Using Natural Remedies Safely in Pregnancy and Childbirth

A REFERENCE GUIDE FOR MATERNITY AND HEALTHCARE PROFESSIONALS

Denise Tiran

FOREWORD BY PAM CONRAD

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SINGING DRAGON
LONDON AND PHILADELPHIA

Disclaimer: The use of complementary therapy practice within maternity care is constantly evolving in response to the needs of women, their families and caregivers, research evidence and service demands and in relation to developments in obstetrics. It is the responsibility of the midwife, doula, complementary therapist or other professional practitioner to remain updated, to engage in evidence-based practice and to work within the parameters of her/his own clinical practice. The author and publisher are not responsible for any harm or damage to a person, no matter how caused, as a result of information shared in this book.

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The information contained in this book is not intended to replace the services of trained medical professionals or to be a substitute for medical advice. The complementary therapy described in this book may not be suitable for everyone to follow. You are advised to consult a doctor before embarking on any complementary therapy programme and on any matters relating to your health, and in particular on any matters that may require diagnosis or medical attention.

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As always, this book is dedicated to my wonderful son, Adam, still living and working in the music industry in our beloved South Africa. As I complete the manuscript for this book, the 2020 coronavirus pandemic rages and the whole world is in lockdown – come home safely soon. I miss you.

Contents

Foreword

The hunger for natural therapies and self-care remedies has exploded globally amongst women, and particularly those on the significant journey towards motherhood: the pregnant woman. Unfounded claims for enhancing fetal development and easing the childbirth experience are promoted by well-intentioned, albeit under-educated individuals, potentially leading to unnecessary risk factors at a vulnerable time. Capitalizing on this trend, herbal and aromatherapy companies market heavily to this segment of the population often without adequate knowledge to safely guide them. This book, written by the foremost authority on the safe use of natural remedies during the pregnancy–childbirth–postnatal period, Denise Tiran, could not be more timely.

Since the late 1980s, Denise Tiran, a registered midwife, practitioner and university educator, has qualified in aromatherapy, herbal medicine, homeopathy, reflex zone therapy, Bach Flower Remedies and a myriad of midwifery techniques, all to improve the experience of pregnancy and childbirth for thousands of women. A pioneer and leading expert in the field, she has written over 15 books and multiple papers for midwifery and complementary or alternative medicine (CAM) practice, and again this book is one of her finest, a true gem.

As I read through the book whilst continuing to learn from Denise, I am reminded of my clinical aromatherapy internship as a nurse and newly qualified aromatherapist nearly 20 years ago with her at Queen Mary's Hospital, London. Transferred to England because of my husband's job, having just devoured her unrivalled *Aromatherapy for Pregnancy and Childbirth*

book, the fortunate opportunity to observe and practise alongside her for a year bridged the gap of understanding integrative medicine and how to specifically weave these therapies into traditional nursing and midwifery care. Twenty years later, thousands of US women have benefited from this unique opportunity of learning that now has been taught to nurses, midwives and doulas, and with this book it can spread even further.

The wealth of information in this book provides midwives, nurses and maternity healthcare professionals with timely and much needed specific herbal, homeopathic and select essential oil information to initiate dialogue with our patients and guide the assessment of the appropriateness for natural remedies with each unique and often changing clinical scenario. Her prenatal CAM clinic at Queen Mary's Hospital, London, where I interned, treated a vast array of multicultural women, and her knowledge of and respect for their traditional medicine systems encouraged open dialogue, education and safer outcomes, and are thoughtfully included in this book.

Herbal medicine, homeopathy and aromatherapy all fall under the category of "natural medicines" and the umbrella of CAM. In the USA, homeopathy and herbal medicine lack standardized education or a credentialing body for professional practice, so it is not uncommon to hear a homeopathic or herbal remedy referred to as if they were one and the same. This book clarifies the unique and most important differences to expertly guide the individual or practitioner. The majority of the time, individuals self-treat from a health food shop without professional guidance. This is of particular concern during pregnancy, childbirth and lactation when the risk factors are greater.

Women seeking natural alternatives often arrive at the labour suite with bags of various remedies unknown to their healthcare team or clearly understood by them. This book does a marvellous job of differentiating the potency and risk factors between a herb, homeopathic, flower remedy or essential oil, even those possessing the same name (i.e. chamomile, ginger, peppermint) but with very different potency, safety and risk factors.

Aromatherapy, the most popular of the natural remedies, is highlighted for its wide range of uses in pregnancy, childbirth and postnatally with the necessary cautions for use. With often enthusiastic, albeit under-educated, essential oil sales and recommendations, particularly during pregnancy, this book will serve as a valuable tool for childbirth education.

This well-researched book provides in-depth information on multiple natural remedies that midwives, nurses, doulas, physicians and other health professionals can use clinically to advise, educate and inform the prenatal–postnatal women in their care, focusing on safety in their application.

The alphabetical listing of 220 remedies, with their common uses, precautions, potential interactions and contraindications for use specifically during the pregnancy, childbirth and postnatal period, make this a very valuable and practical book.

As I reflect on the wisdom and inspiration of Maya Angelou as it relates to this book, "Do the best you can until you know better, then when you know better, do better", I'm honoured to highly recommend this book to enrich our knowledge of natural therapies and, by doing so, we can encourage and educate the women in our care, as we now know a better way!

Pam Conrad PGd, BSN, RN, CCAP
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How to Use this Book

This book is intended as a reference text for midwives, doctors, health visitors, doulas, maternity support workers, complementary therapists, pharmacists and other healthcare practitioners who have professional contact with pregnant women. Health professionals may be asked by women for information and advice on the safety of herbal and homeopathic medicines, aromatherapy essential oils and on the traditional plant, mineral and animal-based remedies used by women from different cultures. Maternity care providers may also elicit women's use of various remedies whilst caring for them and be unsure about the safety or appropriateness of the remedies at different times during pregnancy, labour or the postnatal period. Complementary practitioners from all disciplines may come into contact with pregnant clients who ask them about common remedies used in pregnancy, whilst pharmacists and salespersons in health stores may encounter pregnant customers who question them about natural remedies. Also, midwives and doulas may integrate various natural remedies into their care of women, especially aromatherapy and advice on herbs and homeopathy.

The emphasis in this book is on the *safety* of natural remedies in pregnancy, labour and postnatally, rather than on how to use them. It is often difficult to access information about safety. In this book I have used my extensive investigation of the safety of natural remedies and applied generic principles to the childbearing year – the preconception, antenatal, intrapartum and postnatal periods.

Chapter 1, the introductory chapter, provides an overview of the different systems of natural remedies, including their mechanisms of action and general

indications, contraindications and precautions. Chapter 2 focuses on the use of natural remedies specifically in pregnancy and childbirth. In Chapter 3 I have debated the issue of risk and considered how health professionals, both conventional and complementary, can contribute to ensuring the safety of expectant, labouring and newly birthed mothers when they choose to use natural remedies. I have debated the issue of risk and considered how health professionals, both conventional and complementary, can contribute to ensuring the safety of expectant, labouring and newly birthed mothers when they choose to use natural remedies. A thorough investigation into the potential adverse effects, possible toxicity and interactions with other chemical substances makes for sobering reading but is intended to alert professionals to the pertinent advice that women may need in respect of natural remedies. The clear message is that "natural" does not necessarily mean "safe", especially in pregnancy. Guidelines for the safe use of natural remedies in pregnancy follow in Chapter 4, and the short answer to any doubts about safety is to avoid using them, at least until more specialist information can be obtained.

There follows an alphabetical listing of 220 natural remedies, for quick reference in clinical practice. These include primarily herbal and some homeopathic remedies, essential oils, mineral substances and a few remedies sourced from animals, particularly those used in traditional medicine in developing countries. There are many hundreds of remedies that could have been included, but I have explored a small selection of commonly used remedies, primarily in the developed world. The entries for each natural remedy have not been directly referenced in the text since the book is a "ready reference" for use in clinical practice. However, information has been sourced from a variety of academic and clinical resources, using the most up-to-date material available. References for Chapters 1–3 and a Glossary of Terms used in the alphabetical listings are given at the end of the book.

In the alphabetical listing of herbal and homeopathic remedies and mineral and animal products, each has several sections.

Herbal remedies (including essential oils and traditional remedies)

These entries identify the common or traditional uses, both obstetric-related and general, and their safety, specifically related to pregnancy, labour and breastfeeding. Most remedies are administered orally, but topical (dermal), inhalational or other methods of administration are also covered where appropriate. Some plant-based remedies are consumed within the diet and

are generally considered safe enough in amounts commonly found in foods; safety information given within the profile applies primarily, but not solely, to therapeutic doses or incorrect use.

Contraindications and precautions are included, where necessary extrapolating data from the available information on general contraindications and applying them to pregnant and childbearing women. It must be emphasized that this book is intended mainly for maternity professionals, not for qualified medical herbalists and homeopaths, and there may appear to be some contradictions in these sections. An example of this would be raspberry leaf, in which the alphabetical entry advises avoiding self-administration until the third trimester (information which maternity carers should advise), whereas a medical herbalist may appropriately prescribe it under their own accountability for threatened first trimester miscarriage. Maternity professionals come into contact with many women who are self-prescribing and self-administering, and this book is intended to help maternity professionals err on the side of caution unless they are able to discuss individual cases with a qualified natural remedies (NR) practitioner.

The adverse effects section covers moderate and severe symptoms experienced both from therapeutic doses and from incorrect administration. The interactions section identifies possible pharmacological interactions with drugs and plant remedies, and occasionally with investigative medical tests. Interactions may be definitive or theoretical, usually occurring with therapeutic or recreational use, or from prolonged, excessive or inappropriate use, sometimes even in the amounts found in foods. These sections are included for all remedies, including those that are completely contraindicated, so that professionals can comprehensively advise women who reveal self-administration of herbs considered unsafe, or about which there is little evidence-based information. This may also be helpful for health professionals when apparently idiopathic untoward symptoms occur before, during or after childbirth.

Homeopathic remedies

In these listings, the main obstetric indications are identified, together with those coincidental conditions that women may experience during pregnancy, such as the common cold, accidental injury or ongoing pre-existing problems. There follows a key features section – these are the symptoms, manifestations and emotional aspects that would normally enable a homeopath to prescribe the most appropriate remedy. They are included here so that healthcare professionals working with pregnant women using homeopathy can assess

whether or not they are using the correct remedy. For example, a midwife or doula may be caring for a woman self-administering a homeopathic remedy in labour, but since labour is a dynamic process, the indications for use of a specific remedy may change as the labour progresses. The initial remedy is therefore no longer valid, and continuing to self-administer it could lead either to new symptoms or could mask emerging clinical pathology. Two brief sections follow, on "better for" and "worse for", giving signs and symptoms that characterize whether the specific remedy is appropriate or not. Finally, the section on safety includes general information and any safety issues that have arisen or that apply to the specific remedy.

Mineral and animal products

A few remedies originating from mineral or animal products are included in the listings, using the same sub-headings as those for herbal remedies. Some of these remedies are traditional to specific cultures but the widespread use of the internet and the multicultural nature of populations in westernized countries may mean that healthcare professionals come into contact with women wishing to use them during pregnancy. Although there may be little or no research evidence on these remedies, safety information is extrapolated from what is known and the ways in which women use the remedies.

1

Introduction

Natural remedies (NRs) are derived from any naturally occurring substances and used for medicinal purposes. NRs comprise a significant part of the non-allopathic modalities that constitute "complementary and alternative medicine", although this broader term also encompasses manual, energetic and psychological therapies, such as massage, acupuncture and hypnotherapy, which are not dealt with in this book (for more on this, see Tiran 2018).

The most common forms of NRs are those used in medical herbalism, aromatherapy, energetic medicine modalities such as homeopathy and flower remedies, as well as various traditional medical systems from around the world. Some authorities would also include nutritional therapies, for example macrobiotics and vitamin and mineral supplements, in the general classification of "natural remedies". However, whilst some NRs can be used as culinary flavourings or may interact with certain foods, nutritional therapy is a completely different discipline and is not discussed in this book.

Most NRs are developed from plant materials, although mineral, bacterial and viral, lichens, algae and animal substances are also used, particularly in homeopathy and in traditional medicine systems. Plants have been part of folk medicine for centuries, especially for pregnancy and childbirth, and it has been claimed that there are around 350,000 plants worldwide, many with untapped medicinal potential (Heywood 2011). In the 17th century, the well-known herbalist, Nicholas Culpeper (1616–1652), was the first person to produce an English language herbal pharmacopoeia and, in 1651, a Directory for Midwives exploring popular remedies for reproduction, many of which are still in use today. Developments in medicine in the late 18th

and early 19th centuries moved plant remedies on to a more professional setting that eventually evolved into the modern pharmaceutical sciences. From the 19th century, much of the empirical evidence was lost and science overtook the traditional ways of life. Since the late 20th century and into the 21st century, the medical and scientific fraternities have viewed NRs as part of complementary or alternative medicine (CAM).

