Overview of complementary and alternative medicine and diabetes

Introduction
People with diabetes frequently use complementary and alternative medicine (CAM) and other non-medicine CAM therapies, often combine various CAMs, and combine CAMs with conventional care. They use CAM for a range of reasons, not necessarily to manage blood glucose. The evidence base for CAM is improving, but there is still a lack of quality evidence for many CAMs, and the combination of CAMs and conventional care. CAMs have both risks and benefits: some CAMs, like some conventional treatments, are higher risk than others.

Conventional practitioners should ask about CAM use in a non-judgemental way, document it and monitor the outcomes according to the individual’s reason for using it.

Key words
complementary therapies; herbal medicines; diabetes; safety; risk and benefit

Abstract
People with diabetes frequently use complementary and alternative medicine (CAM) and other non-medicine CAM therapies, often combine various CAMs, and combine CAMs with conventional care. They use CAM for a range of reasons, not necessarily to manage blood glucose. The evidence base for CAM is improving, but there is still a lack of quality evidence for many CAMs, and the combination of CAMs and conventional care. CAMs have both risks and benefits: some CAMs, like some conventional treatments, are higher risk than others.

Conventional practitioners should ask about CAM use in a non-judgemental way, document it and monitor the outcomes according to the individual’s reason for using it.

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### Table 1. Overview of some of the reasons people with diabetes use complementary and alternative medicines (CAMs), some evidence for their use, and some issues to consider when advising people about CAM use or incorporating CAM into diabetes care.

<table>
<thead>
<tr>
<th>Reason for using CAMs and examples of some commonly used CAMs</th>
<th>Brief evidence base</th>
<th>Some issues to consider when advising people about CAM use or incorporating CAM into diabetes care</th>
</tr>
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<tbody>
<tr>
<td>Managing blood glucose</td>
<td>Some CAM diets are similar to recommended conventional diets but often include antioxidants, fish oils, omega 3 and other supplements. Massage lowered blood glucose in children receiving regular massage from their parents. Parents felt less anxious when massaging their child. Many herbs lower blood glucose, HbA1c and lipids, e.g. American ginseng (Panax quinquefolius), Gymnema/guamar (Gymnema sylvestre), fenugreek (Trigonella foenum-graecum), chromium picolinate, Coccinia indica, Momordica charantia, Opuntia streptacantha and Cinnamomum cassia. These herbs and supplements have primarily been used in type 2 diabetes, but one small study suggests Trigonella foenum-graecum reduces blood glucose in type 1 diabetes. Chromium is excreted in urine at a faster rate in people with diabetes than in those without, resulting in relative chromium deficiency that could contribute to insulin resistance. Chromium picolinate 1000µg plus either glipizide or placebo for 24 weeks lowered fasting and postprandial glucose, HbA1c, less weight gain and less body fat measured using DEXA.</td>
<td>It is important to use the botanical names for CAM medicines because common names vary considerably and can lead to a misidentification and adverse events (AEs). People using hypoglycaemic CAMs are at risk of hypoglycaemia, especially if they combine glucose lowering CAMs with conventional glucose lowering medications that cause hypoglycaemia. Chromium, magnesium and antioxidants are essential to insulin action and glucose metabolism and have few side effects but there is little evidence for routine supplementation in diabetes. Supplements should only be used when biochemical tests support the need.</td>
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<td>Manage weight</td>
<td>Some CAM weight loss medicines and diets are beneficial, but some are associated with significant risks. The Diet-Pill-Study group monitors ‘diet pills’ and the marketing companies, and evaluates them for safety and efficacy according to set criteria. Hoodia gordoni, Dietrine and herbal Phentermine met the criteria.</td>
<td>Weight loss requires an integrated approach that includes diet and exercise; thus, CAM medicines could be used with a healthy diet and exercise. Self-prescribed CAM weight loss medicines and taking larger than recommended doses can lead to serious AEs such as renal damage.</td>
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<td>Remain active</td>
<td>Tai Chi – combined with a healthy diet, resistance training, correcting malnutrition, and controlling blood glucose and lipids – improves strength and balance and reduces the associated risks.</td>
<td>Muscle wasting and reduced strength are associated with advancing age, and lead to functional decline and contribute to falls.</td>
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<td>Manage pain</td>
<td>Massage reduces pain intensity and anxiety in the short term in postoperative patients. Acupuncture reduces diabetic peripheral neuropathic pain. Glucosamine and chondroitin are widely used to manage arthritic and joint pain.</td>
<td>There is little evidence that oral glucosamine contributes to hyperglycaemia.</td>
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<td>Mental health</td>
<td>St John’s Wort (Hypericum perforatum) improves mild-to-moderate depression and is better tolerated than conventional antidepressants. Biofeedback, relaxation and counselling therapies reduce stress by attenuating the effects of increased autonomic activity and catecholamine production.</td>
<td>Hypericum perforatum interacts with many conventional medicines including oral contraceptives, benzodiazepines, anticoagulants, chemotherapy medicines, and digoxin. If used with SSRIs it can precipitate serotonin syndrome. It also reduces the effectiveness of antihypertensive medicines. St John’s Wort can cause bleeding; it might need to be stopped prior to surgical and investigative procedures.</td>
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*Table 1 is continued on the next page*
Reason for using CAMs and examples of some commonly used CAMs | Brief evidence base | Some issues to consider when advising people about CAM use or incorporating it into diabetes care
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**Reduce the risk of and manage complications**
- Diet and exercise
- Antioxidants
- CAM medicines
- Essential oils

