who are morbidly obese and have failed to achieve clinically significant reductions in body weight by conventional management. Bariatric surgery is currently the most effective and sustainable weight-loss treatment for people who are morbidly obese.[14] Bariatric surgery can also result in improvement, or even resolution, of type 2 diabetes and sleep apnoea.[14] Weight-loss, typically at a rate of 4 kg per month is achieved by reducing the amount of food that is consumed.[14] Before patients undergo bariatric surgery they have a comprehensive assessment to assess their suitability for the procedure that covers the patient's dietary beliefs, behaviours, cultural and economic background and any psychosocial issues.[14]

Depending on the type of procedure that is performed some degree of ongoing dietary supplementation is required following bariatric surgery. The three most commonly performed bariatric surgeries are:[14]

1. Adjustable gastric banding, which creates a narrowing near the gastro-oesophageal junction restricting the amount of solid food consumed and resulting in earlier satiety. This procedure is associated with the lowest risk of nutritional deficiency.
2. Sleeve gastrectomy, where the patient's gastric volume is decreased to approximately 15% of pre-surgery volume
3. Roux-en-Y gastric bypass (RYGB) involves stapling part of the stomach to create a pouch and then dividing and attaching the jejunum to this pouch. This procedure has a higher complication rate than other procedures.

Bariatric surgery is a major, and often irreversible, procedure. Therefore the assessment of the long-term effects on patients is crucial. The majority of studies assessing the effectiveness of bariatric surgery do not report outcomes more than two years after surgery or do not report outcomes from more than 80% of the original study cohort.[28] There is some evidence that gastric bypass may be more effective at producing weight-loss than gastric banding. The mean percentage excess weight lost in the two to five years following gastric bypass was more than 50% in 11 studies, while nine of 13 studies reported a mean excess weight loss of less than 50% following gastric banding.[28]

Preparing patients for bariatric surgery

It is reported that 35 – 80% of people who may benefit from bariatric surgery have high-calorie malnutrition prior to surgery.[14] This may be due to a combination of poor food choices, long-term cycles of dieting, and the adverse effects of medicines used to treat other conditions. Before bariatric surgery it is recommended that testing be performed so that any nutritional deficiency can be identified and treated post-surgery.[14] Alongside standard blood tests such as a complete blood count and HbA_{1c}, iron studies, vitamin B12, folic acid, vitamin D, A , E and zinc testing should be requested in general practice.[14]

Two to four weeks before bariatric surgery most people are advised to start a very low energy diet involving meal replacements, to reduce their liver volume by up to 25% and decrease the risk of complications.[14] During this time there is an increased risk of hypoglycaemia and medicines may need to be adjusted.[14]

Follow up after surgery

Following surgery, for one to eight weeks, the patient should aim to maintain hydration and to consume sufficient nutrients and protein to allow healing to occur. The return to normal food can be staged as determined by patient tolerance: from liquid, to blended and finally to solids.[14] Each stage of this process should be designed by a dietitian to ensure the patient receives adequate nutrition.[14]

All patients who have undergone bariatric surgery can experience diarrhoea or constipation which may be improved with fluids, fibre and exercise.[14] Adjustable gastric banding does not restrict nutrient absorption, however, eating behaviour following this procedure does need to be modified to prevent regurgitation or blockage which can result in malnutrition due to missed meals.[14] Recurrent vomiting should be addressed urgently following surgery, particularly in the first eight weeks following sleeve gastrectomy or RYGB, as thiamine depletion and dehydration may occur.[14] Vomiting due to stenosis or stricture may occur in 2 – 10% of patients.[14] Patients who have undergone sleeve gastrectomy or RYGB may also experience an overly suppressed appetite and dumping syndrome, where food passes through the gastrointestinal tract too quickly.[14]

Sleeve gastrectomy and RYGB can both result in an increased risk of nutrient deficiencies as well as hormonal and taste changes, and for sleeve gastrectomy, increased gastric emptying.[14] Following sleeve gastrectomy patients may have altered vitamin B12 and iron utilisation and can be advised to take supplements as determined by the results of monitoring. Patients who have undergone RYGB have altered absorption and require multivitamin, mineral and trace element supplementation at higher doses for the remainder of their life.[14]

Monitoring of nutrition status should be done twice in the first year following sleeve gastrectomy and RYGB, and once following adjustable gastric banding, then annually for each.[14] Adjustable gastric banding requires the band to be adjusted periodically, while sleeve gastrectomy and RYGB do not require specific follow up.

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The **"supporting weight management in primary care"** programme

*The Western Bay of Plenty PHO (WBOPPHO), in conjunction with the University of Auckland, has launched a pilot weight management programme for primary care. The programme uses a brief opportunistic approach to make it easier for health professionals to engage with patients with weight- or diet-related health issues. The programme provides health professionals with support material that covers diet, exercise and stress management. The format of the intervention is similar to the "ABC" smoking cessation tool, which is familiar to most primary care clinicians. The three-tiered approach focuses on: **A**sk, **B**rief advice and **O**ffer ongoing support or onward referral – "**ABO**". If this approach proves successful in the pilot programme, the ABO toolkit will be made available nationally.*

The scale of the problem

Obesity is a major global health challenge. The proportion of adults who are overweight or obese has increased substantially over the past 30 years, and there have been no reports of "success stories" from any nation during this time.[1] In New Zealand, it is estimated that over one-third of adults are obese – this includes nearly one-half of Māori and over two-thirds of Pacific peoples.[2]

There have been many major studies on lifestyle interventions to aid with weight management and diabetes prevention, along with findings from "real life" programmes in the community. However, there is little evidence that these interventions result in large-scale (i.e. population level), long-term improvements in weight loss (and maintenance) or metabolic health indicators, such as type 2 diabetes.[1, 3, 4]

This raises the questions of whether researchers and clinicians have the biology of human physiology, nutrition and physical activity basics correct and/or whether the socioeconomic environment is just too difficult to get people to change to healthier lifestyles. There is evidence that both issues have played a part in nations failing to improve normal weight maintenance and metabolic management for their populations.

How the ABO programme can make a difference

The WBOPPHO programme adopts a sympathetic approach to weight management that helps patients understand how our obesogenic society, via aggressive marketing, promotes the consumption of energy-dense food. Through the weight management programme, people are given planning advice so they can find time in their busy lives to overcome their obesogenic environment and regularly eat healthy and nutritious food.

The basis for the dietary advice provided by the ABO programme is evidence that populations that consume large quantities of unprocessed, high-nutrient foods have good metabolic health and central weight management.[5, 6] An important part of the programme is that health professionals acknowledge that people often find it difficult to choose to eat these high-nutrient foods as they prefer refined, energy-dense food.[7] Health professionals are encouraged to think of this preference for energy-dense food as a type of "addiction"; this approach highlights similarities with how smoking cessation is being managed in primary care.

Overcoming barriers to weight-loss interventions

A key part of the weight management programme is to help health professionals overcome barriers to discussing weight- or diet-related issues with patients.

These barriers include:

- Fear of offending patients
- Discomfort at bringing up the issue of weight if the health professional themselves is overweight
- Not being able to offer a service due to lack of knowledge

In order to provide a non-judgemental opportunity for people to discuss issues relating to weight or body shape, it is important that all patients, of any size, can be weighed and measured during the consultation. This may necessitate purchasing a new set of scales, particularly in communities with large numbers of Māori and Pacific peoples who have some of the highest rates of morbid obesity (BMI >40 kg/m^2) and super obesity (BMI >55 kg/m^2) in the world.[8]

Asking patients if they have any concerns about weight management

Health professionals can initiate discussions with patients about body weight or dietary patterns by asking one or two open-ended questions to identify if the patient has any concerns. For example, "*How do you feel about your body shape?*", or "*Are you happy with your diet or eating patterns at the moment?*" Patients who demonstrate a willingness to discuss body weight or diet-related issues should then be encouraged to do so using open, non-judgemental, reflective questions; the focus should be on making the patient feel heard.

Patients who are struggling with weight-related issues need to know that they are not alone, and that many other people are confronting the same problems. Talking about how society creates an obesogenic environment with prominent advertising and the ready availability of energy-dense food is likely to reduce any sense of isolation felt by these patients.

During the "Ask" phase of the intervention health professionals assess the patient's current consumption of plant based, nutrient dense foods, such as vegetables, fruit and nuts, using validated questions.

Giving brief advice

The main dietary advice provided by the intervention is to encourage people to increase their intake of fruit and vegetables (limiting high-starch vegetables such as potato). The goal is for these healthy forms of food to eventually replace "addictive" energy-dense foods. Calorie counting or weighing food is not part of the intervention as this may be perceived by the patient as being negative. A guiding, partnering approach is adopted in order to develop a management plan for the patient, as opposed to a "telling" approach.

A reduction in sedentary activities and an increase in the frequency and volume of physical activity is strongly recommended to all patients.

During the consultation an offer of annual weight, height, waist and hip measurements should be made, if these are not already being recorded. The patient is also offered routine blood tests, e.g. lipid profile, and then asked to return for a follow-up consultation to construct a plan for weight management and ongoing support.

Offering ongoing support or onward referral

Health professionals need to individualise weight-loss support according to patient requirements. For some patients dietary and exercise advice, along with a plan to maintain high levels of fruit and vegetable intake is sufficient. For other patients cognitive behavioural techniques are required to encourage patients to maintain healthy lifestyle changes.

Patients are contacted with reminders to attend quarterly follow-up consultations to encourage them to adhere to agreed behavioural changes.

Pharmacological assistance may be appropriate for some patients

Patients who are obese, i.e. a body mass index (BMI) > 30 kg/m^2, who are unable to achieve clinically significant weight-loss through diet and physical activity alone, may benefit from taking an anti-obesity medicine. None of these medications are currently funded in New Zealand.

Phentermine is a medicine that has not been extensively studied, despite it having a long history as an anti-obesity medicine. There have been concerns about the addictive potential of phentermine, as it is derived from an amphetamine base.[9] There have also been concerns raised about phentermine because of an association with other anti-obesity medicines that have been previously withdrawn from the market due to their potential for causing cardiovascular and psychological adverse effects.[9,10] Current anti-obesity medicine combinations, such as phentermine + topiramate or phentermine + lorcaserin, which are available overseas, continue to be widely studied and

research indicates that adverse effects due to phentermine are unlikely to be a problem short- or long-term in these medicine combinations.[11, 12, 13]

Orlistat, a lipase inhibitor that blocks intestinal fat absorption, can produce modest weight loss in patients who have a high-fat diet.

Metformin may be an appropriate medicine for people who are overweight and who also have raised HbA_{1c} levels. Metformin is thought to counteract central obesity by normalising metabolism and is recommended for use in the treatment of people with intermediate hyperglycaemia (HbA_{1c} 41 – 49 mmol/mol) in New Zealand,[14] however, it is not approved for use as an anti-obesity medicine.

For further information see: "Managing patients who are obese: a growing problem for primary care", Page 8.

Referral may be appropriate for patients with psychological issues

If a patient is suspected of having an obsessive-compulsive eating disorder (e.g. binge eating or bulimia), or delusional shape/weight thoughts (e.g. anorexia), they should be referred to a psychiatrist, psychologist or health professional with expertise in eating disorders. Fluoxetine is known to reduce binge eating, and is also associated with weight loss. Fluoxetine may be a treatment option for patients who are obese and who also have a mood disorder.[15, 16]

The support material provided with the weight management programme includes contact details of community and culturally appropriate health professionals who are able to provide assistance to patients with issues relating to the psychological, social, dietary and physical fitness requirements.