Conversely, there has been a phenomenal resurgence in the public's use of NRs in the industrialized world in the past few decades as people seek a return to a more organic way of life, often rejecting the paternalistic bioscientific approach of allopathic medicine. Various contemporary surveys, systematic reviews and other studies show that the use of NRs ranges from around 35 per cent to 41 per cent of the general population in Europe, North America, Canada and the Middle East (Awad and Al-Shaye 2014; Rashrash, Schommer and Brown 2017; Welz, Emberger-Klein and Menrad 2018). Some reports claim that almost 70 per cent of Australians now embrace complementary medicine in general, but specific information on NR use, particularly in pregnancy, is less readily available (ATMS 2018).

Around the world the most commonly quoted indications for the use of NRs appear to be to promote and maintain general health and wellbeing, to treat minor illnesses and sometimes to attempt to resolve more serious conditions before, or instead of, seeking medical advice (Rahmawati and Bajorek 2017). However, definitive information is difficult to find because surveys use varying terms when posing questions to respondents. The term "natural remedies" may include solely herbal medicines (Zeni *et al*. 2017), or herbs and aromatherapy oils, or herbs and non-pharmacological modalities such as homeopathy (Awad and Al-Shaye 2014), or it may, somewhat erroneously, be interpreted as all elements of CAM including manual and manipulative therapies (Posadzki *et al*. 2013).

Similarly, the use of traditional medicines (TMs) continues in many parts of the world today. Russia has been described as having a "herbophilious" society, with around 58 per cent of the population preferring NRs to drugs, and most using medicinal plants as an integral part of their daily diet (Shikov *et al*. 2017). It is estimated that between 65 per cent and 85 per cent of rural populations in Africa, Asia and parts of South America use indigenous plants and other substances for medicinal purposes (Ekor 2013; WHO 2019; Zeni *et al.* 2017). Indeed, one survey claimed that almost 100 per cent of African women resort to plants for family medicines (S.M. Ahmed *et al*. 2018). In China and other Asian countries such as Japan, Korea and Vietnam, traditional Chinese medicine (TCM) and national and regional variations are often used concomitantly with conventional healthcare. Indeed, a huge

credibility boost has recently been achieved through the acceptance of TM by the World Health Organization (WHO), despite critics claiming there is insufficient evidence to support its use (Hunt 2019).

Different systems of natural remedies

Herbal medicine

Herbal medicine, also known as botanical medicine or phytotherapy ("phyto" = plant), is the oldest therapeutic modality in the world, with archaeological evidence that it was used up to 60,000 years ago. It involves the preparation of fresh or dried plant materials to be administered in various formats. Kew Gardens in London estimates that, globally, over 28,000 plants are currently in use as medicines, although less than 20 per cent of these are included in formal medicinal publications such as pharmacopoeia (Royal Botanical Gardens, Kew 2017). This may be due to the lack of definitive research, scientific scepticism for some modalities that encompass plant remedies such as homeopathy, and the somewhat enigmatic medicinal use of many plants by culturally diverse groups in geographically disparate areas of the world as part of their traditional heritages (see "Homeopathy and energetic remedies" and "Traditional medicine systems", below).

Botanical medicines may be administered as liquid extracts or dried material, from the whole plant or from part of it, such as the leaf, fruit or root. They can be prepared by drying and formulating them into herbal teas or tisanes; essential oils are extracted, commonly by simple steam distillation or by more sophisticated processes. Other herbal products containing complex mixtures of compounds from the plant are processed into tablets, tinctures, creams, suppositories and pessaries. Plants contain numerous constituents which can have physiological effects, including astringent tannins, detoxifying, diuretics, hepatoprotective and hormone-regulating saponins, mucilages which soothe and protect the tissues, antioxidant flavonoids, hormone-like phytoestrogens, volatile (essential) oils and others. Efficacy, safety and purity of herbal remedies may depend on the climate and the soil in which the plants are grown, harvesting and production methods, national and international standardization and the presence or absence of contaminants such as pesticides, heavy metals or microbes.

All herbal medicines, including aromatherapy essential oils and herbal teas, have physiological effects. Irrespective of the method of administration, herbal medicines act systemically, being absorbed, distributed and metabolized, primarily via the liver; waste products are excreted via the kidneys, lungs and skin and to a lesser extent via the intestines (He, Chan

and Zhou 2011). The amount of active chemical constituents in herbal remedies may depend on the format – for example, most herbal teas contain extremely diluted amounts of the active constituents compared to tablets or tinctures produced from the same plants in a formal therapeutic dose.

Medical herbalism in developed countries is based on fairly robust evidence of effectiveness and safety or on tried and trusted pharmacopoeia. Training, often at undergraduate or even Master's level, involves a comprehensive study of anatomy, physiopathology, chemistry, pharmacology, diagnostics, interactions between herbal and pharmaceutical medicines and, more recently, genetics and genomics. Medical herbalists are generally well respected, and although their practice is discrete from mainstream medicine, the scientific and medical communities are increasingly acknowledging the pharmacological nature of the remedies. Indeed, many conventional drugs have their origins in the isolation of chemical constituents from various plants, the first – morphine – being derived from the opium poppy over 200 years ago. Other drugs originating from plants include digitalis (digoxin) from the foxglove; the cancer drug, vincristine, from periwinkle; aspirin, the salicin content (a precursor to aspirin) being found in the bark of the willow tree; and the progesterone-only contraceptive Pill, derived from wild yam.

In the UK and most of Europe, herbal medicine has been regulated by the European Union (EU), which, in 2011, imposed a regulatory system across all member states. All manufactured herbal medicines, previously categorized as unlicensed, are required to have either traditional herbal registration or marketing authorization based on well-established use. Registered herbal medicines must meet specific standards of safety and quality and be accompanied by agreed indications from a minimum of 30 years of common usage; systematic patient safety information must be provided. Licensed herbal medicines have marketing authorization similar to the approval of conventional medicines, although the process is less rigorous than in the preparation of commercially produced pharmaceutical drugs. Nutritional supplements such as vitamins and minerals are not included in this system.

In the USA, herbal and other categories of natural medicine are regulated by the Food and Drug Administration (FDA), being categorized as nutritional supplements that do not require full licensing prior to sale. Some countries, such as Saudi Arabia, permit herbal remedies if they have a substantial period of traditional use – in this case, 50 years. Conversely, in Canada the Natural Health Products Directorate requires clear evidence of the composition and standardization of each product, methods of testing for contaminants, human tolerance limits and safety and effectiveness before

approving a remedy for public sale. The Australian Register of Therapeutic Goods is responsible for approving for sale and use all natural medicines, medical devices and other products such as disinfectants. In other countries where recognized herbal remedies are used within the prevailing TM system, regulations may differ (see "Traditional medicine systems", below).

Aromatherapy essential oils

As part of herbal medicine, essential oils may be used in conjunction with other plant constituents. Medical herbalists can prescribe and administer essential oils as medicines for administration orally, via rectal suppositories or vaginal pessaries; many doctors in countries such as France prescribe essential oils as medicinal drugs. Essential oils have also previously been injected, both intravenously and subcutaneously, but this practice is now largely obsolete. However, these methods of administration must be carefully supervised and are not appropriate in pregnancy and childbirth unless under the guidance of a medical practitioner or an aromatologist who is qualified to administer essential oils.

In most countries, essential oils are more commonly used in isolation as part of the CAM modality of aromatherapy, in which highly concentrated volatile oils are extracted from various parts of different plants to be used topically and by inhalation, harnessing both the physiological effects of their chemical constituents and the psychological effects of their aromas.

Aromatherapy is extremely popular with the public, worth $1.8 billion in the USA in 2018 and expected to grow by 10 per cent by 2026 (Grand View Research 2019). Self-administration is the primary mode of use; in the UK, home use constitutes 45 per cent of the total aromatherapy market (Grand View Research 2019). The Asia Pacific region's demand for essential oils is set to rise exponentially, with a claim that, in India, this is due to the increasing number of industrial burns for which treatment with essential oils may be effective (Grand View Research 2019).

Unfortunately, the pleasant fragrances of essential oils and the popularity, in many countries, of administering them topically via massage means that aromatherapy has gained a reputation primarily as a relaxation therapy. This is not helped by the abundant use of essential oils in the beauty therapy and perfumery industries, and their ready availability for sale in shops and online, which detracts from the lay public's understanding of their pharmacological action, potential medicinal uses and risks.

Each essential oil contains several hundred different chemical constituents, with physiological and psychological effects arising from their

pharmacological, that is, systemic, action. Many of the chemical constituents have proven anti-infective effects, some affect blood pressure, some are relaxing whilst others are stimulating, and some appear to have direct effects on blood cells (Assmann *et al.* 2018; Freeman *et al*. 2019; Kawai *et al*. 2020; Tariq *et al*. 2019). Once absorbed into the body, by whatever method of administration, the chemicals are metabolized via the liver; waste products are excreted via the renal, respiratory and integumentary systems (for more information on clinical aromatherapy in pregnancy, see Tiran 2016).

Regulatory systems of the aromatherapy profession vary around the world but tend to be via optional self-regulation rather than through statutory mechanisms. In many countries, the therapeutic use of essential oils falls under national cosmetics regulations, although in others they are regulated via drugs legislation. Training, standards and parameters of clinical practice vary between countries, as do the regulations for the sale of essential oils to the public. However, despite huge public use and a reasonable body of research evidence, aromatherapy is not considered as scientifically sound as some other therapies. This may be for several reasons. First, the association with the beauty and cosmetics industries seems to devalue aromatherapy as a clinical modality. Many studies explore the use of essential oils in vitro, such as laboratory testing of the anti-infective properties of specific oils (e.g. tea tree). There is limited clinical evidence, most of which investigates the concept of aromatherapy (e.g. "aromatherapy aids sleep" or "aromatherapy eases pain") in which the subjective client–therapist relationship or the placebo effect may also play a part. There are far fewer studies on the clinical use of specific essential oils for specific conditions. Research methodology varies and is sometimes poor, and there are wide disparities in the actual practice of aromatherapy between countries, which, in some cases, is questionable. Whilst some studies on effectiveness have been undertaken using randomized controlled trial (RCT) methodology, there are no RCTs on safety, particularly in relation to pregnancy, since it would be impossible to obtain ethics committee approval to conduct such a trial. The few papers available on aromatherapy in pregnancy and childbirth show wide variations in both research methodology and aromatherapy practice, and rely on an assumption that aromatherapy is "safe enough" for pregnant women, based largely on experiential reporting of benefits and lack of reporting of harm.

Homeopathy and energetic remedies

The German doctor, Samuel Hahnemann, developed homeopathy in the 18th century, and there are now several thousand homeopathic remedies

in use around the world. Contemporary use of homeopathy is widespread; estimates suggest that up to 6 million US citizens self-administer the remedies on a regular basis (Clarke *et al*. 2015).

Hahnemann discovered that the principle of "treating like with like" was more effective and caused fewer side effects than many of the aggressive medical methods in use at the time, which often involved purging, bloodletting and other invasive techniques. Homeopathy is based on quantum physics and the concept of energy: remedies are produced by repeated dilution and succussion (vigorous shaking) of a substance, which, in its original form, may have been highly toxic. Remedies are derived from plants, animal substances (such as apis, from the honey bee), minerals (notably the tissue salts – see below) and occasionally from bacteria and viruses (known as nosodes and sometimes, although controversially, used as vaccination replacements). It has been shown that the action of succussion converts potential energy into kinetic energy, releasing the power of the substance into the water in which it is dissolved, and that the water has the ability to retain the memory of that substance (Ball 2004; Manzalini and Galeazzi 2019). When a person's individual symptom picture is matched to a specific homeopathically prepared medicine, the remedy is said to resonate with the body's innate energy, returning its own energetic vibration to the optimum 7.83 Hz level, thus facilitating a return to homeostatic balance. This can be understood by observing the side effects of substances in their original, undiluted form which, when used in homeopathic micro-doses, will treat the same symptoms. An example is coffee – excessive consumption of coffee may cause insomnia, agitation, headache and palpitations, but someone reporting the same symptoms could be treated homeopathically with a remedy called coffea, in which coffee has been highly diluted and succussed to release its therapeutic potential, that is, "treating like with like".