Table 1. Some of the reasons people with diabetes use CAMs, some evidence for use, and some issues to consider. (Continued from the previous page)

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<td><strong>Reduce the risk of and manage complications</strong></td>
<td>Oxidative stress and reactive oxygen species (ROS) are implicated in the development of many diseases including diabetes complications. Vitamin E might delay the progression of retinopathy; vitamin C might replenish vitamin E; and B group vitamins might improve nerve function. Prophylactic CQ-10 alone or used with other antioxidants improves cardiac conditioning and reduces cardiac AEs during cardiac surgery. <em>Crataegus</em> species (hawthorn) improves heart failure, and peppermint eases gastrointestinal reflux. Some essential oils alleviate pain, reduce blood pressure and improve sleep.</td>
<td>Antioxidants can cause AEs and medicine interactions, especially if high doses are used. Generally, most vitamins and minerals should be obtained from a healthy diet. Supplements should only be used when deficits are identified. Saw palmetto (<em>Serenoa repens</em>) can affect the accuracy of prostate specific antigen (PSA) results and might need to be stopped before PSA is measured.</td>
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<td><strong>Prevent/manage intercurrent illnesses</strong></td>
<td>Cranberry preparations prevent bacteria sticking to the bladder wall and reduce urinary tract infections (UTIs) particularly in women with recurrent UTIs. <em>Helicobacter pylori.</em> Prebiotics and probiotics might have a role in a healthy diet and might reduce the gastrointestinal side effects of some conventional glucose lowering medications, e.g., metformin and acarbose. &quot;Ease a cold&quot; preparations contain several herbs and supplements (e.g., vitamin C, zinc, <em>Echinacea purpurea</em>, garlic and licorice)</td>
<td>Self-diagnosis and treatment might inappropriately delay help-seeking. People need to know how to manage all their medicines during illness as part of sick-day care. People often use CAMs to ‘support the immune system’ as part of preventative care, which might not be appropriate when immune suppressants are indicated. Some of the herbs and supplements in ‘ease a cold’ formulas are sedatives and cautions might apply, e.g., when driving</td>
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<td><strong>Stress management and general well-being</strong></td>
<td>Essential oils enhance well-being, aid relaxation and reduce stress, which benefits metabolic control. Some alleviate stress during procedures such as CAT scans, and post-cardiac surgery. Difficulty identifying odours might be an early sign of Alzheimer’s disease.</td>
<td>Essential oils are often combined with music and massage. In aged-care settings they are used to reduce pain, improve sleep, maintain skin integrity and manage behavioural problems</td>
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| • Using Quality Use of Medicines to aid clinical decisions and selecting non-medicines options first when appropriate and safe. | • Effective communication with patients and among health care providers. |