For further information or questions about the ABO programme, contact Dr Anne-Thea McGill: **at.mcgill@auckland.ac.nz**

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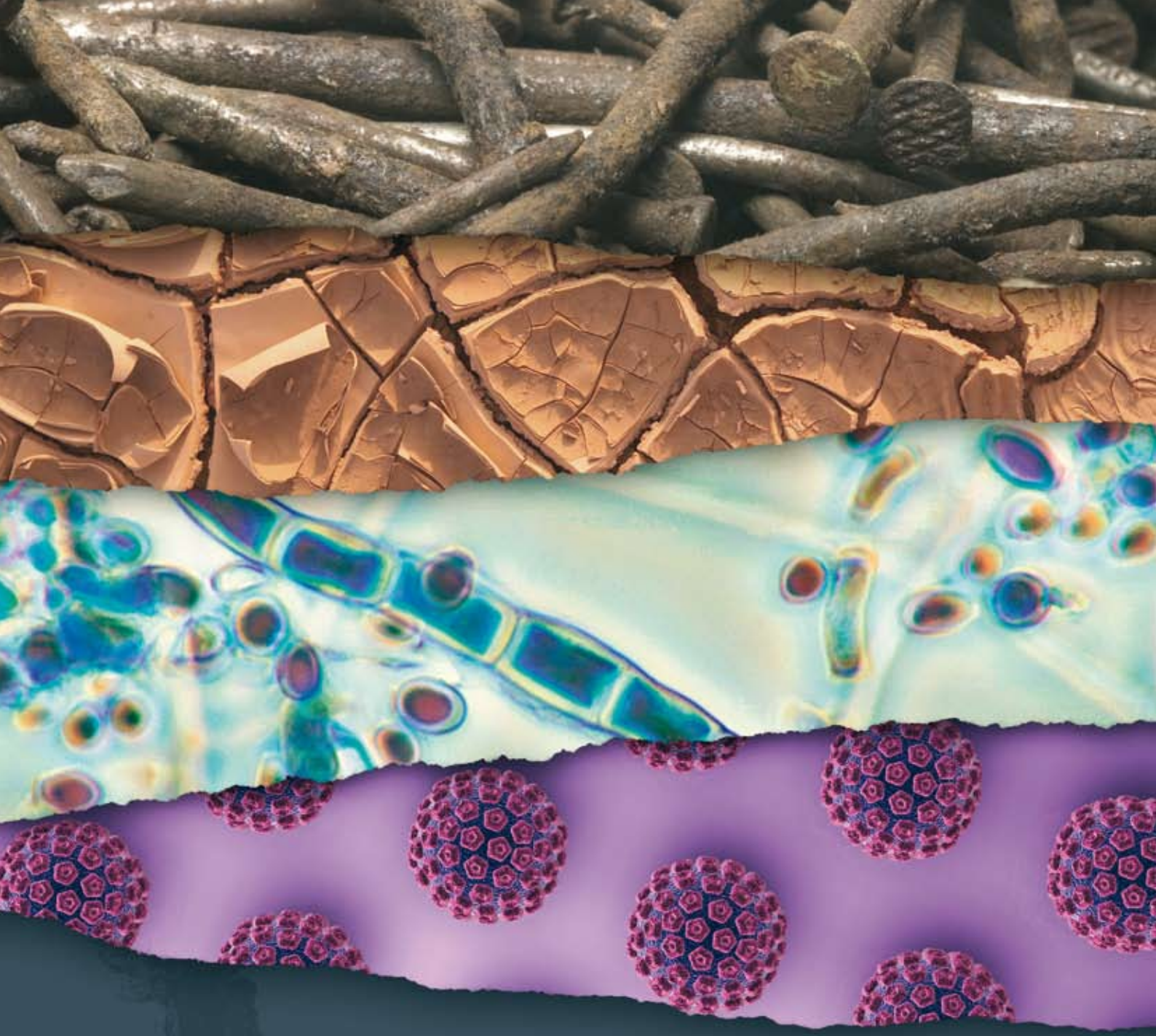


The Foot Series

Ingrown toenails: digging out the facts

Tinea pedis: not just the curse of the athlete

Cracked Heels: stop them in their tracks

Plantar warts: a persistently perplexing problem

Melanoma of the foot

Ingrown toenails: digging out the facts

The best method for treating patients with an ingrown toenail has long been debated. Non-surgical options are generally preferred for patients with mild-to-moderate symptoms, and surgical options preferred in patients with more severe symptoms. However, there is limited evidence available regarding the effectiveness of non-surgical treatments. Recent evidence suggests that some surgical techniques are associated with very low recurrence rates of the ingrown toenail, and therefore should be considered more often, despite being a more invasive treatment.

Ingrown toenails primarily affect younger males

Ingrown toenails, also known as onychocryptosis or unguis incarnates, are a painful condition due to the sides or corner of the toenail digging into the surrounding soft tissue. This results in a breach of the underlying skin and leads to pain, inflammation, formation of granulation tissue, and in some cases infection. The most commonly affected area is the lateral edge of the great (big) toe, although the medial edge and other toes can also be affected. Ingrown toenails most frequently occur in males aged 15–40 years.[1] It has been reported that approximately 20% of patients who present to their general practitioner with foot problems will have an ingrown toenail.[2]

The exact causes of ingrown toenails are still being debated

A number of intrinsic and extrinsic factors (see over page) have traditionally been linked with the development of ingrown toenails. However, there is a lack of quality evidence supporting a single mechanism and ingrown toenail development may be triggered by multiple factors. There is ongoing debate about whether factors relating to the nail itself are responsible for the condition or whether the size and shape of the surrounding periungual nail folds are the cause (Figure 1).[3]

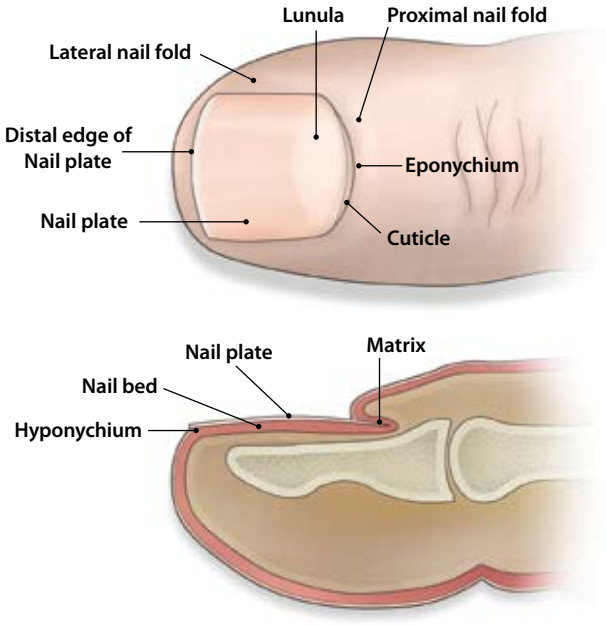


Figure 1: Structural anatomy of the toe and toenail

Factors traditionally associated with the development of ingrown toenails, and supported by varying degrees of evidence, include:[2,4]

- Inappropriate nail trimming which can cause the corner of the nail to dig in to the surrounding skin (see: "Toenail cutting –advice for patients", see opposite)
- Tight or narrow footwear which can compress the toes and result in changes in the shape of the toenail
- Hyperhidrosis and poor foot hygiene
- Onychomycosis (fungal nail infection)
- A family history of ingrown toenails
- Repetitive trauma, e.g. running, kicking or stubbing of the toe
- Abnormally shaped nail plates or nail folds
- Diabetes and obesity
- Thyroid, cardiac and renal disorders
- Some medicines, e.g. retinoids, oral antifungals, ciclosporin and docetaxel (an IV chemotherapy medicine)

Treatment of ingrown toenails includes non-surgical and surgical options

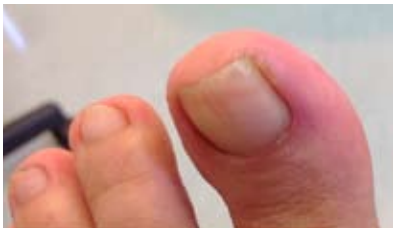
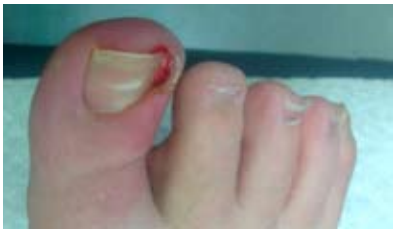
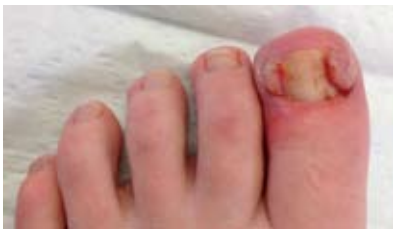
Patients with an ingrown toenail most frequently present with pain, redness and swelling, the severity of which depends on the stage of the ingrown toenail (Table 1) and whether any infection is present. Although clinical staging of an ingrown toenail is not always necessary, being aware of the different stages can help in selecting the most appropriate treatment.

Diagnostic tests are not usually required, but if a particular cause is suspected appropriate tests can be ordered, e.g. nail clippings and scrapings of subungual debris for fungal culture and microscopy.

When deciding on the most appropriate treatment method to manage a patient with an ingrown toenail a number of factors need to be taken into consideration, including:

- The severity of the pain and inflammation and if infection is present
- Whether the patient has previously presented with an ingrown toenail

Table 1: Stages of ingrown toenails (adapted from DermNet NZ, 2013)[4]

Stage		Clinical features
One (mild)		Erythema, mild oedema and pain (especially when pressure is applied to the lateral nail fold) with no pus or drainage
Two (moderate)		Increased erythema, oedema and pain which may be associated with white or yellow coloured pus or drainage from the area. Lateral nail-fold hypertrophy becomes apparent.
Three (severe)		Further increase in erythema, oedema and pain with formation of granulation tissue which can add to pus formation and more significant infection. Lateral nail-fold hypertrophy is more prominent.

Images kindly supplied by Dr Daniel Poratt

- What treatments have been previously tried and if the treatment was successful
- Patient preference and co-morbidities, e.g. some people may not like the cosmetic results of surgical options and people with certain co-morbidities, e.g. diabetes, may not be candidates for some surgical treatments

In general, conservative treatments can be trialled in patients with a first presentation of an ingrown toenail with mild symptoms, in those who do not want to have surgery and in those at an increased risk of surgical complications. Patients with more severe symptoms or with an ingrown toenail that has not responded to conservative treatment can be considered for surgical options.

A 2012 Cochrane review reported that surgical interventions are generally more effective in preventing recurrence of an ingrown toenail than non-surgical treatments.[5] However, the review did not define which stages of ingrown toenails were included in the trials and the results are likely to be more applicable for patients with a moderate-to-severe ingrown toenail.

Conservative options can be tried in patients with mild ingrown toenails

There are a number of general measures and conservative treatments that can be considered in patients with a mild ingrown toenail.

General measures: May not "cure" the ingrown toenail, but can provide symptomatic relief and prevent the ingrown toenail from becoming infected or progressing to the next stage. The following can be considered:[4]

- Gently lifting the nail and removing the spicule (small spike at outer margin of nail plate) that is digging in to the surrounding soft tissue (if the patient has not already tried this or has not performed the procedure effectively)
- Treating any underlying pathogenic factors, e.g. confirmed fungal infection, hyperhidrosis
- Applying silver nitrate to cauterise the granulation tissue and reduce the skin fold bulk. This can, however, be a slow process and it may be more effective to remove the granulation tissue later if surgery is undertaken.
- Cleaning the area with hydrogen peroxide or iodine solution to slow or stop the growth of micro-organisms
- Instructing the patient to gently massage the inflamed area at night

Toenail cutting – advice for patients

Inappropriate toenail trimming is associated with the formation of ingrown toenails and conventional advice to prevent this is for toenails to be cut straight across rather than curved.[5] However, this advice has been challenged more recently. A study that investigated two different surgical techniques in patients with an ingrown toenail reported that the toenail cutting method (straight vs. curved) was not a significant factor in ingrown toenail development.[6] The overall shape of the nail is determined by the growing area at the nail matrix.