Homeopathy does not, therefore, work pharmacologically (chemically) and will not interact with conventional medicines or herbal remedies. However, since homeopathic remedies are highly diluted from the original substance, there is little, if anything, biologically active in the end product, which makes them chemically very fragile. This means that they can be inactivated by other stronger chemical, aromatic or energetic substances, including essential oils, coffee, peppermint, mint-flavoured toothpaste and chewing gum, X-rays, mobile telephones, microwave ovens and strong sunlight. Certain strong pharmaceutical drugs can also block the homeopathic action, including some analgesics, antacids, specific antibiotics, aspirin, steroids, laxatives, cough lozenges, decongestants and "deep heat" preparations for muscle pain.

Conversely, the argument amongst sceptics who do not understand the energetic mechanism of homeopathy is that the highly diluted nature of the remedies implies that they have "nothing in them" – and therefore they have no effect. This is not true, but unfortunately, despite its popularity, homeopathy is currently experiencing worldwide condemnation, primarily because it cannot be studied in the same way as herbal medicine or pharmaceutical research. There is minimal research using the "gold standard" RCT methodology because this does not fit the individualized precise prescribing required of homeopathy, a factor that contributes to its lack of acceptance by scientists (Mathie *et al*. 2017). When studies have been undertaken attempting to use randomized controlled, blinded methodology, results are either insignificant or inconclusive, leading scientists to reiterate their claim that homeopathy is ineffective. On the other hand, it must be acknowledged that either homeopathy does something and needs to be used judiciously, or it does nothing, in which case sceptics have nothing about which to be concerned.

The *WHO Traditional Medicine Strategy* (2013) reports that homeopathy is used in over 100 member states. Practitioner training varies from short six-month courses to two-year diploma programmes (UK), whilst in some countries homeopathy is integrated into four-year naturopathic degrees at both undergraduate and master's levels (USA and Germany). In South Africa, homeopaths have a similar status to medical practitioners following a five-year master's degree and a one-year internship.

Several countries are taking steps to regulate homeopathic practice more stringently and to restrict its use and the availability of remedies for self-administration to the public. The American FDA, which regulates medicines and herbal remedies, has required additional scrutiny of homeopathic remedies since 2017, and actively discourages the use of homeopathic preparations as a replacement for conventional vaccinations (FDA 2019). Canada took steps in 2015 to regulate homeopathic practice in ways similar to that of the conventional health professions (Ng 2020). In the UK, a campaign to discredit homeopathy has led to calls for a ban on its availability via the National Health Service (NHS), despite the fact that many medical doctors trained in homeopathy have previously provided thousands of homeopathic prescriptions for patients (Fernandez and Taylor 2019). Although homeopathy is one of the most popular complementary therapies in France, from 2021 the government will no longer reimburse the cost of homeopathic prescriptions via its health service, stating that there is no evidence of benefit (Scott 2019). Germany is the only EU country in which homeopathy is not restricted and continues to be used by many

conventional healthcare professionals, including midwives. On the other hand, homeopathy is integrated into the conventional healthcare system in Mexico, while India has the largest proportion of homeopathic practitioners per head of population in the world (Abinavhavi 2014).

Tissue salts (sometimes called biochemical salts) are homeopathically prepared micro-doses of inorganic minerals found naturally in the human body. First formulated as medicinal products by Wilhelm Heinrich Schuessler in 1873, they are now incorporated as part of homeopathic practice. Schuessler (or Schußler) was a German medical doctor influenced by the teaching of Samuel Hahnemann and other homeopaths of the time. While mineral supplements replenish deficient mineral reserves in the body, tissue salts aim to support the body's healing processes by regulating electrolyte levels in the cells. Poor diet, stress, toxins and injury can block the homeostatic regulation of the cells, possibly leading to alterations in the sodium–potassium pump. It is theorized that tissue salts can boost the body's salt levels yet do not need to be broken down in the gastrointestinal tract before being assimilated, so that they facilitate the overall absorption of nutrients ingested in food. They are considered safe for pregnant women but should be taken selectively according to current symptoms. They are claimed to have no interactions with pharmacological medications, are non-addictive and, although most contain lactose, they are now also available without lactose for those with intolerances.

Flower essences, such as English Bach Flower Remedies, Australian Bush Flower Essences and the more obscure orchid essences and other traditional remedies using indigenous plants, are similarly energetic medicines although they are prepared differently from homeopathy and are used for different therapeutic purposes. Flower remedies are thought to tap into the energy of the sun, aiming to treat the emotional aspects of health and illness. It is claimed that they have no physical effects on the body, although the physiological impact of relieving emotional distress and trauma can be profound. The evidence base is almost nil, with just a few inconclusive studies investigating primarily Bach Rescue Remedy for stress (Muhlack *et al.* 2006; Resende *et al.* 2014; Rivas-Suárez *et al.* 2017; Wei Yang, Koo and Wang 2015). However, the remedies are available for public purchase and continue to have a following amongst homeopaths and consumers.

Traditional medicine systems

The WHO defines TM as "knowledge, skills and practices based on the theories, beliefs and experiences…indigenous to different cultures"

(WHO 2013). These include TCM and associated Eastern therapies, Indian Ayurveda and traditional African and Latin American medicine, although folk remedies are also used in parts of Europe and by aboriginal peoples in North and South America, Australasia and the Pacific region. All over the world TM focuses on a holistic body–mind–spirit approach, and incorporates the use of locally available plants, minerals and even animals. Treatment may also include massage and other manual techniques, dietary adaptations, exercises and meditation. Spiritual and religious rituals, chanting, prayers and music are also integrated in many TM systems; these are often shrouded in mystery and practised by shaman or witch doctors attempting to ward off the evil spirits believed to be responsible for ill health. Training varies, from observational work with experienced practitioners, as in African and many Latin American countries, to diploma and degree-level programmes for Chinese and Ayurvedic medicine, although there is also a worrying plethora of so-called "practitioner-level" courses that can be studied online at minimal expense. The WHO has accepted TCM and other traditional medical modalities into its global compendium, although this has not been universally welcomed (Hunt 2019).

TM is differentiated from CAM therapies and from folk medicine in that it is associated with discrete ethnic populations in defined geographical locations. TM usually involves a formal consultation with a local practitioner or healer, and is often integrated into a country's healthcare system, while folk remedies are passed on more informally by knowledgeable family members or friends, with little integration into local healthcare. For example, Asian systems of medicine have many ancient records with written philosophies and pharmacopoeia, and the Chinese government is committed to integrating TCM into conventional healthcare practice (Xinhua 2020). Conversely, African medicine is largely an oral tradition passed down from one generation to the next, although various governments across the continent acknowledge the significance of TM in their own regions.

The following are examples of TM:

- *Traditional Chinese medicine* (TCM) is based on the concept of meridians, energy lines that carry the body's life force (called Qi, pronounced "chee") and connect one part of the body to another. Excessive, deficient or stagnant flow of Qi causes disease to develop. Treatment incorporates acupuncture/acupressure, tuina massage, cupping, moxibustion, disciplined martial arts exercise such as Tai chi, diet and the use of indigenous herbs. Conventional medical education

in China has, for some years, been required to include TCM in its undergraduate curricula (Hua *et al*. 2017).

- *Indian Ayurvedic medicine* uses the principles of the five universal elements of space, air, fire, water and earth; these combine to form three energetic life forces or doshas which dictate individual predisposition to disease. Treatment to restore dosha balance may involve blood purification, massage, enemas or laxatives, essential oils and local herbs. There has traditionally been cross-referral of patients between orthodox and complementary practitioners in India, and further legal changes to integrate the two systems more comprehensively have been made (Math *et al.* 2015).

- *Japanese kampo* is traditional herbal and mineral medicine based on that used in TCM and employing similar principles, whilst being largely plant-based medicines with fewer alternative techniques. Kampo medicines are classified by their pharmacological actions into tonic, purgative, heat clearing, expulsive, dispelling dampness and harmonization and regulation of Ki (the Japanese name for Qi). Kampo is widely used in the Japanese conventional medical system and is available as over-the-counter medication for self-administration; costs can be reimbursed by the government.

- *Traditional African medicine* incorporates indigenous herbalism and African spirituality. Herbal medications are prescribed not only for their pharmacological actions but also for their symbolic spiritual significance. Treatments may consist of fasting, dietary adaptations, massage, bathing and surgical procedures. More culturally significant methods may include bleed cupping, zootherapy (use of animals and animal products), magic and shamanism. Healers are seen not only as practitioners of medicine, but also as custodians of traditional practices, religious beliefs and customs, and as informal counsellors, social workers and psychologists (Mokgobi 2014). The WHO published guidelines for the registration of traditional African medicine some years ago, to facilitate greater integration into the healthcare provision across the continent, particularly in sub-Saharan Africa (WHO 2017).

- In *Latin America*, *shamans* are also an integral part of TM practice. They attempt to treat energetic and spiritual disharmony through astral or spiritual "journeys", tapping into human, animal and plant spirit energy and acting as a conduit to transfer this positive energy

> to the ill person. Indigenous plants are used for their spiritual and biological powers. Countries vary in respect of acceptance and regulation, but some, such as Brazil, have introduced legislation to ensure consistency of standards and to preserve local traditions (Carvalho *et al*. 2014).

Although there is emerging research on some elements of TM, notably on Chinese acupuncture and on many of the herbal remedies incorporated into the various systems around the world, the overall evidence base generally remains limited. There is considerable experience of using TM and empirical evidence of effectiveness abounds, but formal scientific research is more limited, particularly in respect of safety. In addition, where TM has been found to be unsuccessful, perhaps resulting in a person's death, this may in some cultures be attributed to spiritual aspects, such as offending the ancestors, or being in possession of evil spirits which prevent recovery from illness, rather than any acknowledgement of potential NR toxicity, mismanagement or delay in obtaining conventional medical treatment.

However, the globalization of TM raises implications for training and the competence of practitioners, as well as the regulation of the remedies used, to ensure safety. This is of particular concern when TMs are used in combination with conventional healthcare in developed countries, especially if taken surreptitiously without informing orthodox medical practitioners. Many TM products are unregulated, even in their own countries of origin, and large amounts are now imported into developed countries, or are produced commercially and made available to purchase via the internet. Interestingly, in India, where Ayurvedic medicine is popular, the government took the unusual step in 2009 to proclaim almost 200,000 different traditional remedies and treatments as "public property" in a bid to prevent multinational companies from seeking commercial patents for them (Ramesh 2009).

TMs may occasionally be contaminated with toxic substances, either accidentally or sometimes intentionally – not with malicious intent but rather in the belief that certain additional substances enhance the therapeutic effect of the remedy. Specific remedies are banned in some countries due to irrefutable evidence of risk. An example of this is the herbal remedy, kava, which is banned in the UK, Germany, France, Switzerland, Australia and Canada due to concerns over its potential to cause liver toxicity (Pantano *et al*. 2016). It is still available in the USA although the issue remains contentious, and kava continues to be used in some cultures as a recreational herb (Kandola 2018; MHRA 2014).

TMs are sometimes made from animals and animal products, often involving endangered species. These include buffalo, leopard, reptiles, porcupine and pangolin in Africa, and clouded leopard, tiger, sea horse and bear amongst others in India, China and Mexico (Alonso-Castro 2014; Chakravorty, Meyer-Rochow and Ghosh 2011; Matthews-King 2019). Some products are imported from other countries, such as African rhinoceros horn used in China, Vietnam and other Far Eastern countries as an aphrodisiac and sexual stimulant (Hsu 2017).

The *WHO Traditional Medicine Strategy 2014–2023* (WHO 2013) aimed to "promote the safe and effective use of TM by regulating, researching and integrating TM products, practitioners and practice into health systems, where appropriate". By 2019, 170 countries (88 per cent of WHO member states) had formally developed policies, regulatory mechanisms and programmes to aid the integration of TM and CAM into national healthcare systems (WHO 2013).

Table 1 summarizes some of the features and the different mechanisms of action of the different types of NRs.