**Safety and risk**

All health care carries some risk. Some CAMs are higher risk than others. More adverse events (AEs) are reported for conventional care than for CAM. There may not be more actual conventional AEs, but AE reporting patterns might be different in that patients are more likely to report CAM AEs than are conventional HPs. Most countries have procedures for reporting AEs; for example, the Medicine Healthcare Products Regulatory Agency Yellow Card Scheme in the UK. HPs’ perception of risk is usually more ‘mathematical’ than that of the general public. HPs tend to explain risk as number needed to treat and relative and absolute risk, whereas most patients prefer social and functional language and want information specific to their personal context (individualised). Adverse events associated with CAM

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<td>Individual CAM, CAM–CAM and CAM–conventional combinations carry different levels of risk. CAM medicines are more likely to cause harm than therapies such as meditation and music. Likewise, there is more evidence for the safety of some CAMs than for others. However, the lack of randomised control trial evidence does not mean there is no evidence: all of these issues apply equally to CAM and conventional therapies. Some CAM–conventional medicine interactions are documented; others are theoretical and can be difficult to predict. Box 2 shows people most at risk of CAM-related AEs. Many conventional medicines were originally derived from plants, e.g., digoxin, aspirin, metformin and the recently introduced sodium-glucose co-transporter-2 medicines. Consequently, herbal medicine pharmacokinetics and pharmacodynamics could help explain why some CAM/conventional medicine AEs occur. Herbal medicines:</td>
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<td>• Reduce conventional medicine bioavailability by inducing liver enzymes, especially the cytochrome P450 system.</td>
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• Induce the production of intestinal D-glycoprotein, which affects medicine absorption and metabolism.
• Stimulate neurotransmitter production such as serotonin, which enhances the effects of some medicines.
• Compete for serum protein binding sites, which increase the amount of free medicine available in the blood. People with low serum albumin, such as older and malnourished people, might be particularly at risk.16

Used alone, neither the herbal nor conventional medicine(s) might be a problem, but the combination can be potentially dangerous. Importantly, the active ingredient(s) in the herbal and/or conventional medicine might cause the AE. Preservatives, colours and contaminants in medicines and foods are known to cause AEs.18 Likewise, underlying health conditions play a role.

Significant AEs include renal and liver damage, hyper- and hypotension, sedation, and electrolyte disturbances.16,17 Documented CAM-related AEs associated with people with diabetes using CAM include:
• Stopping insulin in type 1 diabetes, leading to ketoacidosis.19
• Moxibustion burns to neuropathic legs.20
• Allergies, especially to some traditional Chinese medicines.21
• Bleeding and bruising, especially during surgical procedures.10
• Hypoglycaemia related to herbal medicines used to enhance sexual performance.22 e.g. CQ-10, and Panax ginseng to boost eNOS production and Saw palmetto to ‘normalise’ testosterone. Many herbs can cause hypoglycaemia, and hypoglycaemia can be precipitated by contamination with conventional glucose lowering medicines, especially sulphonylureas.23

However, not all interactions are adverse. Some could be beneficial by enabling fewer medicines or lower doses of more potent conventional medicines to be used; but more research is needed to support such CAM use and may emerge from IM strategies.

Safety and risk profiles for herbal medicines are often based on a long history of traditional use. The term ‘long traditional use’ is variously defined. For example, the European

### Alternative medicine
The practice of any non-conventional medical system as an alternative to conventional medical systems2

### Complementary and alternative medicine (CAM)
All health systems, modalities and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. They include all such practices and ideas self-defined by their users as preventing or treating illness or promoting health and well-being. The boundaries within and between complementary therapies are not always sharp or fixed. CAM therapies are classified into 5 main categories:
• Alternative medical systems such as Traditional Chinese Medicine, and Ayurveda, which usually combine several CAMs
• Mind–body interventions
• Biologically-based therapies such as foods and vitamins and minerals
• Manipulative and body-based therapies such as chiropractic and massage
• Energy therapies such as Qigong, Reiki and electromagnetic fields