Patients can be advised to:

- Cut their toenails either straight across or with a gentle curve, taking care not to cut too deeply down into the corners of the nail; podiatry grade clippers may be required to cut tough, thick nails
- Use a nail file to prevent jagged edges and create a smooth, rounded edge. A Black's file (a thin file designed to clear debris from the nail sulcus [gutter] and file the edge of the nail) can be recommended as the thin design helps to access difficult to reach areas, e.g. the spicule

Patients with mobility or flexibility problems or very thickened nails may need to be referred to a podiatrist for nail cutting.

- Educating the patient about wearing appropriate footwear that fits well and does not result in excessive bunching of the toes, e.g. wearing shoes with a wide toe box or open toe

People with a fungal toenail infection have an increased risk of developing an ingrown toenail as the fungal infection causes the toenail to become thickened. Patients often require treatment with an oral antifungal, e.g. terbinafine or itraconazole, or a topical antifungal, e.g. amorolfine or ciclopirox, in combination with the ingrown toenail treatment.

For further information, see "Management of fungal nail infections" BPJ 19 (Feb, 2009).

Antibiotics: The use of antibiotics in patients with an ingrown toenail appears to be primarily based on historical practice and there is limited clinical trial evidence supporting their routine use.[2, 7] Antibiotics may be considered when a patient presents with obvious signs of infection, e.g. erythema, pus and some evidence of extending cellulitis, especially if the infection extends beyond the nail fold. However, it can be difficult to differentiate between infection and non-infective inflammation. If it is decided that antibiotics are warranted, the antibiotic selected should have cover against *Staphylococcus aureus*, e.g. flucloxacillin, as this is the bacteria most commonly associated with nail fold infections.[2]

Antibiotics have also traditionally been prescribed to reduce any infection prior to surgery. However, it has been reported that once the ingrown part of the toenail has been surgically removed and chemical matricectomy with phenol performed, the localised infection/inflammation resolves without the need for antibiotics.[2] Antibiotics are also not routinely required when the surgical treatment targets the surrounding skin folds.[8]

Non-surgical treatment strategies

There are a number of non-surgical options available that target either the ingrown toenail itself or the surrounding nail folds. The aim of conservative treatment is to separate the ingrown part of the toenail from the surrounding nail fold. The cotton wick method is the most commonly performed of these methods in general practice.

The cotton wick (packing) method: Involves elevating the lateral edge of the toenail and inserting a small piece of cotton wick (which can be soaked in disinfectant or antiseptic) under the edge of the nail to prevent it digging in to the surrounding tissue (Figure 2).[4] The procedure can generally be performed without the use of a local anaesthetic. If necessary, silver nitrate can be used to cauterise any surrounding granulation tissue. Be aware that silver nitrate is corrosive and stains both the toenail and surrounding tissue black. Patients usually report immediate relief of pain after the procedure. The patient can be instructed to repeat the process once, or if necessary, twice daily, or if the cotton falls out. It is generally recommended that the cotton wick only remain in place for approximately one week as distal subungual onychomycosis can develop if the cotton wick is left in for a prolonged period.

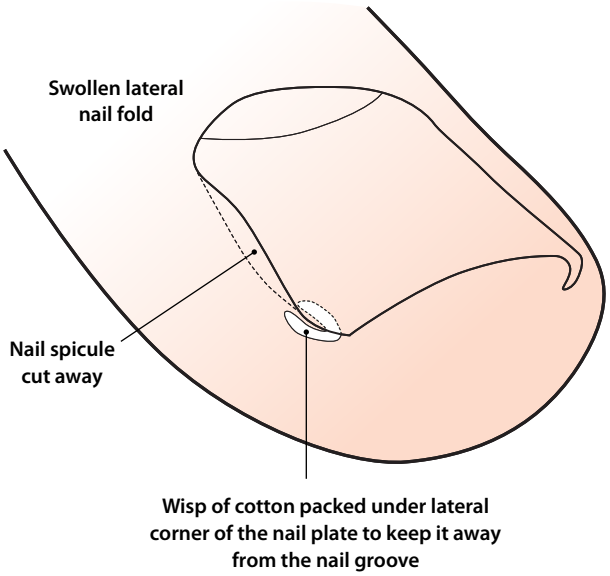


Figure 2: The cotton wick (packing) method

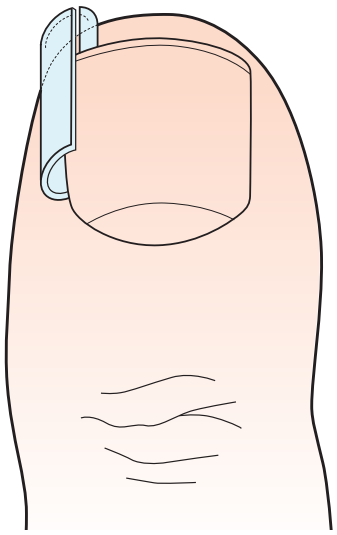


Figure 3: The gutter splint (sleeve) technique

Dental floss technique: This technique is similar to the cotton wick method except that a string of dental floss is used to separate the toenail and the nail bed rather than a cotton wick. The dental floss is inserted obliquely under the corner of the ingrown toenail and pushed proximally. The procedure is usually performed without a local anaesthetic. It has been reported that patients experience immediate relief of pain, followed by growing out of the spicule without injury to the nail fold.[9] The dental floss is usually left in place until the lateral anterior tip of the of the nail plate reaches the hyponychium (Figure 1).[9] The dental floss should be replaced if it becomes dirty or falls out before this occurs.

The gutter splint (sleeve) technique: A small sterile plastic tube, most commonly from an IV line, is split lengthways (with a diagonal cut on one end to aid smooth insertion) and inserted under the lateral edge of the nail (Figure 3). The nail corner and lateral edge of the nail is lifted and the "gutter" slid down so that it rests between the nail and the underlying soft tissue. A local anaesthetic is required when performing the procedure.[10] The gutter can be fixed in place with adhesive tape, sutures or an acrylic resin. The gutter splint can then be covered with an appropriate dressing to stop it catching on clothing and bed sheets. The length of time the gutter is left in place depends on the time required for the normal nail to grow over the tip of the toe and can range from two weeks to three months.[2] The technique has been reported to be highly effective – one study reported no recurrences in 62 patients who underwent the procedure.[10]

Taping method: This technique is the least invasive of all the conservative non-surgical treatments and uses an adhesive elastic tape, e.g. strapping tape (approximately 15 – 20 mm wide and 5 cm long), to pull the lateral nail fold away from the ingrown toenail (Figure 4).[7] One end of the elastic tape is placed against the ingrown nail alongside any granulation tissue (if present) and then wrapped around the toe so that the other end overlaps the first without covering the toenail.[11] The exact taping technique is crucial and patients will require specific instruction about how to perform it.[7] It is generally recommended that the affected toe is re-taped every three to seven days (or when the tape becomes ineffective) for at least two months.

Orthoyxia (brace technique): This technique uses a small metal brace to pull the edge of the ingrown toenail away from the underlying soft tissue, after removal of the spicule. However, these braces are not readily available in New Zealand. A study that investigated nail bracing in patients with an ingrown toenail reported that all 12 patients were pain-free after six to 10 months of treatment.[13]

Angle correction technique: This technique aims to correct the convex nature of the toenail by filing the entire surface of it with the intention of decreasing its thickness by 50–75%. The process is then repeated by the patient every two months making the nail thin and soft which reduces the pressure on the nail fold. A Blacks file (a specialised nail file – see "Toenail cutting", Page 27) can then be used to reshape the edge of the nail. Patients need to be educated about the importance of not removing too much of the toenail as this can result in pain when pressure is placed on the nail.

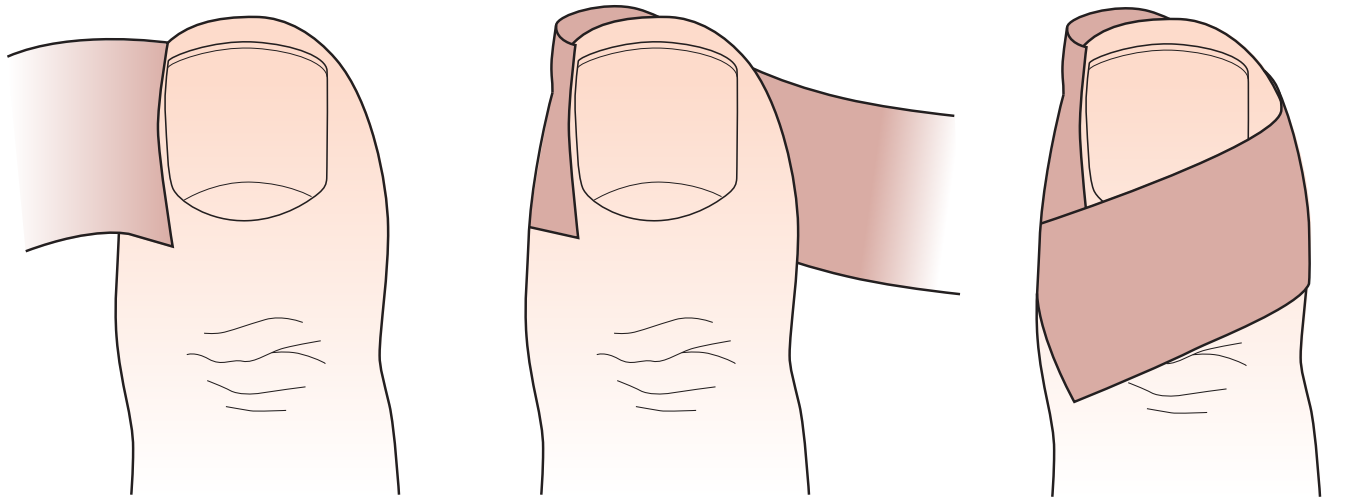


Figure 4: The taping method

Surgical treatment options: techniques target either the nail or the soft tissue

Most surgical techniques for correcting an ingrown toenail are variations of two different approaches which either target the nail plate itself or the lateral skin folds that surround the toenail. Surgical treatments have traditionally focused on the nail as the causative agent, and the most commonly performed procedure is the "wedge resection" technique that involves partial removal of the toenail with segmental phenol ablation (see below).[5]

Recent evidence suggests that a surgical technique that targets the nail folds and leaves the toenail intact (based on the "Vandenbos" technique, see opposite) should be considered more often, as very low recurrence rates have been reported.[8]

Surgical treatments that target the toenail

There are a number of different techniques that target the toenail. Most are variations of the widely used "wedge resection" technique which involves removal of the affected margin of the ingrown toenail. After avulsion of the affected portion of the toenail, destruction of the nail matrix prevents that part of the nail re-growing (therefore permanently reducing the width of the toenail). There are a number of methods used for destruction of the nail matrix including liquefied phenol (90%), sodium hydroxide (10 – 20%), surgical dissection, diathermy, electrocautery and carbon dioxide laser. Of these, phenol is the most commonly used and has been shown to be effective in preventing recurrence.[5]

Partial nail avulsion (wedge resection) with segmental phenol ablation

This procedure is performed under a partial ring block with 1% plain lidocaine injected at the base of the toe. As the major innervations to the nail plate are the plantar digital proper nerves, the majority of the local anaesthetic should be placed on the plantar aspect of the digit. A three-sided ring block is recommended as a four-sided block is associated with a risk of ischaemia.[14] A ring tourniquet is applied to the toe followed by longitudinal removal of the outer part (usually 3 – 5 mm) of the affected toenail, including the nail matrix. Segmental ablation of the exposed toenail matrix is then performed using liquefied phenol. There is some debate about the length of time that the phenol should be applied for, but two 60-second applications appears to be most widely used.[1] Other studies have reported that phenol only needs to be applied for 60 seconds in total, which can be split into three 20 second applications.[15] The applications should be separated by a washout with saline (alcohol is often used but is unnecessary) and this should be repeated after each application of phenol.[1] The area should be dried with a cotton wool swab prior to each application of the phenol to reduce the chance that the phenol will be diluted with blood or saline.