Table 1: Features of different NR modalities

	Derived from	**Mechanism of action**
Herbal remedies	Whole plants/parts of plants; includes oral, topical, inhalational, rectal, intravaginal, sometimes subcutaneous or intravenous use of essential oils	Pharmacological, i.e. chemical, mechanism of action – metabolized, utilized and excreted in the same way as drugs, irrespective of method of administration (although at different rates)
Aromatherapy	Essential oils extracted from different plants; administered by inhalation and topically via massage, creams, in water and as compresses	
Homeopathy	Plants, minerals, animal products, bacteria, viruses	Energetic remedies, mechanism of action not fully understood, based on quantum physics; not metabolized physically – NO pharmacological action
Tissue salts	Naturally occurring mineral salts used in homeopathic dilution, incorporated into homeopathic practice	
Flower remedies	Dilutions of plants, minerals, water prepared by exposure to sun or by boiling; aim to treat emotional aspects of health and illness	

	Derived from	Mechanism of action
Traditional medicines	Plants, minerals, animal products, bacteria; also manual therapies, nutritional and spiritual practices indigenous to different cultures around the world	Plant products act pharmacologically Other substances may work pharmacologically or energetically

2

The Use of Natural Remedies in Pregnancy and Childbirth

Surveys suggest that, in terms of herbal medicine, those most commonly used during pregnancy and birth, both in westernized and TM systems, appear to be aloe vera, chamomile, cranberry, echinacea, evening primrose, garlic, ginger, ginseng, peppermint, raspberry leaf and valerian (Cardoso and Amaral 2019; Kennedy *et al*. 2013). In addition, Bangladeshi women use lemon, prune, mustard oil and black seed (M. Ahmed *et al*. 2018), while Middle Eastern women favour thyme, sage, aniseed, cumin, fenugreek and olive oil (Al Essa *et al*. 2019; John and Shantakumari 2015). Aromatherapy is by far the most popular NR modality in developed countries, particularly by self-administration, but also professionally administered by independent practitioners and increasingly offered by midwives and doulas for labouring women.

Homeopathy and flower remedies tend to be less commonly used, or at least less commonly identified in research studies, surveys and authoritative publications. They are generally prescribed following professional consultation or self-administered by women already familiar with their therapeutic principles. The primary source of evidence for homeopathy in pregnancy appears to come from Germany where it is relatively well accepted alongside mainstream medical care (Münstedt *et al*. 2014), but no recent surveys identifying the incidence of use in pregnancy could be found. Homeopathic professional and regulatory organizations tend to expound the benefits of homeopathy in pregnancy, with advice to women on how to use

the different remedies appropriately, rather than to pursue more academic research on the incidence of use or any potential adverse effects.

In a hierarchy of usage, popularity and safety, pregnant, labouring and postnatal women's access to NRs appears to be via various means, from self-administration to professional consultation, namely:

- Self-administration without consultation with a healthcare professional, either orthodox or complementary.
- Self-administration following advice from maternity care professionals who are not qualified in the relevant therapy.
- Administration by maternity care professionals who have some training but who are not fully qualified in the therapy.
- Administration by, or self-administration following consultation with, maternity care providers who are fully qualified in the NR modality.
- Consultation with a qualified complementary therapy practitioner with little or no post-registration education on application of the therapy to pregnancy, labour and the postnatal period.
- Consultation with an independent qualified medical herbalist or homeopath, or with a culturally approved traditional medicine practitioner, who prescribes appropriate remedies.

Self-administration of NRs

The self-administration of NRs is particularly prevalent amongst pregnant women in all cultures, with documented statistics coming from both developed and developing countries. Surveys in westernized countries in recent years have suggested that anything from 1 per cent to 87 per cent of expectant mothers may be self-administering NRs (Close *et al*. 2016; Hall, Griffiths and McKenna 2011; Sibbritt *et al*. 2014; Trabace *et al*. 2015). A large multinational study of almost 10,000 pregnant women from 23 countries investigated women's use specifically of herbal remedies (Kennedy *et al*. 2013). The study identified an average use of NRs of 29 per cent, the highest incidence being in Russia (69 per cent), Eastern Europe (51.8 per cent) and Australia (43.8 per cent). Another study found 23 per cent of Danish women self-administering herbal remedies, many on a daily basis (Volqvartz *et al*. 2019). In the USA, the number of pregnant women using CAM therapies in general appears to be around 67–68.5 per cent (Johnson *et al*. 2016; Strouss *et al*. 2014), although Kennedy *et al*. (2013) found only 26.6 per cent specifically using herbal or

homeopathic remedies. Interestingly, an Australian study showed a relatively low use of herbal preparations, with the incidence of the most commonly used, raspberry leaf, evening primrose and spirulina, being under 5 per cent (Shand *et al*. 2016). This conflicts with earlier studies and is possibly not a true reflection of contemporary NR use by Australian women, especially given its popularity amongst midwives for use in labour (Frawley *et al*. 2015; Hall and Jolly 2014; Hall, McKenna and Griffiths 2012). In the Middle East, 72 per cent of pregnant women in Jordan use NRs, 56 per cent in Saudi Arabia, 49 per cent in Turkey and 22 per cent in Iran, while the increasing use of NRs for termination of pregnancy is causing concern (Al Essa *et al*. 2019; Ali-Shtayeh, Jamous and Jamous 2015; Kıssal, Çevik Güner and Batkın Ertürk 2017; Sabourian *et al*. 2016; Sattari *et al*. 2012). There appears to be less data on antenatal use of NRs in Latin America, although one Brazilian study indicated around 22 per cent of the general population using herbal medicines from garden plants, with women being the primary users (Zeni *et al*. 2017). Whilst NR use in pregnancy and labour is common across the world, it has, understandably, been shown to decrease during the postnatal period (Birdee *et al*. 2014).

However, as with studies of the non-pregnant population, the methodology used in many of these pregnancy-related surveys may not accurately reflect the real use of NRs. It is particularly difficult to elicit precise responses when women (and many health professionals) do not understand the differences between herbal, homeopathic and other types of natural remedies; often they do not recognize herbal teas as NRs, and nor do they appreciate the pharmacological nature of essential oils used in aromatherapy. Women may admit to self-administering a specific remedy yet do not take it correctly or in an appropriate therapeutic dose. They may seek aromatherapy treatment from a qualified practitioner but may identify more with the massage component (as a complementary therapy) than with the essential oils used (as NRs). Additionally, since many plants are used in both herbal medicine and homeopathy (same Latin names but prepared differently), surveys are dependent on women knowing the modality of the remedies they have used. This is because herbal remedies may be potentially toxic, yet the same plant prepared homeopathically and taken appropriately will potentially treat similar symptoms effectively without the pharmacological risk of toxicity. For example, blue cohosh (*Caulophyllum thalictroides*) is extremely toxic in its original herbal (pharmacological) form, whereas the highly diluted homeopathic (energetic) preparation, caulophyllum, from the same plant, can be a useful and safe remedy in labour.

Terminology and the way questions are asked of a study population may

also elicit different responses. In a survey of 889 Scottish women, McLay *et al.* (2016) found that when a closed question was asked, such as "Have you used herbs/herbal medicines during pregnancy?", the positive response rate was just 4.3 per cent. When a checklist with named remedies was used, of those who originally answered "no", there were, in fact, as many as 39 per cent who had used one or more remedies. Allen *et al.* (2014) also raise this issue, in respect of both NRs and conventional drugs and other substances, such as alcohol. Similarly, asking women about their use of a specific NR for a specific condition, such as "ginger for sickness", may also be flawed: many women, especially in the UK, rely on commercially produced ginger biscuits, which contain very little ginger, rather than taking an appropriate therapeutic dose liable to be effective as an anti-emetic (see Tiran 2012).

In the developing world, traditional birth attendants (TBAs) embrace the use of indigenous plants to aid the birth process. Nalumansi, Kamatenesi-Mugisha and Anywar (2017) found that TBAs generally appear to have good knowledge on NRs, although Aziato and Omenyo (2018) disagree, suggesting that their lack of knowledge can threaten women's wellbeing. Recorded rates of NR use in Africa range from 20 per cent in Ghana to 62 per cent in Sierra Leone and up to 73 per cent in Ethiopia, but the actual percentage of women using NRs may be considerably higher (Jambo *et al.* 2018; James *et al.* 2018; Nyeko, Tumwesigye and Halage 2016; Laelago, Yohannes and Lemango 2016). On the Indian sub-continent, a systematic review of NR use in pregnancy across seven different Asian countries found an average use of 47 per cent (Ahmed *et al.* 2017), whereas in Bangladesh alone it was found to be up to 70 per cent (M. Ahmed *et al.* 2018). Hispanic communities in the Americas also have high antenatal herbal medicine use, with reportedly "good understanding" of their therapeutic purposes and the potential risks to their babies (Green *et al.* 2017).

Expectant mothers use NRs for many reasons, the most popular being to aid relaxation and ease antenatal discomforts, to prepare for the birth and to facilitate physiological progress in labour. Women's decisions to use NRs are possibly taken after analysing information from a variety of sources before drawing final conclusions (Barnes *et al.* 2018). Cultural norms and personal philosophies about health, as well as a desire to manage one's own health, are significant factors in women's choices in the western world (Peprah *et al.* 2019).

Many women self-administer NRs to resolve pregnancy symptoms, as well as incidental minor illnesses such as the common cold (M. Ahmed *et al.* 2018). Sometimes they resort to NRs for more specific medical or obstetric complications, such as urinary tract infections (Kennedy *et al.* 2013).

Yuvaci *et al*. (2019) revealed that almost 60 per cent of Turkish pregnant women with mental health issues were taking herbal teas, often concomitantly with prescribed antidepressants. This included some, such as St John's wort, which is contraindicated, both in pregnancy and in conjunction with antidepressant medication (Apaydin *et al*. 2016). There is a widespread misconception that NRs have fewer side effects and are more effective than medically prescribed drugs (James *et al*. 2018; Wolgast, Lindh-Åstrand and Lilliecreutz 2019). Arabiat *et al*. (2019), amongst other authorities, stress the need for more education of the public by health professionals on the dangers of NRs, although current lack of knowledge of midwives, doctors, doulas and other birth attendants first requires a concerted effort towards professional education (see below).

In developing countries, poverty is likely to be a motivator to self-administration of NRs for obstetric and gynaecological conditions, in preference to accessing costly medical advice, which may also involve long and arduous journeys (Jambo *et al*. 2018). In addition, societal and cultural reliance on local healers, especially in Africa, may exert an element of pressure on women to use TMs. Countries with male-dominated societies, coupled with paternalistic conventional health services, cause women to seek privacy, and the fear of possible mistreatment at the hands of male staff has also been suggested as a reason for self-administration, especially by women seeking termination of pregnancy (Gerdts *et al*. 2017). In many countries, cultural traditions require women to adopt a specific lifestyle during pregnancy, usually involving dietary and social restrictions and administration of herbal concoctions, with any obstetric complications being attributed to failure to comply with these customs; feelings of guilt lead to delay in seeking appropriate conventional treatment, possibly compounding the adverse effects of any continuing NR use (Riang'a, Nangulu and Broerse 2018).

The desire to expedite labour appears to be prevalent worldwide, with anything from raspberry leaf to elephant dung being used (Muñoz Balbontín *et al*. 2019; Panganai and Shumba 2016). Using herbs and homeopathy for the relief of pain and aiding progress in labour is also common, while breastfeeding women in many regions, particularly in developing countries, use herbs to stimulate lactation (James *et al*. 2019; Maonga *et al*. 2016) or to aid recovery from birth, as in China (Wang *et al*. 2018).

There is also a worrying use of NRs for neonates and infants. Women in many African countries, from Ethiopia to Nigeria to South Africa, use various local plants for infant colic and teething (Adane *et al*. 2020; Di Gaspero *et al*. 2019; Nwaiwu and Oyelade 2016). In the Middle East, 78 per cent of neonates with jaundice are given herbal remedies, despite the

potential for many to be hepatotoxic, thus increasing the risk of kernicterus (Heydari *et al*. 2016). Even in the USA, 40 per cent of disadvantaged mothers in Houston, Texas, were found to be using honey pacifiers, despite honey being contraindicated in infants due to the risk of botulism from spores in the honey (Benjamins *et al*. 2013).

The use of natural remedies by maternity care professionals

Many midwives and birth workers advocate the use of NRs and other CAM therapies in their care of women during pregnancy and particularly in labour. In most cultures, the use of herbs and other NRs has been fundamental to childbirth for centuries, and many midwives and doulas want to return to the natural way of birthing that has been largely lost, especially in developed countries in which obstetrics presides over maternity care in a paternalistic, evidence-based, litigation-conscious manner.

There are, however, wide variations between countries in terms of education and training, practice, accountability lines and acceptance of NR use by midwives and other birth workers. Some maternity professionals are fully qualified in a therapy or have received maternity-specific training to enable them to use the therapy within strictly defined parameters to ensure safe practice. However, many more have little or no knowledge or understanding of NRs, particularly of the contraindications and precautions, correct doses, potential adverse effects and complications of inappropriate use, interactions with drugs or other orthodox treatments or their impact on maternal and fetal wellbeing and pregnancy and labour progress (Mollart, Stulz and Foureur 2019; Mollart *et al*. 2018). They are passionate about helping women to achieve physiological birth with as few interventions as possible but fail to acknowledge that any intervention, whether medical or "natural", is an interference in the intrinsic physiological process of pregnancy and childbirth.