### Integrative medicine (IM)
The blending of conventional and complementary medicines and therapies with the aim of using the most appropriate of either or both modalities to care for the person as a whole.52 There are 3 main levels of CAM integration:
• Integrative level where governments formally recognise CAM and it is incorporated into health systems policies, and regulatory procedures
• Inclusive level where CAM is recognised and largely accepted but may not be formally integrated into health systems
• ‘Tolerance’ level where CAM is not a formal part of national health systems

#### Box 1. Definitions of complementary, alternative and integrative medicine

- Using medicines with a narrow therapeutic index such as lithium, phenytoin, barbiturates, warfarin and digoxin
- Using high-risk medicines such as insulin
- Have renal and/or liver damage
- Have atopic conditions, e.g. allergies, asthma or dermatitis
- Older people
- Children
- Pregnant women
- Take 5 or more medicines (polypharmacy)
- Use alcohol or drugs of addiction

In addition, practitioner-related factors such as the following contribute to the adverse event risk profile:
• Consult practitioners who lack knowledge about safe CAM use or about conventional care
• People whose conventional health professionals do not ask about CAM use and whose CAM practitioners do not ask about conventional treatment
• People who self-diagnose, delay seeking medical advice and do not tell conventional or CAM practitioners about the CAM they are using
• People who import CAMs or use CAMs that are not subject to stringent regulatory standards when travelling

#### Box 2. People with diabetes most at risk of a CAM or integrative medicine-related adverse event.
People with diabetes are at increased risk because they usually have more than one risk factor and risk factors can be additive

Directive on traditional herbal products regards long traditional use for at least 15 years within Europe and >30 years outside Europe.24 Interestingly, conventional medicine manufacturers are not required to meet such stringent duration of use criteria before their medicines can be marketed. Despite rigorous testing, AEs often become evident after conventional medicines are registered and used in clinical care.

Significantly, modern technology and herb cultivation, harvesting and
Box 3. Some sources of reliable information about CAM and some methods used to evaluate CAM evidence

- Cochrane Database of Systematic Reviews. Complementary Health Field. www.cochrane.org/
- The World Health Organization has a range of relevant publications

Extraction techniques mean modern herbal medicines might have a different chemical make-up from medicines produced using traditional production processes and might be more safe or less safe, but they are often still marketed under the ‘long traditional use’ label.

Standards and regulation
Standards and regulatory processes that aim to improve safety and reduce risk vary throughout the world. In Australia, herbal medicines, homeopathic medicines, essential oils (aromatherapy), vitamin and mineral supplements and conventional medicines are regulated by the Therapeutic Goods Administration, which assesses medicine safety and, generally, regards CAM as lower risk than conventional medicines. Manufacturers of lower-risk medicines must be able to substantiate claims that the medicine is safe but, unlike conventional medicine manufacturers, they are not required to submit evidence of safety when they apply to have the medicine listed. Manufacturers of low-risk medicines are not permitted to use terms such as cure, treat, manage, or prevent on medicine labels or marketing strategies.

Many European countries require evidence to support the manufacturer’s claims before they can be registered. The World Health Organization (WHO) Terminologies on Traditional Medicines and the European Parliament and Council Directive on the use of traditional products stipulate that herbal medicines must be produced according to good manufacturing practices. The European Directive contains a number of other guidelines about medication standards and legal responsibilities applicable to retailers, wholesalers, manufacturers and importers. Other medicine-related quality control processes include labelling, manufacturing and advertising regulations and Acts, and pre- and post-market surveillance.

Most CAM practitioner associations self-regulate, but are not formally regulated in most countries. The duration and quality of the training vary considerably among CAM disciplines and among countries. Reputable CAM practitioners belong to an appropriately constituted professional association that has initial and ongoing education and competency standards.

Ways health professionals can enhance safety
Health professionals can use the following strategies to enhance CAM safety:
- Keep an open mind about CAM use and use non-judgemental language to encourage people to disclose their CAM use.
People with diabetes are high CAM users; therefore HPs must regularly ask about CAM use in a non-judgmental way.

Declaration of interests
There are no conflicts of interest declared.

References