Postoperative care: The patient should be advised to keep their leg elevated for 24 – 48 hours while seated and avoid wearing a shoe on the affected foot for approximately three days. Antibiotics are not routinely required as it has been reported that postoperative antibiotic prophylaxis does not reduce the rate of postoperative infection or recurrence of the ingrown toenail.[5, 6] The patient can remove the dressing on the day after surgery and soak the affected foot in warm water containing Epsom salts, twice daily, for approximately one week. Table salt (one to three tablespoons per litre of water) can be used as an alternative to Epsom salts. Patients may require analgesia, e.g. paracetamol +/- codeine or ibuprofen, for two to three days. Follow-up check of the site at one week is recommended (Figure 5).

The recurrence rates following this procedure vary from 1 – 14%.[6, 7] A 2006 randomised study that compared partial nail avulsion with or without phenol ablation of the matrix reported that the one-year recurrence rates were significantly lower when phenol ablation was used (14% vs. 41%).[6]

This technique can be performed in patients with diabetes as it is not contraindicated in the presence of an impaired arterial blood supply.[7] The procedure can also be used safely in children (although it is rarely performed), usually after conservative treatments have failed.[7]

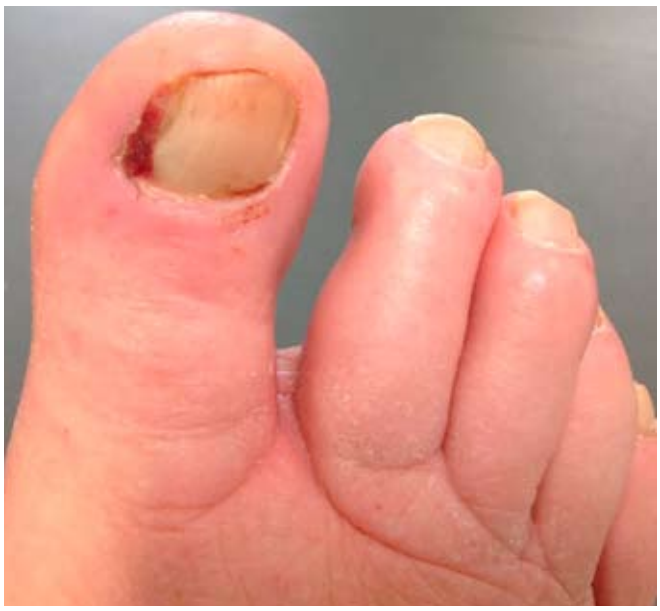


Figure 5: One week after partial nail avulsion and phenolisation
(Image supplied by Dr Daniel Poratt)

Longitudinal band method

This technique involves longitudinal removal of the middle 4 – 5 mm of the affected toenail as far back as the skin at the base of the toenail, i.e. the most distal portion of the nail and nail matrix are left intact. Although limited clinical trial data are available for this technique, the advantages appear to include low recurrence rates (approximately 2%) and minimal limitation of daily functioning.[16]

Total nail avulsion not recommended

Total removal of the nail without phenol ablation is not recommended because overall recurrence rates of approximately 70% have been reported in a number of studies.[8] Total removal of the nail with matricectomy is generally considered to be an obsolete technique.[7]

Surgical treatments that target the lateral nail fold

Surgical techniques that target the lateral periungal soft tissue nail fold were first described by Vandenbos and Bowers in the late 1950s.[17] Recent research suggests that the "Vandenbos" technique results in very low or "zero" recurrence rates (see below) and provides an alternative surgical option for ingrown toenails.[8, 18]

Excision of the nail fold (based on the Vandenbos technique)

This procedure involves extensive removal of the periungal nail fold while leaving the toenail itself intact. The procedure is performed under a three-sided ring block of the affected toe and involves making a large elliptical incision on each side of the nail and removing the relevant lateral skin folds. It is important that the excision is generous and adequate (leaving a soft tissue deficiency of approximately 1.5 × 3 cm). Light cauterisation with either silver nitrate or electrocautery is then performed and the wound is left to heal by secondary intention.[8] A gauze dressing should be applied.

Postoperative care: The patient should be instructed to remove the gauze dressing after 48 hours and to soak their feet in a warm water bath containing Epsom salts for 15 – 20 minutes.[18] Table salt (one to three tablespoons per litre of water) can be used as an alternative to Epsom salts. A new dressing can then be reapplied and the procedure repeated up to three times a day for the next four to six weeks, although patients are often not adherent with this.[8] Paracetamol +/- codeine or ibuprofen are usually sufficient for pain relief in the immediate postoperative period. Antibiotics are not routinely required.[18] Ideally, the patient should be followed-up after two weeks. The wound should be healed after four to six weeks with the nail sitting above the surrounding soft tissue.[18]

Two studies that examined the Vandenbos-based technique reported no recurrences of ingrown toenails after the procedure, no cases of osteomyelitis, and high rates of patient satisfaction due to good cosmetic results.[8, 18]

N.B. The Vandenbos technique is not recommended in patients with diabetes as poor blood supply can delay healing. Partial nail avulsion with phenol ablation is recommended in these patients.

Instructional videos for many of the surgical procedures for treating ingrown toenails can be found on YouTube.

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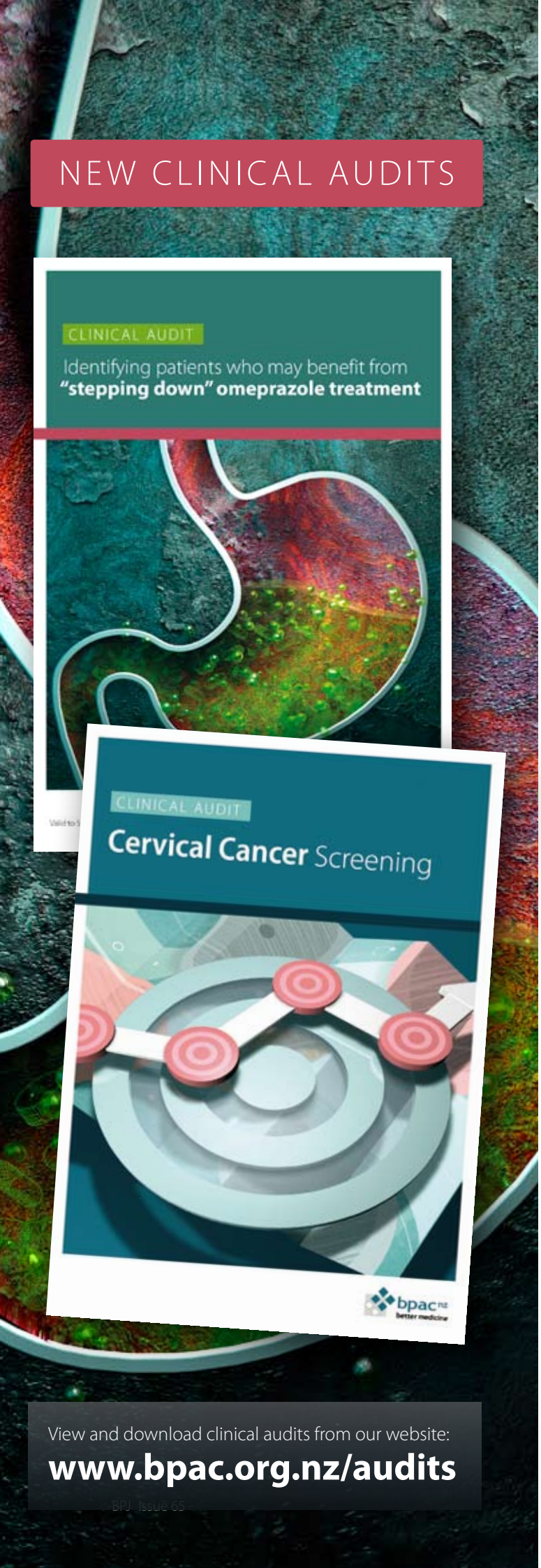

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Tinea pedis:
not just the curse of the athlete

Tinea pedis is a common fungal foot infection that is often associated with high rates of treatment failure or recurrence. This is often due to inadequate duration of antifungal treatment. In most cases, tinea pedis can be managed with topical antifungal treatment, however, oral antifungal treatment is sometimes required, e.g. in patients with more severe infections, including moccasin tinea pedis, those with fungal nail infections and those with repeated topical treatment failures.

Tinea pedis is a fungal infection that primarily affects the interdigital spaces and the plantar surface of the foot. It is estimated that approximately 70% of the population will be affected with tinea pedis at some point in their life.[1] The prevalence of tinea pedis is highest among people aged 31 – 60 years, and it is more common in males than in females.[1] Tinea pedis can be caused by a number of different dermatophyte fungi, including *Trichophyton rubrum*, *T. interdigitale* and *Epidermophyton floccosum*.[1]

The dermatophytes that cause tinea pedis grow best in a moist, damp environment. The fungal spores can survive for extended periods (months or even years) in bathrooms, changing rooms and around swimming pools.[2] Some practical advice that clinicians can give to patients to help reduce both the risk of contracting tinea pedis and re-infection includes:

- Wearing less occlusive shoes and changing shoes and socks on a daily basis, and if they become wet
- Thoroughly drying feet after showering or swimming
- Not sharing towels
- Wearing jandals in communal showers and changing rooms

People who are more at risk of tinea pedis include those who are immunocompromised, who sweat excessively (hyperhidrosis), and those who have poor peripheral circulation or diabetes.[2, 3]

Signs and symptoms vary according to the type of tinea pedis

Patients with tinea pedis typically present with itching, erythema and small blisters on one or both feet. Malodour is more likely to be due to bacterial infection. More specific signs and symptoms depend on the subtype of tinea pedis.

Interdigital tinea pedis (often referred to as athlete's foot) is the most common form and is predominantly caused by *T. rubrum*. It is characterised by macerated skin with fissures between the toes (usually between the fourth and fifth toes) and frequently erythema (Figures 1 and 2, over page).[1]

Moccasin (chronic hyperkeratotic) tinea pedis is also predominantly caused by *T. rubrum* and is associated with scaling plaques and mild erythema on the heels, soles and lateral aspects of one foot, or less often, both feet (Figure 3, over page). Skin markings appear exaggerated and white. The dorsal surface of the foot is usually clear.[1]

Inflammatory or vesicular tinea pedis is predominantly caused by *T. interdigitale* and is associated with clusters of vesicles and pustules on the instep or mid-anterior plantar surface.[1]

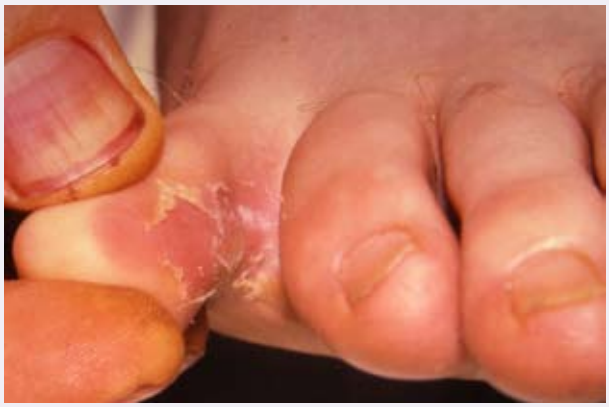

Figure 1: Interdigital tinea pedis showing macerated skin and erythema between the fourth and fifth toes (Image provided by DermNet NZ)