Many midwives in Europe and Australia use essential oils combined with massage (Einion 2016; Hall, Griffiths and McKenna 2013), although most are not fully qualified in aromatherapy. Indeed, possession of a professional qualification in aromatherapy does not necessarily equip a midwife or doula to apply the principles of the therapy to its practice within maternity care. There is also an extremely worrying trend in some countries for midwives to undertake short maternity-specific courses in aromatherapy and then to attempt to train other colleagues, frequently without gaining practice to consolidate their own learning, and almost universally without adequate qualification or indemnity insurance to teach the subject (source: numerous communications with UK colleagues).

Whilst aromatherapy can offer a relaxing means of facilitating pregnancy and birth progress and is generally considered safe enough when used correctly, it could currently be deemed to be the most dangerous use of NRs in terms of inappropriate use, both by the women themselves but also when offered as an adjunct to midwifery or doula care. Women put their trust in maternity professionals to care for them safely, but this trust may be misplaced when midwives and doulas stretch their professional boundaries with the ill-informed use of aromatherapy. I have received numerous reports of pathological complications, sometimes attributable to the injudicious use of essential oils (source: communications with colleagues around the world).

In addition, the increasing number of aromatherapy studies undertaken by enthusiastic midwives with a poor understanding of essential oil safety is disturbing. A recent Iranian randomized, controlled, single-blinded study appeared to show the benefit of using lavender oil (type not specified) by inhalation for neonates undergoing painful investigative procedures such as venepuncture (Razaghi *et al*. 2020). However, essential oil use, especially by inhalation, is completely contraindicated in neonates due to rapid transfer across the blood–brain barrier and the need to metabolize the oils via an immature liver, risking serious toxicity (see Tiran 2016).

On the other hand, Italian midwives are proficient in the use of herbal remedies (Muñoz-Sellés, Vallès-Segalés and Goberna-Tricas 2013) and many obstetricians and midwives in Germany use homeopathy, although many feel the training is inadequate to ensure competence (Münstedt *et al*. 2014; Wiebelitz *et al*. 2013). Interestingly, since 2014, Belgian midwives have been permitted to use homeopathy after completion of a 50-hour course (Lombaerts and Vanthuyne 2018). Abedzadeh-Kalahroudi (2014) claimed that all midwives in the Middle East use NRs, although this statistic was not referenced, the type of NR was not specified and education of maternity providers on the safe use of NRs appears minimal and inconsistent. Many midwives and nurse-midwives in the USA use herbs in their practice, but most have less than five hours' training on the subject and many advise on, or administer, NRs without any specific training and often without medical knowledge or approval (Delmondao 2016; Dennehy *et al*. 2010).

In the developing world, where childbirth is often supported by unqualified TBAs, herbal medicines and other NRs are commonly incorporated into care, often with little, if any, formal training. Further, women's own use of NRs for general health, particularly to aid fertility, leads to continuing use during pregnancy, which appears to be condoned without question by TBAs (Kaadaaga *et al*. 2014). For most TBAs their experience and knowledge of NR use in pregnancy and birth is empirical, having been gained through

apprenticeship with colleagues or as part of their own families' usage (Aziato and Omenyo 2018; Shewamene, Dune and Smith 2017). Some countries are beginning to formalize training programmes for TBAs to ensure greater safety for women (Hernandez, Oliveira and Sharazian 2017; Ohaja and Murphy-Lawless 2017), but the proportion of time, if any, spent on learning about the safety of NRs is not clear.

The interest and the desire to act as the mother's advocate amongst all maternity professionals is laudable but does pose some risks when maternity professionals are not fully qualified in the use of different NRs. As with the general public, many midwives, doulas and some obstetricians seem to believe that there is no risk from NRs, usually because they do not appreciate the mechanism of action, notably of pharmacological herbal remedies, including essential oils used in aromatherapy.

3

Risks of Natural Remedies in Pregnancy and Birth

Whilst there are undoubtedly many benefits from using NRs in day-to-day life, especially for reproductive health and wellbeing, many consumers and health professionals fail to understand that "natural" does not mean these remedies are automatically safe; conversely, it does not mean that they are inactive. The greatest concern relates to herbal medicines, from both indigenous plants and TMs, mainly because these have pharmacological effects, are generally unlicensed and are easily accessible by the public. There are significant risks to women using NRs and TMs, especially during labour and when used in combination with conventional drugs.

Nothing is without risk. All NRs have physiological effects that may be either positive or negative depending on how they are used. However, it is important not to leap to conclusions about the potential adverse effects of NRs through lack of understanding of phytochemistry and energetic principles and the factors that may affect them. Risk needs to be put in context rather than being seen as absolute. NRs may indeed be safe enough, when prescribed by appropriately trained professionals with dual knowledge of both the specific modality and its application to pregnancy and birth. No single pharmaceutical drug is appropriate or safe for every individual with the same symptoms, and this principle also applies to the use of NRs. Drugs are prescribed following an assessment and careful decision-making about the most effective and safest treatment, with close supervision and evaluation of its effects. Professional practitioners of the various NRs also follow this

process, but this is not the case when women decide to self-prescribe NRs; indeed, what is appropriate for one woman is not necessarily safe for another.

Sceptics claim that any benefits of NRs are due to the placebo effect, particularly in relation to the poorly understood energetic medicines, but it must be acknowledged that a placebo can be a powerful entity in its own right. On the other hand, doctors are quick to blame "quack medicine" when an individual taking NRs develops untoward reactions, even though the symptoms may be unrelated to the remedies. Others criticize the apparent lack of evidence for both effectiveness and safety, although this is not a reason to reject consideration of risk: in some respects lack of evidence can pose more risk in human terms because healthcare professionals may choose to ignore these "alternative" remedies and may not be alert to the possibility of detrimental effects. Indeed, lack of evidence of the potential for harm is not the same as proof of safety.

There are several types of risk from NRs that may impact on maternal or fetal health and the progress of pregnancy and labour, including:

- Direct and indirect adverse effects of NRs.
- Potentially toxic effects of NRs.
- Interactions between NRs and drugs or other NRs.
- Specific adverse effects of NRs on pregnancy and labour.
- Contraindications and precautions to use of NRs in pregnancy and childbirth.

Direct and indirect adverse effects of NRs

Stub *et al*. (2016) consider direct risk in which NRs cause physiological complications through toxicity (see below), and indirect risk as a result of poor communication between patients and healthcare providers (human factors).

Indirect risk may arise from:

- Women's non-disclosure of self-administration of NRs without professional consultation.
- Women's non-disclosure of NR use prescribed by an independent qualified practitioner.
- Professional prescription of NRs by a qualified practitioner without communication with maternity care providers.

- Informal non-documented advice on NRs by well-meaning but ill-informed maternity professionals.
- Use of NRs integrated into conventional maternity care by maternity professionals without adequate knowledge.

Maternity professionals may be unaware of women's use or may fail to recognize the impact of NRs on a mother's or baby's condition or the progress of pregnancy or birth. Numerous surveys reveal that patients almost universally fail to offer information voluntarily to their healthcare providers about their use of NRs or other CAM therapies (Allen *et al*. 2014; Davis *et al*. 2012; James *et al*. 2018; Johny, Cheah and Razitasham 2017; Kelak, Cheah and Safii 2018). This non-disclosure occurs both in developed and developing countries, even when patients are being treated for serious medical conditions (Adane *et al*. 2020; Bahall 2017; Henson *et al*. 2017; Peprah *et al*. 2019). Non-disclosure applies both to the use of NRs that have been prescribed by an independent practitioner and to women's self-administration without appropriate professional advice.

Despite the incidence of NR use being higher amongst the pregnant population than most others, expectant mothers may think that it is not necessary for maternity carers to know about their use of NRs, or that they are not interested. They may fear having their views disparaged and their preferences disregarded. They may perceive conventional healthcare professionals as not knowing enough about NRs, or may not feel comfortable sharing information about their intended or actual use (Johny *et al*. 2017; Johny, Whye and Safii 2018). In developed countries, some women may be comfortable using NRs such as homeopathy, perhaps having used them for many years, and do not consider it important to inform their maternity care providers. Others commence self-administration of NRs in pregnancy as a replacement for medical drugs that they know are discouraged. This is commonly without any consultation with health professionals: women appear to gain most of their initial information on NRs from friends and family, with the obvious risk that it is not always accurate or comprehensive enough to ensure safe use (Kıssal *et al*. 2017; Pallivalapila *et al*. 2015).

The huge rise in the self-administration of NRs by the public, particularly when accessing potentially incorrect, incomplete or contradictory online information, frequently leads people to use NRs inappropriately, risking potentially harmful effects. Surveys suggest that women are largely unaware of the possible harmful effects of NRs (Barišić *et al.* 2017; Barnes *et al*. 2018; Bettiol *et al*. 2018). There is widespread acknowledgement amongst both conventional and CAM authorities that more research is needed on

the safety of NRs and that women must be encouraged to disclose their use, whether through professional consultation with the relevant practitioners or from self-administration (Boltman-Binkowski 2016; Bruno *et al*. 2018). Failure to do so may, at the very least, confuse the presenting symptom picture or complicate the woman's medical or obstetric condition or, in extreme cases, lead to serious toxicity and even fetal or maternal death.

Conversely, whilst most maternity professionals do not consciously enquire about women's use of CAM therapies and NRs, many expectant mothers are given superficial advice about the use of NRs by well-meaning midwives, doctors or doulas, often incorrectly (Al Essa *et al*. 2019; Barnes *et al*. 2018; Kennedy *et al*. 2013; Koc, Topatan and Saglam 2012; personal communications with colleagues). Indeed, recommendations to take herbal remedies that are contraindicated in pregnancy are three times more likely to come from a maternity professional than from an informal source (Kennedy *et al*. 2016). Maternity professionals generally know very little about NRs, but there is an increasingly urgent need for greater awareness as the incidence of use amongst pregnant women escalates exponentially.

Contemporary medical and midwifery education in most countries does not include the subject of "complementary therapies" or "natural remedies" as part of the pre-registration curriculum. In midwifery, those universities and other training establishments that do include the subject usually focus on the enjoyable relaxation effects of therapies such as massage or aromatherapy. Little coverage is given to the significant use of NRs by women in the preconception, antenatal, intrapartum or postpartum periods. In both midwifery and medical education, if an introduction to CAM is included, either at undergraduate or postgraduate level, this mostly explores the benefits as a means of increasing advocacy for women, and frequently fails to balance the subject with in-depth exploration of potential hazards and interactions with conventional care, based on contemporary evidence.

Some midwives and doctors seem either to disparage or reject NRs, effectively abdicating any responsibility to provide women with information through their own lack of knowledge. Conversely, others allow their enthusiastic advocacy for natural methods, and a desire to help women, to influence the advice they give. This can be evidenced amongst midwives in many parts of the world (Adib-Hajbaghery and Hoseinian 2014; Koc *et al*. 2012; Stewart *et al*. 2014). Occasionally, too, some doulas may use NRs clandestinely, especially in labour, perhaps in an attempt to maintain the balance of power between themselves and midwives or doctors (Stevens *et al*. 2011). Virtually all authors conclude that midwives, maternity nurses, doulas, medical staff and pharmacists need more education on the safe use of

NRs in pregnancy and childbirth, but despite the valiant efforts of specialist authorities on the subject, this is still very far from being made universally available.

Conversely, women may consult a qualified practitioner of herbal medicine, homeopathy, aromatherapy or TM during their pregnancies. Whilst western medical herbalists and homeopaths cover reproductive health as part of their pre-registration training, the subject of pregnancy – and particularly labour – is a post-registration aspect of aromatherapy and other complementary modalities. For many therapies, it is not mandatory to undertake specialist training on reproductive health in order to work with pregnant and newly birthed mothers. Further, post-registration maternity training is often superficial and poorly applied to pregnancy, birth and postnatal anatomy and physiology. Training is often provided by a therapy tutor with an interest in working with pregnant clients, or by a therapy tutor accompanied by a midwife, both of whom may be experts in their own field but who have limited understanding of how the two elements marry together.

There is little, if any, communication between complementary practitioners and conventional maternity professionals, protagonists on both sides of the health divide possibly believing that their particular expertise is sufficient to ensure safety for their clients. Poor interprofessional communication may also be due to medical dominance and a lack of appreciation of the roles of complementary practitioners (Nguyen *et al*. 2019). McIntyre *et al*. (2020) suggest that the use of a designated tool to ensure sharing of information between conventional and complementary practitioners could reduce the risks associated with non-disclosure by individuals. Further, this would ensure discussion on the impact of one modality with the other and enable better understanding of the impact of and interaction between orthodox and complementary care.

Disclosure of NR use requires two-way communication in order to avoid indirect adverse effects. This may be interaction between pregnant women and midwives and doctors, or between doulas and midwives, or between complementary practitioners and maternity professionals. At the very least, medical and midwifery staff should routinely ask expectant mothers about their use of NRs and document their answers in the women's maternity records. The question may need to be asked at the first antenatal appointment, in the third trimester when birth preparation is discussed and again in early labour to elicit what the mother may have taken already to aid progress and ease pain. Whilst the use of NRs tends to be less in the postnatal period, healthcare providers working with breastfeeding women should also be alert to their possible use of NRs. Conventional maternity

staff may not know all the answers to the women's questions, but taking note of their self-administration or prescriptions from independent practitioners at least highlights the possibility of interactions and adverse effects if a woman's condition deteriorates, particularly if no other reason can be found. An example of this would be the admission of a woman in apparently idiopathic preterm labour, who may have injudiciously been using NRs such as raspberry leaf, evening primrose or clary sage oil to prepare for birth but which prematurely stimulate contractions.

Zheng *et al*. (2019) go so far as to suggest the need for communication between governmental and professional bodies, and clinical, educational and research organizations, to enable maternity providers to inform women about the currently available evidence of efficacy and safety of NRs and to direct them to reliable sources of information. They also advocate the need for collaboration with patient support groups to educate those working with pregnant, labouring and breastfeeding women.

Many NRs cause unpleasant responses. These reactions may be anticipated or unanticipated and are related to both correct and incorrect administration (doses, mode, duration, etc.). Adverse reactions to NRs may exacerbate the presenting symptoms and tend to persist until treatment is discontinued or modified. Alternatively, a remedy may have no beneficial effect and the presenting symptoms may worsen; this is not technically an adverse reaction to the remedy but rather a consequence of the delay in obtaining appropriate medical treatment due to a misplaced reliance on the NR.

Appropriate prescription of NRs following an in-depth consultation with a knowledgeable, experienced medical herbalist, homeopath, aromatherapist or qualified TM practitioner is far less likely to result in adverse effects due to erroneous use. However, given that the majority of pregnant and childbearing women will be cared for by doctors, midwives, doulas and other birth workers, and the fact that huge numbers of expectant mothers are self-administering NRs, the potential for harmful effects is much greater.

There are several types of physiological reactions that may occur with NRs:

- Normal healing reactions to correctly administered homeopathic/energetic remedies.
- Abnormal reverse provings to incorrectly administered homeopathic/energetic remedies.
- Adverse reactions caused by direct side effects to pharmacological herbs and drugs.
- Indirect adverse reactions to pharmacological herbs and drugs.

A *healing reaction*, sometimes called an aggravation or Jarisch-Herxheimer reaction, is a normal, anticipated reaction to homeopathy or other energy-based medicines such as flower remedies (and also occurs with other CAM modalities such as reflexology or acupuncture). The effects usually occur at the start of a correctly prescribed course of homeopathic treatment; inappropriate prescribing either produces no reaction or a reverse proving (see below). The individual may experience a temporary, relatively mild aggravation of the presenting symptoms, new symptoms may develop, such as skin irritation, or old symptoms may re-emerge, for example discomfort at a healed fracture site. This is seen as the body attempting to expel toxic or antagonistic metabolites in response to appropriate treatment that aims to facilitate regeneration. Symptoms occur during this process because the body is attempting to cleanse itself of existing toxins faster than they can be eliminated: the higher the toxin levels, the slower the regeneration, and the healing reaction will therefore be more exacting. Indeed, lack of a healing reaction to a correctly prescribed remedy may infer that the remedy has not yet been effective in treating the person's condition. Previously, some CAM practitioners termed this effect a "healing crisis", but this implies a problematic response, whereas a significant healing reaction is welcomed as a mark that the correct treatment has been given and the body is reacting well to it. Unfortunately, the uninitiated may erroneously believe these anticipated healing reactions are "side effects" caused by the NRs.

Negative responses to homeopathic and energy-based remedies occur through incorrect use or overdose. If a homeopathic remedy is administered inappropriately, either the right remedy taken for too long, in too high a dose or too frequently, or the wrong remedy is used, a *reverse proving* occurs in which the person develops the symptoms that the incorrectly administered remedy is intended to treat. This means that, not only are the presenting symptoms and their cause not treated, but also new symptoms are superimposed on the original ones. An example sometimes seen in newly birthed mothers incorrectly taking homeopathic arnica to reduce perineal bruising is a reverse proving in which systemic bruising develops (usually due to taking tablets too frequently). It should be noted here that, since homeopathic remedies do not act chemically, increased doses are generally achieved by increasing the frequency of administration, not by increasing the number of tablets at each administration. Further, extremely frequent administration of remedies is usually applied only to very acute situations – for example, a primary postpartum haemorrhage may require a remedy to be administered every 30 seconds. Correct administration of homeopathic arnica after a normal delivery would involve taking one tablet

of an appropriate potency (commonly 30c) no more than four times daily for a maximum period of four days.

A reverse proving is an adverse reaction to a homeopathic remedy, not a side effect, since homeopathy does not act pharmacologically. There is no interaction of homeopathic remedies with other substances such as drugs or herbal medicines, although some prescribed medication can antidote (that is, inactivate) the remedies because they are chemically stronger. The easiest way to reduce the effects of inappropriate administration is simply to stop taking the remedy; unlike the metabolism of herbal remedies and drugs, there is no risk of negative reactions from sudden withdrawal, nor is there a continuation of pharmacological action until complete excretion of waste products.

It is, however, necessary to identify the precise nature of any untoward effects occurring during treatment with homeopathy. In Posadzki *et al.*'s systematic review of homeopathy (2013), 30 patients were reported as experiencing adverse reactions which were deemed to be "directly attributable" to the homeopathic prescription, while a further 8 suffered negative effects as a result of substitution of conventional medical care with homeopathy. However, their assertion that "homeopathy has the potential to harm patients…in both direct and indirect ways" fails to take account of those relatively minor reactions occurring in response to an appropriately prescribed dose of a remedy, that is, a normal healing response. Further, the authors provide an astonishingly comprehensive list of life-threatening conditions apparently "caused" by taking homeopathic medicines, including acute pancreatitis, bladder cancer, cardiac arrest and the need for renal dialysis. There seems to be little acknowledgement of the non-pharmacological nature of homeopathy and a reliance on the authors of the reviewed papers correctly identifying the adverse events as being related solely to homeopathy. Furthermore, failure to seek medical advice in favour of homeopathy cannot be viewed as an adverse effect of the homeopathy in particular: patients could self-administer any other substance instead of seeking medical advice, including over-the-counter drugs, yet this course of action would not be classified as an "adverse effect" of the drugs. In addition, some sweeping conclusions were drawn about the dangers of homeopathy, a fact that was challenged by several medical homeopaths in subsequent papers (Johnson 2014; Tournier, Roberts and Viksveen 2013; Walach, Lewith and Jonas 2013).

However, since 2011 the US FDA has received over 400 reports of adverse reactions in infants given homeopathic teething granules or gels (Abbassi 2017). These included infants suffering convulsions, dyspnoea, drowsiness, coma and gastrointestinal complaints, as well as 10 deaths thought to be directly attributable to the remedies. The FDA advised parents not to use

the products, and several companies have voluntarily withdrawn stock from sale; one company issued a recall on a homeopathic teething product found to contain inconsistent amounts of belladonna. This is therefore not an error in clinical prescribing but an error in commercial preparation of the remedy, but this issue is likely to be another setback for the acceptance of homeopathy. It is also possible that some parents used the remedies inappropriately, triggering reverse provings. Unfortunately, as with the adverse effects of herbal medicines, problems with homeopathy most likely occur with incorrect use due to poor knowledge and lack of understanding of the mechanism of action.

Herbal medicines, aromatherapy essential oils and many traditional remedies contain significant amounts of pharmacologically active ingredients, some of which are potentially toxic and liable to cause negative, sometimes serious, reactions. The term "adverse reactions" is often used to describe all negative responses to pharmacological substances, but technically, there is a difference between side effects and adverse effects.

Side effects are defined as undesirable, but sometimes anticipated, reactions that can be directly related to the chemical action of the remedy, usually from administration of a normal dose, perhaps over a prolonged period of time. Side effects are generally new symptoms arising shortly after commencing treatment, but they tend to resolve with time as the individual becomes accustomed to the causative agent. Side effects are generally less likely to occur with appropriately prescribed herbal remedies than with pharmaceutical drugs, in which a single active ingredient has been isolated from the plant and synthesized in order that a commercial patent can be obtained. An example would be aspirin, a side effect of which is gastritis. Its active component, salicylate, is derived from salicin in the bark of the willow tree. When taken correctly as a herbal remedy, other constituents in the willow bark act synergistically to suppress the gastric irritant effects that occur with salicylate in isolation.

Strictly, *adverse effects* are unexpected, detrimental indirect interactions with other chemicals, whether naturally occurring in the body, as with hormones and enzymes, or from chemicals entering the body, such as drugs, foods, recreational substances and environmental toxins. Additional factors impacting on the tendency to develop adverse reactions to drugs and NRs include gender, age, genetic predisposition, current state of health, tendency to allergies and concomitant administration of multiple pharmacological agents.

Since 2012, the EU definition of "adverse reactions" has included negative effects due to error (inclusion or omission), misuse or abuse, as well as

reactions to unlicensed medicines. For the purposes of this book, the term "adverse effects" is used throughout the alphabetical listing that follows to denote any negative responses, whether they are direct side effects or indirect adverse reactions.

Izzo *et al*. (2016) acknowledge the potential for adverse effects from NRs, identifying pregnancy, birth and childhood as particular risk periods. Individuals may experience adverse reactions or side effects to a named remedy, or to specific constituents within it. Ingestion, and dermal, respiratory, rectal, intravaginal or intravenous exposure, can contribute to adverse effects, primarily but not solely when administered in therapeutic doses. Effects may be acute or chronic; some effects may be immediate, or they emerge after prolonged use, for example carcinogenesis. Overdose or sudden withdrawal can cause deleterious reactions. Toxic compounds, either naturally occurring or from additives, such as mercury, lead or arsenic sometimes found in imported TMs, may also cause potentially lethal effects (Angelon-Gaetz *et al*. 2018; Sensi *et al*. 2019).

Adverse effects of all types are more likely to occur when women self-administer NRs without appropriate consultation with a qualified practitioner. Lack of knowledge poses a significantly increased risk of adverse reactions from NRs that are known to be contraindicated in pregnancy or birth, or that should not be used with certain medical conditions or treatments. Volqvartz *et al*. (2019) found that almost a quarter of pregnant women in Denmark were regularly administering herbal remedies, particularly ginger and liquorice. This is despite ginger having proven anticoagulant effects and the high salt content of liquorice being associated with hypertension, therefore requiring avoidance or caution in pregnancy. A review of Jordanian women's use of medicinal plants to aid conception found that many of the herbal remedies had antifertility actions (non-implantation, early miscarriage) rather than the presumed fertility-enhancing effects (Akour *et al*. 2016). In both developed and developing countries there is a concerning lack of knowledge amongst women about the correct doses, contraindications and precautions related to NRs and the need to avoid them altogether when taking prescribed drugs (Ghazali, Bello and Kola-Mustapha 2019; Smeriglio, Tomaino and Trombetta 2014).

Some authorities go so far as to suggest that health professionals should actively discourage women from using NRs during pregnancy and birth because the possibility of adverse effects is greater than any benefit that may be derived from the remedies (Muñoz Balbontín *et al*. 2019), although this may exacerbate the indirect risk of non-disclosure. Whilst there is little

formal research of specific obstetric risks from the injudicious use of NRs, there is growing empirical evidence of adverse reactions. Indeed, the self-use of contraction-promoting NRs, such as raspberry leaf, blue cohosh, castor oil, evening primrose and clary sage, before or during medical induction of labour, has been shown to increase the incidence of obstetric complications and fetal distress, in some cases by as much as 55 per cent (Dante *et al*. 2014; Panganai and Shumba 2016; Zamawe *et al*. 2018; personal communications with colleagues).

Table 2 summarizes the different reactions to NRs.