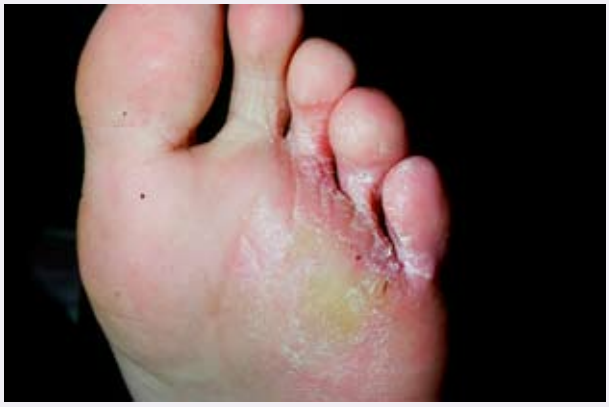

Figure 2: Interdigital tinea pedis showing scaled, peeling skin and extension on to the plantar surface of the foot (Image provided by DermNet NZ)

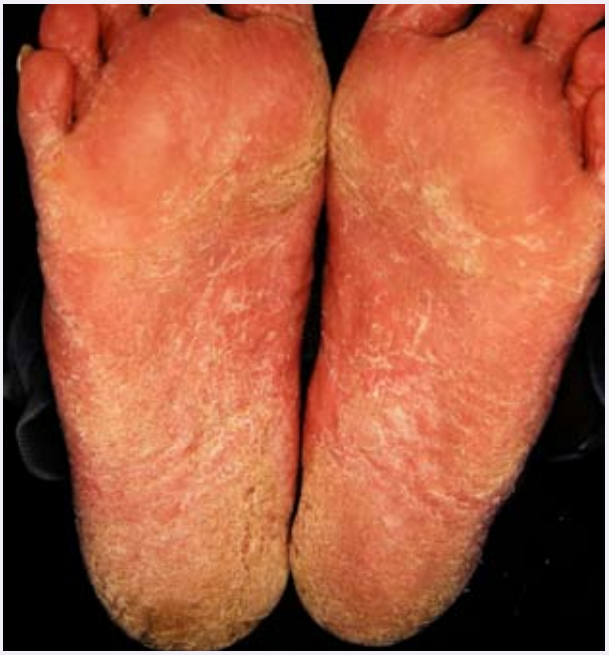

Figure 3: Moccasin tinea pedis showing dry, thickened skin covering the plantar surface with scaling and plaques (Image provided by DermNet NZ)

Ulcerative tinea pedis is predominantly caused by *T. interdigitale* and is associated with the rapid spread of vesiculopustular lesions, ulcers and erosions. The lesions are macerated with scaling borders and typically start in between the fourth and fifth toes before spreading to the lateral dorsal and plantar surfaces over a few days. The ulcerative form is often associated with secondary bacterial infection.[1]

Diagnosis and differential diagnosis – fungal cultures can be useful

The diagnosis of tinea pedis is usually based on the patient's symptoms and the clinical appearance. There are, however, a number of other conditions that should be considered when a patient presents with suspected tinea pedis, including:[1]

- Onychomycosis (fungal nail infection) – approximately one-third of patients with tinea pedis have a concomitant nail infection which can result in recurrent tinea pedis infections[1]
- Dermatophytide (ide or id) reaction – an allergic rash (secondary eczematisation) caused by an inflammatory fungal infection[4]
- Non-dermatophyte associated podopompholyx – a type of eczema which can affect the feet and may resemble a vesicular form of tinea pedis. It is more likely to be bilateral and symmetrical; mycology is negative.
- Palmoplantar pustulosis (see opposite) – typically characterised by scaly, partially or completely red, dry and thickened skin on the plantar surface of both feet, that is similar in appearance to psoriasis on other parts of the body.[5] Note that psoriatic nail dystrophy often closely resembles onychomycosis.
- Juvenile plantar dermatosis – characterised by dry, shiny, glazed skin on the sole of the foot due primarily to friction. It is most commonly seen in children who are atopic, particularly boys aged four to eight years.[6]
- Contact dermatitis – sweat, friction and home-remedies can cause irritant contact dermatitis; contact allergy may be due to accelerants (from rubber), chrome (leather tanning agent), glues and dyes in footwear
- Atopic dermatitis – usually diagnosed because of its presence on other body sites[7]
- Bacterial foot infections, e.g. pitted keratolysis (associated with very malodorous feet) and bacterial web infections secondary to tinea pedis infection

Skin scrapings for fungal microscopy should be undertaken

when initial topical treatment has been ineffective, whenever considering oral treatment, or in patients with an atypical presentation. Skin scrapings should be taken from the leading edge of the lesion using a blunt scalpel blade or curette. Nail clippings should be collected from abnormal toenails. If there is clinical evidence of a secondary bacterial infection, e.g. malodour or maceration, swabs for bacterial microscopy and culture should also be collected.

N.B. Potential bacterial infections include erythrasma which fluoresces coral pink under a Wood's lamp (this can be done in the surgery) and is not responsive to antifungal medicines.

For further information, see: "Collecting specimens for the investigation of fungal infections", Best Tests (Mar, 2011).

Treatment of tinea pedis: topical or oral

In general, patients with interdigital tinea pedis can be treated with a topical antifungal. Patients with moccasin, vesicular or ulcerative tinea pedis, or persistent tinea pedis may require oral antifungal treatment.[1]

Topical antifungals treatments – treatment duration is important

Topical miconazole, clotrimazole and terbinafine are used for the treatment of tinea pedis. Recurrence of tinea pedis after the use of a topical antifungal is common, and is often due to a patient discontinuing treatment shortly after the symptoms appear to have resolved.[1] It is therefore essential to educate the patient about the importance of applying the topical

Palmoplantar pustulosis (palmoplantar pustular psoriasis)

Palmoplantar pustolosis is a chronic, recurrent inflammatory condition that can be mistaken for a fungal foot infection. The exact cause of palmoplantar pustulosis is unknown. It is now regarded as distinct form of plaque psoriasis.[8] The disease is usually recalcitrant and affects one or both soles of the feet or palms of the hand. Patients typically have repeated eruptions of sterile pustules that are associated with scaly, thickened, red skin that often develops painful cracks (Figure 4). In patients with acute flares, the background skin is red and dotted with small yellow or darker-red blisters within the red patches. These lesions then dry and become scaly. Patients in the chronic stage of the disease often have dry, thickened skin and deep fissures.[9]

The diagnosis of palmoplantar pustulosis is usually based on symptoms and clinical appearance. A skin biopsy is sometimes used to confirm the diagnosis although this is rarely undertaken in general practice.[5] There are a number of conditions which have been reported to occur more frequently in people with palmoplantar pustulosis, including chronic plaque psoriasis (in 10 – 25%) and some autoimmune conditions, e.g. coeliac disease, type I diabetes and thyroid disorders.[5] The majority of people with palmoplantar pustulosis are current or ex-smokers (65 – 90%) and genetic factors, e.g. a family history and IL36RN gene mutation (not routinely tested for), have also been associated with the disease.[5] Palmoplantar pustulosis is more common in females than in males and is rare in children.[9]

Management of palmoplantar pustulosis can be challenging and no treatment is curative. A recent systematic review reported that intermittent ultrapotent topical corticosteroids, e.g. clobetasol propionate, topical psoralen with ultraviolet A photochemotherapy (PUVA), acitretin and ciclosporin, appear to be the most effective treatments for symptom control.[8] Referral to a dermatologist is generally recommended for patients with symptomatic palmoplantar pustolosis.

For further information, see: "The treatment of psoriasis in primary care" BPJ (Sep, 2009).

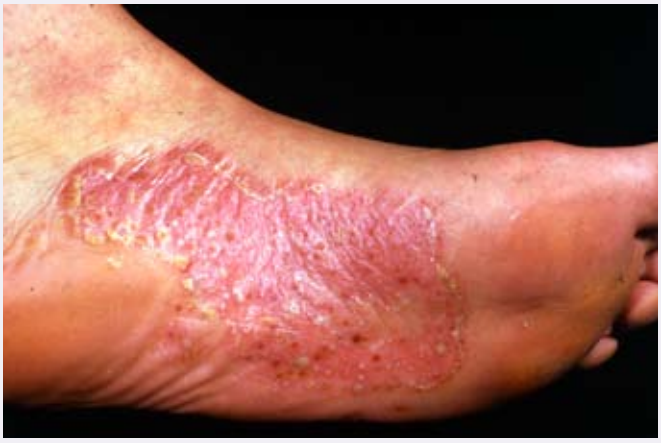

Figure 4: Palmoplantar pustulosis showing scaled, thickened skin and pustules (Image provided by DermNet NZ)

antifungal for the recommended full duration of treatment. Topical treatment should be applied to the affected area of skin, extending on to several centimetres of the surrounding normal skin.[10]

Azole antifungals

Topical azole antifungals are effective for the treatment of patients with tinea pedis infections, when used for the recommended duration, and there appears to be little difference between the individual azole medicines.[11] Therefore, the decision whether to prescribe a patient miconazole or clotrimazole is at the discretion of the clinician, as both miconazole and clotrimazole creams are fully subsidised on the Pharmaceutical schedule.[12]

Miconazole cream 2% (fully subsidised): The patient should be advised to apply a thin layer of cream, twice daily and c**ontinue treatment for ten days after symptoms have resolved**.[12] Miconazole also comes in a range of other non-subsidised formulations, including powder, solution, spray, lotion and tincture (partially subsidised).

Clotrimazole cream 1% (fully subsidised): The patient should be advised to apply a thin layer of the cream, twice or three times daily and **continue treatment for two weeks after symptoms have resolved**.[12] Clotrimazole also comes in a 1% solution which is partially subsidised.[12]

Miconazole 2% + hydrocortisone 1% (fully subsidised) combination products are also available. There is no conclusive evidence that patients with tinea will benefit from combination treatment, particularly as they will need to be switched to a miconazole-only cream,[13] but this product may be considered when inflammatory symptoms are predominant.[12] The patient should be advised to apply a thin layer of the cream, twice daily, until the inflammatory symptoms have disappeared or **for a maximum of two weeks**.[12]

When the miconazole + hydrocortisone treatment is discontinued, the patient will need to be switched to a miconazole-only cream which should be **continued for at least 10 days** after the symptoms have resolved.[12]

Topical miconazole and clotrimazole are generally well tolerated. Adverse events are relatively rare and are usually related to localised skin reactions, e.g. irritation and hypersensitivity reactions.[12]

Other topical azole treatments available in New Zealand include a econazole 1% cream and solution (partly subsidised) and a ketoconazole 2% cream (not subsidised).[12]

Topical allylamine antifungals (terbinafine)

Topical terbinafine is not subsidised on the Pharmaceutical Schedule, but is available to purchase over-the-counter as a cream, gel, solution and spray. Terbinafine should usually be applied **once daily, for one week**. It can be repeated as necessary.[12]

Allylamine antifungals such as terbinafine are reported to be generally more effective than azole antifungals, e.g. miconazole and clotrimazole, in patients with fungal infections of the foot.[11] This is because terbinafine has a fungicidal action, i.e. destroys the fungal cell, in contrast with the azole antifungals which are fungistatic, i.e. inhibit fungal growth.[14]

Topical terbinafine is generally well tolerated; adverse effects include local irritation and hypersensitivity reactions.[12]

When to consider an oral antifungal treatment

Although most people with a localised tinea pedis infection can be successfully treated with a topical antifungal medicine, some patients may require an oral antifungal medicine, including:

- Patients with a more treatment-resistant subtype of tinea pedis, e.g. moccasin, vesicular or ulcerative
- Patients with interdigital tinea pedis that is severe and involves multiple interdigital spaces or has spread to the plantar aspect of the foot
- Patients with a co-existing fungal nail infection
- If topical treatment has been unsuccessful

If oral treatment is required, the two recommended oral antifungal treatment options are terbinafine or itraconazole.[2] Both treatments are fully subsidised on the Pharmaceutical Schedule, but itraconazole requires endorsement by a specialist.[12]