Table 2: Types of reactions to natural remedies

Healing reaction	Normal, anticipated, desirable elimination of toxic metabolites from administration of energy-based remedies such as homeopathy; seen as a requisite precursor to self-healing and resolution of presenting problem. Temporary, usually occurring at start of treatment; treatment should be continued
Reverse proving	Adverse, undesirable reaction to inappropriate or incorrect administration of a homeopathic remedy, triggering symptoms that the incorrectly administered remedy is intended to treat. Symptom picture is compounded by failure to treat with the correct remedy, with superimposed symptoms caused by the incorrect remedy. Treatment with the offending remedy should be discontinued
Side effect	Undesirable, possibly predictable, direct reactions to the specific remedy or to specific chemical components, often with administration of normal therapeutic doses; effects usually reduce as body becomes accustomed to remedy. Treatment may be continued but should be reviewed and discontinued if side effects outweigh the benefit of the remedy
Adverse reaction	Unintended, often unexpected indirect effects of pharmacological agents in combination with intrinsic or extrinsic chemicals entering the body; often dependent on individual susceptibility OR Negative unexpected reactions to incorrect administration, often due to lack of knowledge; may be unrecognized through women's non-disclosure; may cause life-threatening toxicity of major organs or body systems. Treatment should be discontinued, gradually or immediately (depends on precise remedy)
No effect	Pharmacological agents – may be due to non-therapeutic dose or placebo effect Energy-based remedies – may be due to administration of incorrect remedy or may be significant in terms of the healing process – further/different treatment is needed to trigger an appropriate healing reaction

Potentially toxic effects of NRs

Adverse effects of NRs, as with drugs, are usually mild to moderate, such as allergic reactions or gastrointestinal effects. Prompt recognition of anticipated symptoms and discontinuation of the remedy can minimize any exacerbation of direct side effects that may occur. True unexpected adverse reactions can, however, occasionally cause life-threatening toxicity, especially if there is a delay in the recognition of symptoms and continued use of the NRs. Acute toxicity is defined as the toxic effects of exposure, usually to a single or large dose, whereas chronic toxicity occurs with prolonged exposure, sometimes over months or years. In some cases, the toxicity potential of some chemical agents declines with time as the substances degrade, but with others, such as essential oils, degradation in the form of oxidation may increase the risk of adverse effects. Systems particularly affected include the hepatic, renal, cardiac, haematological or neurological systems. For clarification, it should be noted in the discussion that follows that the issue of toxicity applies primarily to pharmacologically active NRs rather than to homeopathic or other energetic medicine modalities.

Gastrointestinal effects such as transient diarrhoea may result from taking any herbal remedy, not simply laxative herbs. Nausea and vomiting, heartburn, indigestion and oesophageal reflux, abdominal pain and bloating may also develop. More prolonged effects can lead to dehydration, electrolyte disturbance, oesophageal varices and other serious systemic conditions. Common herbs that may cause gastrointestinal effects include aloe vera, cascara, senna and St John's wort, but many others will initiate symptoms in susceptible people. Upper gastrointestinal tract allergic reactions from the oral administration of some NRs include mouth irritation and ulceration, with swelling of the lips and tongue. Causative examples include celery, aniseed, pineapple, coriander, cumin, fennel, parsley, dandelion and hibiscus, ingested either as foods or herbal remedies. Direct lower gastrointestinal effects are, however, less common than the indirect stomach and intestinal symptoms resulting from toxicity to other systems.

Integumentary adverse reactions include skin or mucous membrane irritation, erythema, blistering, heat and inflammation. With prolonged use, eczema and psoriasis can develop. Some NRs may affect the skin irrespective of the method of administration. Skin sensitivity is the easiest adverse reaction to detect as it usually occurs during or shortly after topical administration (contact dermatitis or primary sensitivity) (Pokladnikova *et al.* 2016); dermal reactions to ingested NRs may take longer to develop (secondary sensitivity). Topical use of essential oils, such as tea tree and eucalyptus, can trigger primary sensitivity, notably but not exclusively when the oil has oxidized.

Other essential oils may be rich in phenols, including clove, cinnamon, basil, thyme and aniseed. NRs that may trigger secondary skin reactions include poison ivy, cannabis oil, castor bean, celery, chrysanthemum, echinacea, garlic, ginkgo biloba and Panax ginseng, as well as combination products (Palanisamy, Haller and Olson 2003). Phototoxicity, in which direct exposure of the skin to strong sunlight causes burning, blistering and pain, may result from the use of NRs such as St John's wort or furocoumarin-rich essential oils including bergamot, bitter orange, carrot seed, lemon and lime.

Vaginal steaming with herbs, popularly used after childbirth by indigenous peoples in southern Africa, Thailand, Indonesia and parts of Latin America, may impact on the mucus membranes and vaginal flora, predisposing the woman to vaginal irritation and infections (Hull *et al*. 2011; van der Helm *et al*. 2019). Similarly, injudicious long-term use of herbal and coffee enemas may damage the rectal mucosa (Lee *et al*. 2020; Prasad *et al*. 2012).

Respiratory reactions, including dyspnoea, rhinitis, asthma, hay fever, cough and respiratory arrest, can occur with both inhalational use – as with essential oil vapours – or with oral use. Some individuals are sensitive to specific plant groups and may experience a variety of allergic respiratory reactions from oral, dermal or inhalational exposure. Those who are allergic to the Asteraceae/Compositae family, which includes daisies, chrysanthemums, marigolds, ragwort and others, are particularly vulnerable to dyspnoea, hay fever, asthma and anaphylaxis. Occupational exposure to the dust from herbal preparations can also impair respiratory function (Golec *et al*. 2005).

Renal toxicity – the negative impact of NRs on the renal system – may only become apparent when there is severe kidney impairment. In pregnancy, variations in renal function may be deemed to be obstetric-related before any association with NR use is made. For example, the salt content of liquorice root consumption may cause fluid retention, hypertension and altered serum electrolytes (Asif 2012), possibly masquerading as severe pre-eclampsia. Cranberry and other herbs raise oxalate levels, increasing the risk of renal calculi, even though cranberry is often used to treat urinary tract infections and cystitis. Examples of common herbs that may adversely impact on the renal system include blue cohosh, cat's claw, ginkgo biloba, horsetail, juniper berry, ma huang, pennyroyal, stinging nettle, St John's wort and yohimbe. Concern has also been expressed about the potential renal toxicity resulting from the use of Chinese medicinal herbs (Yang *et al*. 2018).

Liver toxicity is a very real risk of many herbal remedies administered orally, or even via the skin, respiratory tract or other routes, since the liver is the primary organ of metabolism and detoxification. Some herbs, such as agrimony, are significantly hepatotoxic (Cho *et al*. 2018), whereas others,

for example echinacea, may only cause problems in susceptible individuals following prolonged use. An online Editorial from *The Lancet* (2018) suggested that the incidence of liver toxicity from herbal supplements has risen steadily in the last decade and now accounts for 20 per cent of all drug-induced cases in the USA, and an unbelievable 70 per cent in Singapore and South Korea. Andrade *et al*. (2018) suggest that, as women are more likely than men to resort to herbal medicines, they are statistically more prone to hepatotoxicity and therefore at greater risk of needing liver transplants or of dying from liver disease.

Early signs of developing hepatic pathology may be non-specific, possibly delaying recognition of NRs as the causative factor. Symptoms include tiredness and lethargy, nausea, vomiting, abdominal cramps and diarrhoea, as well as dermal hypersensitivity and rashes. Some of these may be misinterpreted as an exacerbation of physiological antenatal disorders until other signs such as fever and jaundice follow. However, the symptom picture can be similar to that of general hepatic disease, and it is essential that midwives and obstetricians are alert to the possibility of women ingesting NRs that may precipitate adverse hepatic reactions. This is especially significant in the event of suspected obstetric cholestasis. Many herbal remedies used in Chinese, Ayurvedic and Japanese kampo medicine are reported to cause hepatotoxicity, notably in those containing multiple ingredients, although this may sometimes be due to contaminants rather than the specific remedies (Iwata *et al*. 2016; Liu *et al*. 2018). Indeed, Teschke and Eickhoff (2015) call for herbal remedies to be reclassified globally as drugs since the risks of hepatotoxicity are significant. Examples of herbs that are potentially hepatoxic include: black cohosh, borage, echinacea, fennel, greater celandine, green tea, juniper berry, kava, marjoram, nutmeg, pennyroyal, skullcap and valerian.

Although less common than hepatic or renal adverse effects, *cardiovascular toxicity* can be serious, and mostly involves changes in cardiac electrical conduction or damage to cardiac muscle function, leading to inefficient circulation of the blood. Symptoms of developing cardiotoxicity include oedema, tachycardia, a dry non-productive cough, weakness and vertigo. Some plant medicines have a direct effect on the heart and cardiovascular system, such as deadly nightshade, liquorice and mandrake. A systematic review by Jalili *et al*. (2013) found hypertensive effects of herbs such as bitter orange, blue cohosh, dong quai, ginkgo, ginseng, liquorice, ma huang, pennyroyal, senna, St John's wort and yohimbe, whilst others may reduce blood pressure, including cat's claw, garlic and kudzu (Tabassum and Ahmad 2011). This means that these herbs would be contraindicated in women with

hypertension, particularly those taking medication, and caution should be employed by women with low blood pressure who take hypotensive herbs. Cardiovascular symptoms may also arise from the adverse effects on other systems, usually with excessive or prolonged use of specific remedies.

Neurotoxicity – toxins in some NRs can affect the peripheral and/or central nervous systems, causing damage to the neurons and impacting on neurological activity. Symptoms include anxiety, depression, confusion and behavioural changes, weakness and numbness of the limbs, loss of bodily functions with altered reflexes, impaired vision, headaches and sexual dysfunction. Toxic effects on the autonomic nervous system are significant and can affect the cardiovascular, respiratory, gastrointestinal and endocrine systems. Potentially neurotoxic herbs include opium, cannabis, deadly nightshade, henbane, hemlock, yellow vine and angel's trumpet. Even popular essential oils such as peppermint and tea tree can, when taken orally, cause unconsciousness, convulsions and other near-fatal effects (Hammer *et al*. 2006; Nath, Pandey and Roy 2012).

Anticoagulant and antiplatelet effects of herbal remedies and TMs can also be significant. Many herbs are known to have substantial amounts of chemical constituents such as salicylates that affect clotting factors or platelet aggregation. Early effects may include widespread bruising of the skin, increased clotting time for minor injuries or, in pregnancy, excessive bleeding of the gums and apparently idiopathic vaginal bleeding. Medical herbalists have long been cautious when prescribing remedies for patients on anticoagulant therapy such as heparin or warfarin, or taking other medicines or therapeutic doses of herbs with a similar action, such as aspirin or ginger (Abebe 2019; Choi, Oh and Jerng 2017; Stoddard *et al*. 2015). Indeed, the evidence for the anticoagulant effect of numerous herbal remedies, coupled with the potential central nervous system depressant effects of some, has led anaesthetists to advise patients due for elective surgery to discontinue all herbal remedies for at least two weeks prior to surgery (Kam, Barnett and Douglas 2019). This would be good advice for women booked for elective Caesarean section or other planned surgery during pregnancy. Similarly, women requiring dental surgery or extractions during pregnancy should be advised to inform their dentists prior to the procedures. Some examples of herbs known to have anticoagulant and/or antiplatelet effects include angelica, bromelain, chamomile, cinnamon, dong quai, evening primrose, feverfew, garlic, ginger, ginkgo biloba, meadowsweet, St John's wort, turmeric and willow bark.

Conversely, some herbal remedies, such as coenzyme Q10 and goldenseal, increase the risk of clotting, a factor that may be significant in the perinatal period when maternal clotting factors naturally increase to prevent torrential

haemorrhage at delivery. Theoretically, unreported self-administration of these herbs, particularly over a prolonged period, could significantly disrupt the coagulation mechanism, increasing the risk of disseminated intravascular coagulation in the event of severe postpartum haemorrhage.

Carcinogenicity tends to occur with prolonged use and may not become apparent for some time. Several herbs have been shown to have potential cancer-causing effects, including aloe vera leaf (Guo and Mei 2016). Another herbal remedy, Aristolochia clematitis, also known as birthwort, is used in Chinese medicine, but it is banned in many countries as there is considerable evidence to indicate that it may cause carcinoma in the upper renal tract (Hoang *et al*. 2016).

Musculoskeletal adverse effects tend to be non-specific and may result from toxicity to other systems. Muscle and joint pain may occur, but ataxia, reduced bone density and other symptoms can develop with prolonged exposure to the culpable plants.

Immune system effects can be considerable from herbal remedies and most of the literature explores the immunostimulant action of different plant substances, notably echinacea (Bone 2012; Karsch-Völk *et al*. 2014). However, caution should be employed in women with existing immune system disorders such as rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel disease, multiple sclerosis, type 1 diabetes mellitus, Guillain-Barre syndrome and psoriasis.

Interactions between NRs and drugs or other herbs

Interactions can occur between herbal remedies and drugs or between two or more herbs used concomitantly. Since herbal remedies, like drugs, are metabolized by the liver, the potential for hepatotoxicity is substantial if NRs are taken injudiciously. Complex cytochrome P450 (CYP450) enzymes (proteins), located in most organs and tissues of the body, act to metabolize endogenous substances in the liver, kidney, lungs, digestive tract and other tissues; this is thought to be the prominent mechanism for processing foreign molecules entering the body. The composition of the CYP450 mechanism is affected by genetic, environmental and lifestyle factors, influencing the metabolism of drugs and other substances. This means that two competing chemicals requiring metabolism by the same CYP450 enzyme may interact with one another, leading to the dominance of one substance over the other (potentiation or prolonged effects), or conversely inhibition (suppressing one substance and increasing the half-life of the other).