Terbinafine is the first-line oral treatment for tinea pedis

Terbinafine is generally used first-line for patients with tinea pedis when oral treatment is required, as it has been reported to be more effective than itraconazole and has less potential for medicine interactions.[14]

In adults with tinea pedis, the recommended oral treatment regimen is terbinafine 250 mg, once daily, for two to six weeks.[12] If oral treatment is required for a patient with tinea pedis complicated by a fungal nail infection, it will need to be continued for at least three months.[12]

Terbinafine is associated with some potentially serious adverse effects, although these are uncommon.[15] Patients taking oral

terbinafine may experience gastrointestinal disturbance (e.g. nausea, dyspepsia and diarrhoea), allergic skin reactions (e.g. urticaria), dysgeusia (unpleasant sense of taste), headache and joint and muscle pain.[16] Serious adverse can include Stevens-Johnson syndrome, toxic epidermal necrolysis, liver dysfunction and reduced neutrophil count. The rates of terbinafine discontinuation due to adverse events are relatively low (approximately 3 – 4%).[15]

Terbinafine is not recommended in people with liver disease.[12] For all patients, liver function tests (LFTs) should ideally be performed prior to initiation of terbinafine and then performed every four to six weeks during treatment.[12] Terbinafine should be discontinued if any significant abnormalities in LFTs are observed or if the patient reports any symptoms that suggest liver damage, e.g. anorexia, nausea, vomiting, fatigue, or dark urine. Adverse hepatic effects may not arise until after the discontinuation of terbinafine treatment. Treatment discontinuation due to increases in the liver transaminase levels are reported to be <1%.[15]

Terbinafine may be used at a halved dose in patients with renal impairment (eGFR of less than 50 mL/min1.73 m^2), if there is no suitable alternative treatment.

A patient information brochure on terbinafine is available from: **www.saferx.co.nz/terbinafine-patient-guide.pdf**

Itraconazole – avoid in heart failure and be aware of potential drug interactions

Itraconazole requires specialist endorsement for subsidy, and should be considered as the second-line oral treatment in patients with tinea pedis. The recommended dosing regimen for patients aged over 12 years is either 100 mg, once daily, for 30 days or 200 mg, once daily, for seven days.[12] Absorption of itraconazole capsules is improved if it is taken with a full meal or an acidic drink such as fruit juice.[12]

Although no head-to-head randomised trials comparing the two regimens have been performed, the 100 mg/day itraconazole regimen may be preferred due to a more favourable adverse event profile. Adverse events resulting in treatment discontinuation have been reported to occur more frequently in patients receiving 200 mg/day of itraconazole (4%) compared with those receiving 100 mg/day of itraconazole (2%).[15] Treatment discontinuations due to increases in transaminase elevations are relatively low (<1%), but are also more common in patients taking 200 mg/day than in patients receiving 100 mg/day.[15]

Itraconazole is also associated with gastrointestinal adverse effects (e.g. nausea, vomiting, diarrhoea and abdominal pain), blood pressure changes, skin rashes and rarely changes in liver enzyme levels. Other less common adverse events include pancreatitis, heart failure and leucopenia.[12] Itraconazole should only be used in people with liver dysfunction if the benefits outweigh the risk of hepatotoxicity.[12] LFTs should be requested if the itraconazole treatment duration is longer than one month.[12] Treatment should be discontinued if significant abnormalities in LFTs are observed or if the patient reports any symptoms that suggest liver damage, e.g. anorexia, nausea, vomiting or fatigue.[12]

Itraconazole should not be used in people with ventricular dysfunction or in people with a history of heart failure.[12] Caution is advised in people with an increased risk of heart failure, e.g. older people, those with cardiac disorders, or those receiving negative inotropic medicines, e.g. calcium channel blockers, beta blockers or antiarrhythmics. Itraconazole is an inhibitor of the CYP3A4 enzyme and therefore should be avoided or used with caution in patients who are receiving medicines which also inhibit or are metabolised by this enzyme, e.g. simvastatin, atorvastatin, ticagrelor, felodipine and quetiapine. Itraconazole can also increase the risk of bleeding in a patient taking warfarin, so dose reduction and more frequent INR monitoring may be necessary.[17]

Complications and follow-up

Patients should be advised to return for assessment if the initial treatment is unsuccessful or if they have frequent recurrences of tinea pedis. If this occurs, take a skin scraping for a fungal culture (even if one was done at the initial consultation) to confirm that the patient has tinea pedis. Check compliance with the treatment regimen. It may also be necessary to investigate whether other members of the household have untreated tinea pedis, as this can result in re-infection from shared use of a bathroom or towels.

Complications from tinea pedis can include secondary bacterial infections; it is a common predisposing cause in cellulitis. Patients with recurrent cellulitis of the lower leg should be examined for evidence of tinea pedis. Patients undergoing CABG with vein grafts from the legs should also be assessed for tinea pedis and treated prior to surgery to help prevent postoperative infection in the leg the vein was harvested from.

Majocchi granuloma is a rare complication of tinea pedis. It is a persistent, suppurative folliculitis, usually on the lower leg, caused by a dermatophyte infection. Patients generally require treatment with an oral antifungal medicine.[18]

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Cracked Heels: stop them in their tracks

Cracked heels are most often caused by a lack of moisture in the skin. Fissures generally occur on the back of the heel and usually affect both feet. For most people cracked heels are a cosmetic problem only, however, fissures can become problematic if they deepen and cause pain, and in some cases infection will develop. Topical products, e.g. urea-based creams, are used to both prevent and treat cracked heels.

Cracked heels generally occur as a result of dry skin on the feet. This is often accompanied by hyperkeratosis (thickened skin) and callus formation around the edges of the heel, which is yellow or dark brown in colour.[1] When weight is applied to the fat pad in the heel, it expands sideways and creates fissures in the skin, which has become less elastic and more prone to cracking due to decreased moisture. Initially, small fissures can appear over the surface of the heel or callus and these may become larger and deeper resulting in pain and bleeding. Pain is typically worse on weightbearing and alleviated by rest. People with larger, deeper heel fissures have an increased risk of infection which may progress to cellulitis and ulceration, especially in those with additional risk factors such as diabetes.[1]

Risk factors include dry skin and systemic conditions

There are a number of predisposing factors which make heel fissures more likely to occur. These include the presence of abnormally dry skin, corns or calluses, prolonged standing (especially on hard surfaces), excess body weight, going barefoot or regularly wearing sandals or open-backed shoes.[1]

Underlying systemic conditions can also be associated with the development of cracked heels, and include:[1]

1. Atopic dermatitis – a family history of asthma, eczema or allergic rhinitis can be particularly useful in diagnosing atopic dermatitis (especially in infants)
2. Juvenile plantar dermatosis – characterised by dry, shiny, glazed skin on the sole of the foot due primarily to friction. It is most commonly seen in children who are atopic, particularly boys aged four to eight years.[2]
3. Psoriasis, particularly palmoplantar psoriasis – tends to be a chronic, recurrent condition
4. Other forms of palmoplantar keratoderma – which can either be hereditary or acquired and described as localised or diffuse thickening of the skin on the palms and soles
5. Any systemic condition that can cause dry skin, e.g. hypothyroidism or diabetes

Topical treatments can be used for both prevention and management

Preventing and treating dry skin to avoid cracked heels is preferable, but patients usually present for treatment after heel fissures have developed. There are a wide range of emollients available that can be used to both prevent and treat dry skin and cracked heels. Formulations that have water-retaining (humectant) and keratolytic properties are the most effective.[1]

Urea-based products: The most commonly used product is 10% urea cream. It is fully subsidised on the Pharmaceutical Schedule (as HealthE cream) and also available for general sale (Nutraplus, Aquacare).[3] A 10% urea + 5% lactic acid cream

(Calmurid – general sale) can also be considered. For people with severe fissures it may be necessary to use a product with a higher urea content, e.g. Eulactol 25% (fully subsidised) or Neat Feet Heel Balm 26% (general sale – other similar products are also available).[4] It has been reported that a 25% urea cream improves pain, dryness, appearance of the skin, skin scaling and desquamation scores after four weeks in patients with heel fissures.[5]

N.B. Urea products can cause discomfort and stinging when applied to broken skin if the dermal layer is exposed.

Salicylic acid-based products: Salicylic acid is keratolytic (skin exfoliant) and has been shown to reduce hyperkeratosis, fissures and pain when applied to heels as a 6% cream.[6] There is a wide range of proprietary "cracked heel" products that contain salicylic acid available for purchase in New Zealand, usually together with urea. Salicylic acid is subsidised if prescribed in a dermatological base, e.g. white soft paraffin, urea cream 10% (HealthE cream). The salicylic acid product should be applied to the thickened, dry heel skin; it may cause a stinging sensation if applied to fissures or other broken skin if the dermal layer is exposed.

Alpha-hydroxy acids: Are a group of organic carboxylic compounds found in milk, fruit, sugar cane and other natural products, and include glycolic, citric and lactic acids. These compounds are found in a number of general sale products, e.g. QV Feet Heel Balm, and help exfoliate the skin and reduce keratinisation.

Saccharide isomerate: This compound is also known as pentavitin. It is a key ingredient of Ellgy Heel Balm which is available for purchase at pharmacies. Pentavitin is a moisturising agent which contains natural carbohydrates found in the stratum corneum. It is not easily washed off and results in long-lasting moisturisation.

Other treatment options

Topical creams and balms are sometimes insufficient in patients with deeply cracked heels and other treatment options may be required, along with referral to a podiatrist for severe cases. Some options that can be suggested to patients include:[1]

1. Using a pumice stone to debride the hard, thickened skin (after softening it with a keratolytic emollient). Electronic machines for removing scaled skin are also available. In severe cases, it may be necessary for the clinician to debride the skin using a scalpel or razor blade. Patients should be advised against using a blade at home as there is a risk of injury, which can result in infection.
2. Treating the fissures with a liquid, gel or spray bandage or tissue glue, e.g. cyanoacrylate liquid skin protectant. This has been shown to reduce pain and aid healing.[7]
3. Applying adhesive tape to close over the fissure and support the underlying tissue
4. Using an orthotic device, e.g. insoles, heel pads, along with appropriate enclosed footwear to redistribute bodyweight and provide more support for the heel

Complications

Most patients with cracked heels will be successfully treated with the methods listed above. In some patients, especially those with deeper, larger heel fissures, infection can develop which may be localised or result in cellulitis. If cellulitis occurs, management includes debridement of dead tissue, elevation of the feet and oral antibiotic treatment, e.g. flucloxacillin. People with diabetes are more prone to infection and if they have neuropathy or impaired vascular supply, heel fissures can result in a foot ulcer.

There are many "home remedies" and alternative treatments that people may try to treat dry skin on the feet and to heal fissures. Ask the patient if they are using any other treatments in addition to standard care, and ensure that the treatments are not causing harm, e.g. home remedies that dry, rather than hydrate, the skin or cause skin damage.

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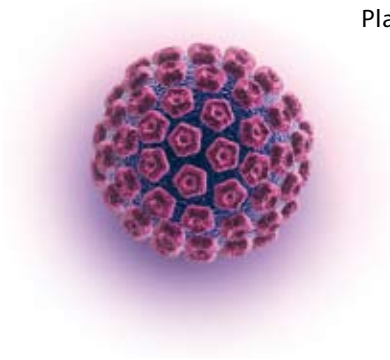
Plantar warts: a persistently perplexing problem

Plantar warts, also known as plantar verrucae, are manifestations of infection with human papillomavirus. They can be painful due to their position on weight-bearing skin and in some patients may cause embarrassment due to their cosmetic appearance. Plantar warts often spontaneously resolve so conservative management is an option, particularly as some warts are resistant to multiple treatments. Although cryotherapy using liquid nitrogen is a conventional treatment for warts, there is limited evidence that this is an effective management method. Topical treatments for warts have variable success rates, however, wart paints and gels containing salicylic acid show good evidence of efficacy. Melanoma is a rare but important differential diagnosis.

Plantar warts are caused by cutaneous infection with the human papillomavirus (HPV). There are numerous types of HPV which manifest in different ways. Plantar warts are generally caused by HPV-1, 4, 27 and 57 (see: "HPV vaccine", Page 44).[1] There is limited high-quality epidemiological data on the prevalence of plantar warts. However, they generally occur with the greatest frequency in children and adolescents.[1] Although plantar warts are not usually associated with serious clinical consequences, they can cause stress or embarrassment, which should not be underestimated. Plantar warts are also often painful when present on weight-bearing areas of the foot or when they rub against footwear.



Plantar warts are almost always benign, however, in rare cases (and particularly in people who are immunosupressed), warts of prolonged duration have been reported to undergo malignant transformation to squamous cell carcinoma or plantar verrucous carcinoma.[2, 3, 4]

Diagnosis is based on clinical appearance

Plantar warts can be confused with corns or calluses. The use of a hand-held dermatoscope can assist in diagnosis for practitioners trained in its use. Warts are characterised by hyperkeratosis or thickening of the skin, and are often found on pressure points. Small dots or lines are usually visible inside the lesion, which represent broken capillaries and can range from red to brown in colour.[5] They are more clearly shown by dermatoscopy, where red/purple dots or clods (blood vessels) are surrounded by white circles or lobules (keratin). The blood vessels may become more obvious if the outer layers of hyperkeratotic tissue are trimmed off. In contrast, corns exhibit a translucent core (concentric fine white rings on dermatoscopy), while calluses show a generalised opacity across the lesion (structureless on dermatoscopy).[5] Multiple adjacent verrucae may form mosaic warts.

Although rare, the most important differential diagnosis in a patient with a suspected plantar wart is melanoma. Other tumours may also rarely occur in this site (see: "Melanoma of the foot", Page 45).

Prevention of transmission

HPV is transmitted by skin contact or contact with surfaces touched by other people with the virus. HPV can be present for weeks or years before the appearance of a wart, and persists for life, even after the wart has resolved. This may lead to recurrence at the same site, e.g. if a person who is carrying the virus becomes immunosuppressed; plantar warts are very prevalent in organ transplant recipients.

People with plantar warts can auto-inoculate HPV and spread infection to other parts of the body. For example, picking at warts with fingernails may result in transference of infection to the hands. Abrasive implements used to remove thickened wart skin, and clinical implements such as dermatoscopes, have been shown to retain detectable HPV DNA.[6, 7] Whether this contamination represents transmissible virus is uncertain, but as a precautionary measure any implements used on the wart should be sterilised or discarded after use.

Children frequently acquire warts from infected family members or in a classroom environment, therefore, prevention efforts need to focus on the both the home and school.[8, 9] Going barefoot in public spaces, around swimming pools or in shared bathroom areas increases a person's risk of HPV infection. People already infected with plantar warts should be advised to take precautions to reduce transmission to others, such as wearing footwear in the home and school environments and covering warts with tape before using communal areas.

Treatment of plantar warts

Up to 80% of people will experience resolution of plantar warts without intervention within two years.[10] Many patients will, however, wish to attempt treatment. All topical treatments for warts have variable success rates, therefore several different management methods may need to be trialled before the wart is resolved. Wart paints and gels containing salicylic acid show good evidence of efficacy, and can be recommended as a starting point for patients who wish to trial a treatment.

Watch and wait

It is estimated that cure rates of plantar warts with a watch and wait approach are likely to be in the range of 25% over a period of a few months.[11] Eventually, most warts will resolve without treatment, but this may take several years.

If the wart is causing discomfort, the wart surface can be abraded with an emery board (disposable nail file), pumice stone or a similarly abrasive surface. Patients should be advised that items used on the wart should be discarded after use or sterilised (e.g. placed in boiling water for five minutes or soaked in bleach) to reduce the risk of viral transmission. The lesion can also be debulked to improve absorption of creams or ointments into the underlying infected tissue, if pharmacological treatment is trialled.

Topical creams and ointments

Most topical treatments for plantar warts are recommended as a daily application until the wart has resolved. There are no specific guidelines for when treatment efficacy should be reviewed or when to switch to an alternative treatment.

Salicylic acid

Topical treatment with salicylic acid is often regarded as a first-line approach to treating plantar warts. Salicylic acid is a keratolytic agent and works by debriding the skin. Salicylic acid 27% gel (general sale) should be carefully applied to the wart, once daily. The surrounding skin should be protected, e.g. with soft paraffin or a specially designed plaster. The wart should be gently abraded with an emery board or pumice stone once a week. Treatment may need to be continued for up to three months.[12] A Cochrane systematic review of the treatment of warts included two studies assessing the efficacy of salicylic acid for plantar warts, and found a 29% increase in cure rate with salicylic acid over placebo after 12 to 13 weeks.[13]

Topical salicylic acid may cause irritation if applied to fissures or abrasions. Caution is recommended in patients with reduced skin sensation (e.g. patients with diabetes) as over-application may cause skin ulceration.[12]

Silver nitrate

Silver nitrate (general sale) is available in the form of a stick which is moistened (ideally with distilled water rather than tap water) and applied directly to the wart for one to two minutes.[14] Treatment should be applied once daily for a maximum of six applications.[14] The surrounding skin should be protected. The efficacy of silver nitrate treatment has only been assessed in one randomised controlled trial where patients using silver nitrate showed complete cure rates approximately 30% higher than patients using placebo applications.[13] Adverse effects include stains on surrounding skin, or clothing coming into contact with the application area, as well as the possibility of chemical burns.[12]

Fluorouracil (5-FU)

Fluorouracil is a chemotherapeutic agent used in the treatment of various cancers. Topical fluorouracil is indicated for malignant and pre-malignant skin lesions. The use of fluorouracil cream for plantar warts is an off-label indication.

After debridement with a pumice stone, patients can be instructed to apply fluorouracil 5% cream (prescription only, subsidised) to the lesion, twice daily.[15] The wart should be covered with an occlusive dressing after each application of fluorouracil with treatment continued for up to 12 weeks.[15] Complete eradication rates as high as 95% have been reported after 12 weeks of treatment with fluorouracil 5% cream.[15] Patients may experience pain, blistering and local irritation. When used close to the nail, fluorouracil can cause nail detachment.[13]

Other treatments for plantar warts have limited evidence of effectiveness

Imiquimod and podophyllotoxin

These two medicines are not indicated for the treatment of cutaneous warts. While they should theoretically be useful given their indication for the treatment of anogenital warts, there is little evidence at present to support their use for plantar warts.

Imiquimod 5% cream has been assessed in two randomised controlled trials for the treatment of cutaneous warts, conducted by the manufacturer, which suggested some benefit but this indication has not been pursued further.[13] Inefficacy may be due to poor penetration of imiquimod through the hyperkeratotic skin.

Podophyllotoxin, the major active ingredient of podophyllum, has not been assessed in randomised controlled trials for the treatment of cutaneous warts.[13] In the past, patients may have used a product marketed for plantar warts which contained podophyllum resin 20% and salicylic acid 25% (posalfilin ointment), but this is no longer available in New Zealand. Podophyllum can cause painful necrosis, particularly of normal skin adjacent to the wart, and is contraindicated in pregnant women and young children.[12]

Topical zinc cream

The application of zinc to a wart is thought to augment immune function and/or assist in skin repair. Topical zinc cream for the treatment of cutaneous warts has been assessed in two studies, which suggest it is superior to placebo treatment and comparable to salicylic acid in efficacy.[13] However, one of these studies used zinc sulphate which is not available as a topical product in New Zealand.

A zinc oxide barrier cream 15 – 40% (general sale) may be trialled to treat a plantar wart, but there is limited evidence of effectiveness.

Occlusive treatments

Covering a wart with adhesive tape or plaster has been anecdotally reported as a cure. Three clinical trials have assessed its efficacy versus either cryotherapy as a comparison treatment, or a corn pad or moleskin wrap as a dummy placebo treatment.[13] Although the first of these studies showed that duct tape was superior to cryotherapy, the two studies where duct tape was compared to a corn pad or moleskin wrap found no statistically significant differences between treatments. Available evidence does not support the notion that applying tape to a wart results in increased cure rates.

Cryotherapy

Cryotherapy has traditionally been used for plantar warts. However, clinical trials report low rates of cure and it results in significant pain and blistering, reducing mobility for up to several weeks. A meta-analysis of trials of cryotherapy (with liquid nitrogen or any other substance which induces cold damage to warts, e.g. dimethyl ether and propane [DMEP]) showed that freezing of cutaneous warts located on the hands or feet was no better than placebo.[13] Studies of combination treatment of cryotherapy with additional topical salicylic acid application do not support the idea that this treatment is better than salicylic acid alone.[13] Cryotherapy for plantar warts is therefore a non-evidence based intervention, associated with significant morbidity.

N.B. Cryotherapy is less effective for treating plantar warts due to the thickness of the stratum corneum in this area. It may be more effective for treating warts in other body sites, e.g. anogenital warts.

Hyperthermia

Raising skin temperature is thought to promote apoptosis (programmed cell death) and subsequently bring about an influx of inflammatory and immune cells. In the context of wart treatment, these effects could theoretically improve HPV clearance. However, given the specialised devices required (e.g. exothermic skin patches, radiofrequency heating apparatus' or infrared lasers) and the potential for burns with misapplication, the use of hyperthermia to treat plantar warts has limited application in a general practice setting.

Surgical removal of warts

For some patients, plantar warts will persist despite multiple treatment approaches. Surgical removal of the wart may be considered as a treatment of last resort. However, in many cases, surgery may also prove unsuccessful. Therefore, the alternative option of ceasing active treatment of the wart can be discussed with the patient.

A plantar wart can be removed under local anaesthetic by shave, curette and electrosurgery, laser ablation or full-thickness excision. Since plantar warts often arise on load-bearing tissue, the need to keep weight off the area of excision following the procedure may cause reduced mobility and interference with daily living or work commitments. Adverse effects are those expected from any minor surgery, including the risk of infection and post-procedural pain and scarring.

There is little data available on the success rates of surgical approaches to plantar wart treatment.

HPV vaccination

The quadrivalent HPV vaccine funded in New Zealand, Gardasil, protects against cervical cancer and genital warts, and targets HPV-6, 11, 16, and 18. It is therefore not active against the HPV variants that are most commonly implicated in plantar warts (HPV-1, 4, 27 and 57). However, there are some case reports where patients with recalcitrant plantar warts have been successfully treated after the administration of quadrivalent HPV vaccine.[16, 17] These cases suggest that the vaccine induced a broader immune response. This approach has not been assessed in randomised controlled trials.

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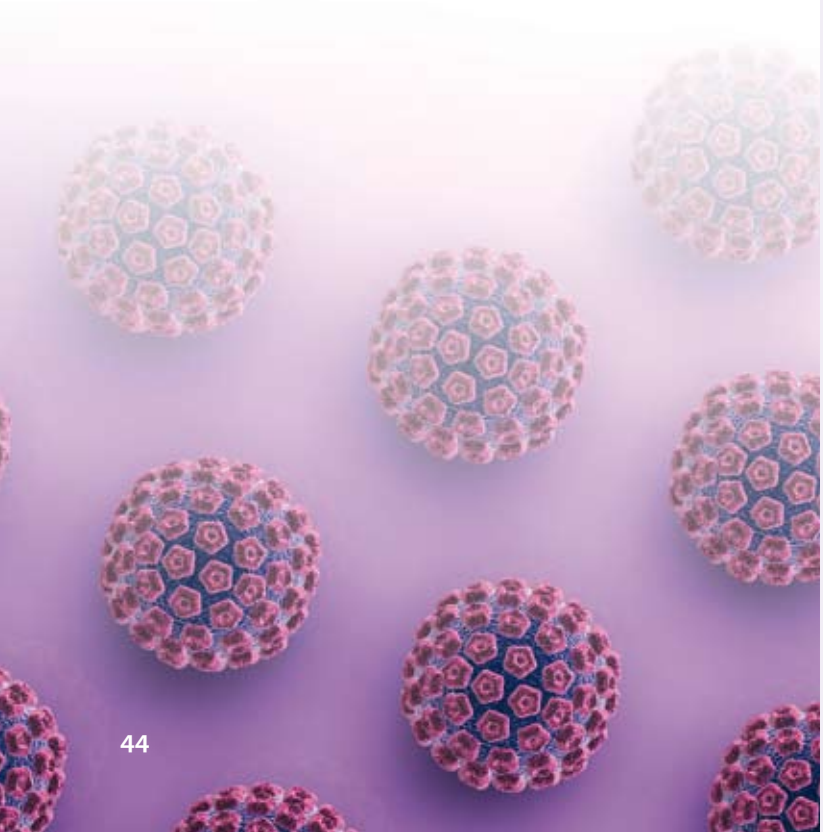

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Melanoma of the foot

Acral melanoma is a subtype of cutaneous melanoma, which manifests on the palms, wrists and soles of the feet (including the nail unit). Melanoma on the soles of the feet may be unnoticed by the patient for many years, and can be misdiagnosed as other podiatric skin conditions, including plantar warts.[1]

The annual incidence of melanoma in New Zealand is approximately 35 to 40 cases per 100,000 people; acral melanomas constitute a minority of these cases (< 5%).[2, 3] In people of European descent, 95% of melanomas are due to exposure to ultraviolet radiation, which is not thought to be an important factor for the development of acral melanomas.[4] However, acral melanomas make up a larger proportion of all melanomas in darker-skinned populations (including Pacific peoples),[5] and a substantial number of these occur on the feet.

Acral melanomas are typically thicker than other forms of melanoma at diagnosis and patients have a poorer prognosis, likely due to a later stage at presentation and diagnosis.[6] Acral melanoma can be found on any area of the foot, including weight bearing sites and the sides of the foot.[7] Lesions usually have a persistent irregular stain, with asymmetry of colour and structure.[8] Diagnosis of acral melanoma can be difficult if patients have hyperkeratotic lesions, with little or no pigmentation, similar to plantar warts (amelanotic or hypomelanotic melanoma – Figure 1).[1, 8] A parallel-ridge pattern of pigmentation seen on dermatoscopy is suggestive of acral melanoma.[8] Blue colouration is indicative of invasive melanoma. Acral melanoma may also involve the nail apparatus where it may present as atypical longitudinal melanonychia (a slowly widening and irregular band of discolouration in the nail plate), nail destruction or an irregular patch or nodule (which may be non-pigmented) in the skin lateral to, distal to, or under the nail plate.

Patients with suspected acral melanoma should be referred to a dermatologist to confirm the diagnosis.

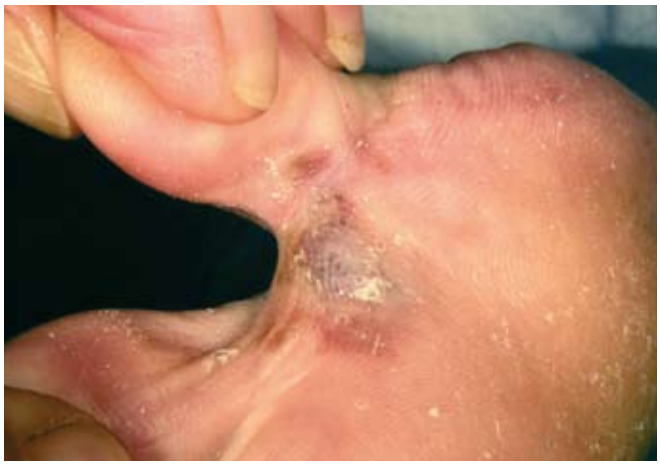

Figure 1: Acral melanoma showing a hypomelanotic lesion (Image provided by DermNet NZ)

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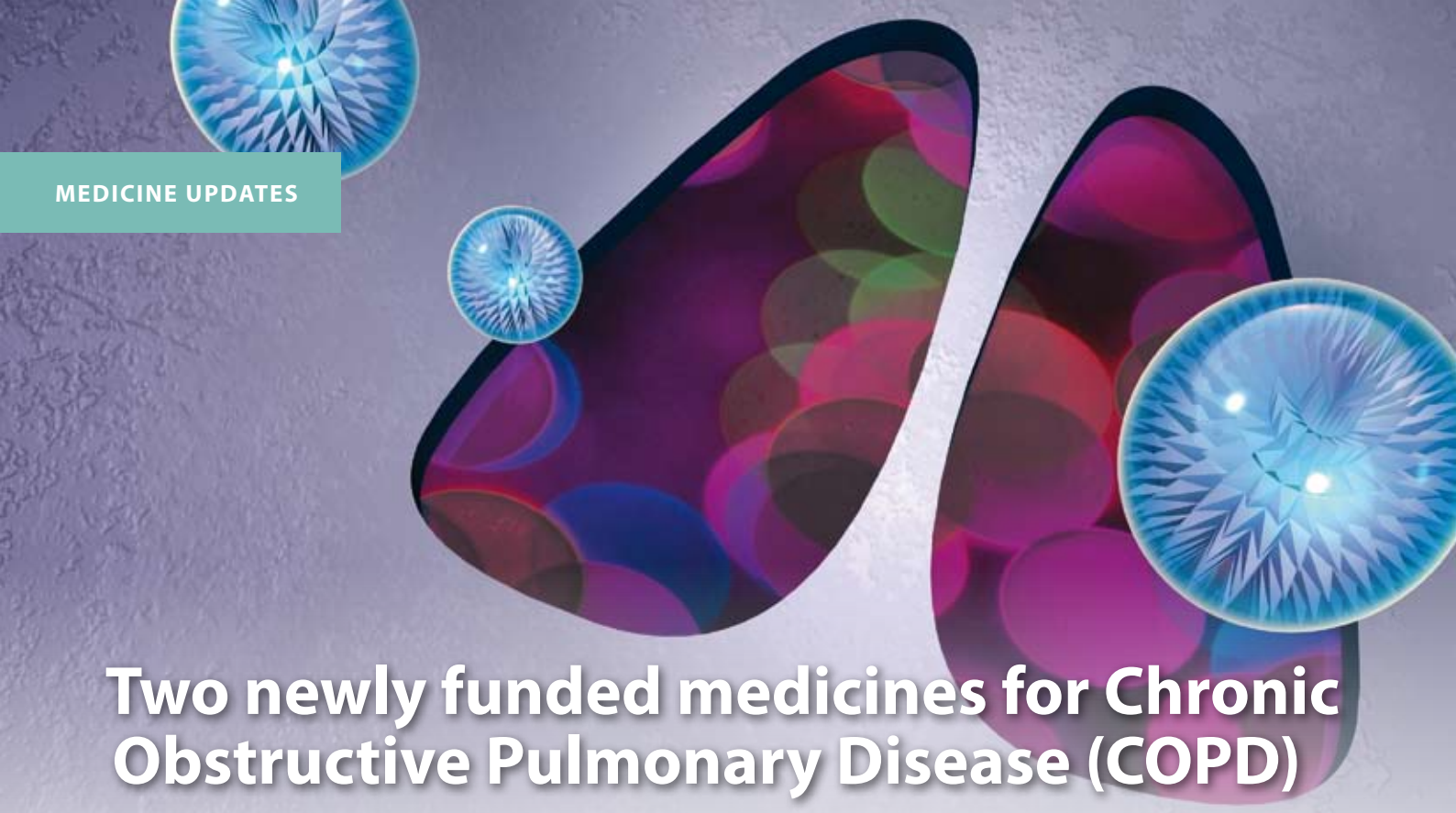

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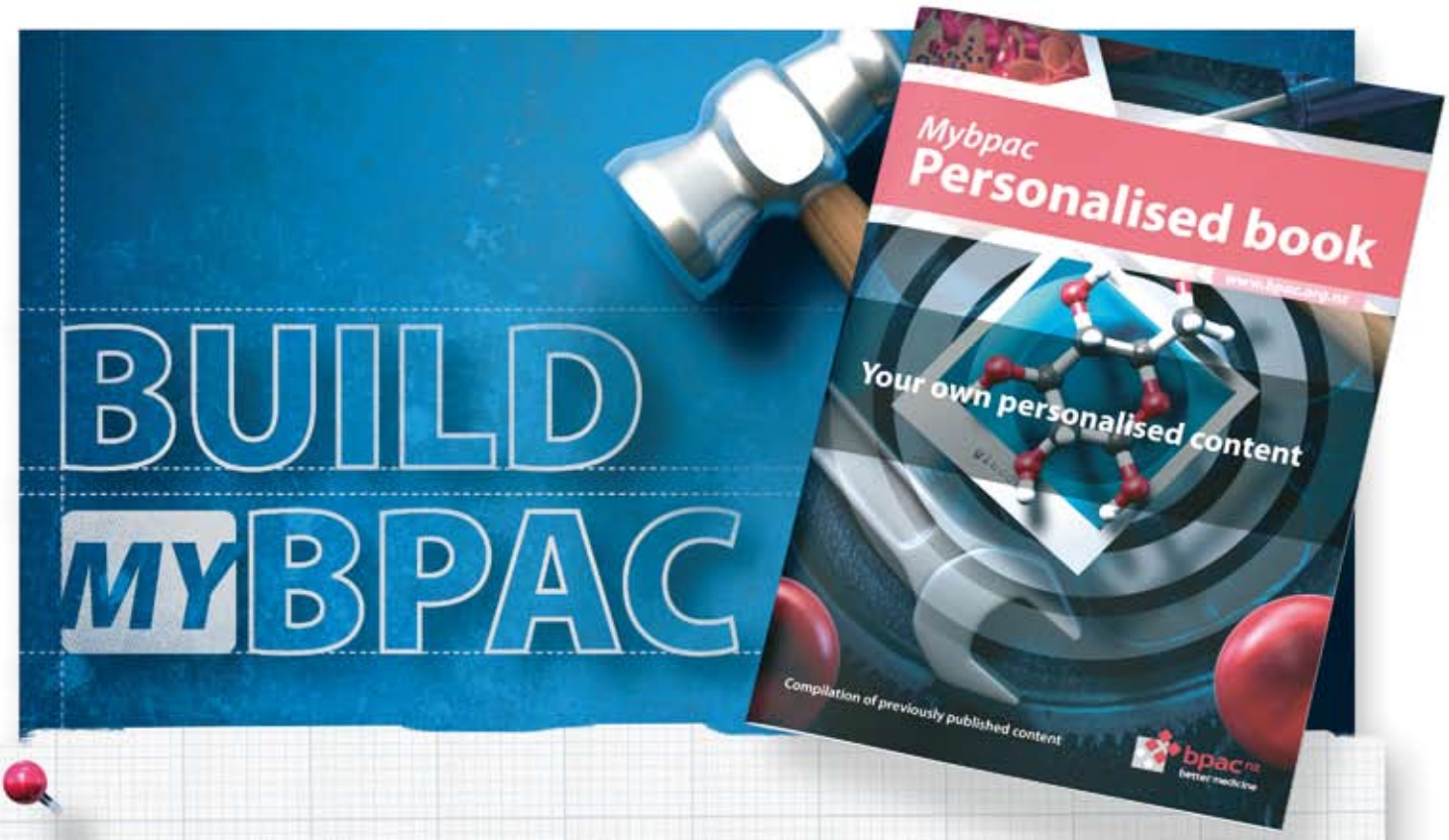

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