Interaction may prevent the full detoxification process of the foreign

chemicals or cause retention of metabolites that should have been eliminated, the latter in some cases having a longer-term effect in the form of carcinogenesis. Further, when humans or animals ingest secondary plant metabolites, there can be significant disruption of metabolic pathways within the body, triggering serious adverse effects. St John's wort is a particular example of a popular herbal remedy found to have a significant impact on the CYP450 mechanism in humans; it is known to interact with the contraceptive Pill, anticoagulants, antidepressants, certain antivirals, immunosuppressants, narcotics, digoxin, antirejection drugs used after organ transplant and others (Awortwe *et al*. 2018; Mayo Clinic 2017). On the other hand, some phytochemicals can increase detoxification by inducing CYP450 metabolism, including chemicals found in citrus fruits, particularly grapefruit, plants from the cabbage family, grapes and several spices. Patients on certain drugs are advised to avoid these foods to prevent an overly rapid metabolism.

Common herbal interactions can occur when a woman is taking anticoagulants or antiplatelet medications, including heparin, warfarin and enoxaparin, as well as non-steroidal anti-inflammatories, for example aspirin, particularly in conjunction with therapeutic doses of remedies such as ginger, feverfew or ginkgo biloba and others (Di Minno *et al*. 2017). Antidepressants, notably tricyclics, and monoamine oxidase inhibitors may interact with ginseng, kava and St John's wort (Nicolussi *et al*. 2020), and anti-epilepsy medication may be affected by grapefruit, echinacea, St John's wort and evening primrose (Rašković *et al*. 2014). Nutmeg, either in therapeutic oral doses or inhaled as an essential oil, is hallucinogenic and may interfere with the pharmacology of pethidine (Swerts *et al.* 2014).

Hypoglycaemic effects can occur with some herbs and women with diabetes mellitus should avoid these, although non-diabetics can also experience the effects of a fall in serum glucose. Examples include aloe vera, astralgus, cassia, coenzyme Q10, garlic, ginger, Panax ginseng, Siberian ginseng and St John's wort. Medication for cardiac and cardiovascular conditions may interact with ginger, motherwort, ginseng, liquorice, black pepper essential oil, peppermint essential oil, passiflora, coenzyme Q10 and St John's wort. Kava and coenzyme Q10 are contraindicated with certain antiemetics, whilst other herbs interact with certain anaesthetics, antihistamines, antihypertensives and antacids. Phyoestrogenic herbs such as blue cohosh, ginseng, liquorice, raspberry leaf, red clover, St John's wort and vitex agnus castus should be avoided with oxytocics in labour and postnatally when recommencing the contraceptive Pill.

Pregnancy and labour already place physiological demands on the woman's body, and those who require prescribed medication for obstetric

complications or pre-existing medical conditions must be strongly advised to avoid all herbal remedies unless prescribed by a qualified, experienced medical herbalist. Caution is needed when using aromatherapy essential oils and TMs to avoid either complicating the symptom picture further or masking any worsening of the mother's condition.

Specific adverse effects of NRs on pregnancy and labour

A comprehensive systematic review of almost a hundred studies involving over a million pregnant women showed significant negative effects from inappropriate use of herbal remedies (Muñoz Balbontín *et al*. 2019). For example, raspberry leaf was shown to be associated with an increased need for Caesarean section; liquorice and ingestion of sweet almond oil were associated with preterm labour; and several studies found evidence of interactions between herbal remedies and obstetric drugs (Brantley *et al*. 2014; Illamola *et al*. 2020; Lake and Olana Fite 2019). Amongst the indigenous African population, antenatal and intrapartum use of NRs is associated with a high rate of postnatal and neonatal complications (Fukunaga *et al*. 2020). Increasingly, expectant mothers are putting their own and their unborn babies' health at risk due to lack of knowledge about NRs, notably herbal medicines and aromatherapy essential oils, as well as a general lack of communication with their healthcare providers who are, in turn, poorly informed (Bruno *et al*. 2018).

There are many herbal remedies and TMs that are completely contraindicated in the preconception period, pregnancy, labour and during breastfeeding. Examples include, but are not restricted to:

- Aconite
- Agrimony
- Ashwagandha
- Belladonna
- Birthwort
- Blue cohosh
- Boldo
- Butterbur
- Cascarilla
- Cinchona
- Colchicum
- Coltsfoot
- Comfrey
- Deadly nightshade
- Henbane
- Kava
- Khat
- Lady's mantle
- Lobelia
- Opium
- Pennyroyal
- Rue
- Staphysagria
- Tansy
- Wormseed
- Wormwood
- Yohimbe

When NRs are used in the preconception period and early pregnancy, there are risks of teratogenicity and mutagenicity. For example, Lin *et al*. (2019) found an association of ginseng and other Chinese herbs with low birth weight and preterm birth when taken by women undergoing assisted reproduction. Many herbal remedies cross the placenta and may be toxic to the embryo, including autumn crocus, comfrey, mistletoe, pennyroyal, pokeroot, tansy and wormwood and herbs used in Chinese medicine (Li *et al*. 2015). Even the ubiquitous ginger, an extremely popular remedy for pregnancy sickness, may be teratogenic in large quantities and contribute to fetal loss (Eid and Jaradat 2020; Stanisiere, Mousset and Lafay 2018). Others are known abortifacients (causing uterine contractions) or emmenagoguic (causing menstruation-like vaginal bleeding) and can, on occasion, be fatal (Ossei *et al.* 2020). Emmenagoguic NRs increase the risk of threatened miscarriage, antepartum or postpartum haemorrhage, whilst those that trigger contractions may contribute to preterm labour, intrapartum hypertonic uterine activity or excessive postnatal bleeding in susceptible women.

Some NRs may also have adverse effects on neonates, especially with prolonged use during pregnancy or excessive use near term. For example, cannabis may contribute to an increased risk of psychotic-like episodes in neonates (Bolhuis *et al*. 2018; Gunn *et al.* 2016), and there have been several reports over the years of serious neonatal effects of blue cohosh, commonly used in the USA to expedite labour, including epileptic-type convulsions, stroke and congestive heart failure (Datta *et al*. 2014; Dugoua *et al*. 2008; Finkel and Zarlengo 2004; MacPherson and Kilminster 2006).

Essential oils work somewhat differently in respect of embryological risk. Although essential oil molecules cross the placental barrier, the risk of toxicity depends on the concentration, method of administration (respiratory or dermal) and the proportion of different chemicals thought to have adverse effects on cell formation. Conversely, essential oils known to have emmenagoguic properties may contribute to threatened or actual miscarriage. However, it is fair to state that when used appropriately in minimal doses up to a maximum of 1.5 per cent, some – but certainly not all – essential oils should be "safe enough" in pregnancy. Women should be advised to avoid all aromatherapy oils unless they are informed that they are safe to use. Most issues with essential oil safety arise from a desire to enjoy the aromatic benefits without understanding the pharmacological impact of aromatherapy.

Self-administration of herbal remedies and TMs in conjunction with drugs prescribed for a specific clinical indication is of concern, not least due to non-disclosure. A common example is the use of NRs such as raspberry

leaf or clary sage essential oil to encourage uterine contractions at the same time as oxytocic induction of labour is undertaken (source: numerous communications with colleagues). Until further evidence is available on the safety of NRs for induction of labour, it is recommended that they are not used (Zamawe *et al*. 2018). It is essential that women are questioned about their use of NRs immediately prior to and during labour, even when it is of spontaneous onset. Continuation of intrapartum self-administration of uterotonic herbs can lead to disturbed uterine polarity, hypertonic or hypotonic contractions, fetal distress and, in extreme circumstances, placental separation and catastrophic haemorrhage or uterine rupture with fetal and maternal death.

Herbs and oils contraindicated in pregnancy due to their potential to cause uterine contractions include:

- Angelica
- Aniseed
- Arbor vitae
- Ashwagandha
- Barberry
- Basil
- Betony
- Bitter orange
- Black cohosh
- Bloodroot
- Blue cohosh
- Caraway
- Celery seed
- Cinnamon
- Clary sage
- Clove bud
- Cowslip
- Devil's claw
- Dong quai
- False unicorn root
- Fennel
- Fenugreek
- Ginger
- Goldenseal
- Jasmine
- Juniper berry
- Marjoram
- Motherwort
- Mugwort
- Oregano
- Parsley
- Passiflora
- Raspberry leaf
- Rosemary
- Saffron
- Sage
- Shepherd's purse
- Thyme
- Turmeric
- Vervain
- Wild yam
- Yarrow

(Note: Small amounts of those herbs commonly used in cooking are generally safe and some are suitable for use with caution during or after labour.)

Altered physiology during the childbearing year further increases the risks from metabolism of NRs. For example, glomerular filtration fluctuations impact on renal excretion of chemical substances, and glucose metabolism

may be impaired when NRs with hypoglycaemic potential are used, such as ginseng, fenugreek and bitter melon, as well as various plants used in Chinese and Ayurvedic medicine (Hui, Tang and Go 2009). Similarly, the natural haemodilution in pregnancy may be exacerbated by herbs known to reduce iron levels, such as turmeric, possibly leading to pathological anaemia (Smith and Ashar 2019).

Contraindications and precautions to use of NRs in pregnancy and childbirth

It is fascinating to note, in the debate on the safe use of NRs, that very few authorities apply the principles of NR risk to the complexities of specific medical conditions. There is a dichotomy between orthodox and complementary medical advice. The conventional healthcare sector usually states generic contraindications, primarily in relation to herbal medicines, as: pregnancy and breastfeeding; concomitant use with prescribed drugs; serious health issues such as liver or kidney disease; impending elective surgery; and children under 18 and adults over 65 years of age. This broad advice is wise but is not specific enough, is not based on any in-depth professional knowledge of doctors and pharmacists, and fails to take account of the increasing self-administration of herbal remedies by the general public. The added injunction to "contact your doctor or pharmacist before taking herbal remedies" is also not particularly helpful, especially since some medical practitioners disparage NRs, and many will not have adequate knowledge of the pertinent issues of self-administering NRs; thus the potential that patients will not seek guidance is very real.

Similarly, conventional healthcare sources state, correctly, that homeopathic remedies may contain potentially harmful substances yet fail to set this in the context of the mechanism of action of homeopathy, by which the toxicity of substances prepared homeopathically (that is, diluted and succussed) is rendered pharmacologically inactive. An example is the use of arsenic. Many people are aware that arsenic can be fatal in large doses and may cause profuse vomiting, diarrhoea, headache, tachycardia and palpitations in lower doses – these are adverse reactions to the chemicals. However, homeopathic arsenic treats the same symptom picture, with any changes in symptoms being healing aggravations rather than the toxic effects of arsenic.

European, US and Australian government attitudes towards TMs and "folk medicine" from China, India, Africa and elsewhere is similarly judgemental, implying an intrinsic belief that, since TMs originate from

cultural groups, largely in developing countries, they cannot possibly be as safe, reliable, effective or acceptable as conventional pharmaceutical drugs. The pharmaceutical companies come under extensive criticism in this respect, although in fairness, many companies are investigating the components of TMs for development into mainstream drugs. The arrogant attitudes of western governments towards TMs may only partly be attributed to the commercialization of the pharmaceutical industry; the real issues go beyond this to an inherent distrust of anything that is not home grown and that does not fit contemporary established principles.

On the other hand, in regions of the world where TMs are used by large numbers of the indigenous populations, government approval may take a different stance. For example, in Africa, whilst TMs are not necessarily incorporated into allopathic medicine, a greater appreciation of the public's reliance on TMs has led many governments to develop national policies and regulatory frameworks for TM. By 2010, 22 African countries were engaged in research on the medicinal potential of plants used in TM, and the number of marketing authorizations for individual TM products ranged from 1 in Cameroon to over 1000 in Ghana and Nigeria; several countries also included TMs in their lists of nationally approved drugs (Mothibe and Sibanda 2019). The Japanese government tacitly acknowledges the place of kampo, and China and India are making rapid progress in integrating TMs further into conventional healthcare. However, in the Far East, since national personality characteristics favour deference to authority, governmental advice focuses more on seeking help from appropriately trained practitioners of TM rather than on the issues of self-administration, despite the increasing availability of over-the-counter remedies.

Generic government-produced safety statements in westernized countries are intended to cover the widest range of the general public and serve to relinquish any real sense of responsibility since herbal, homeopathic and traditional remedies are not generally part of a country's orthodox healthcare system. The popular media reinforces this by sensationalizing case studies in which people have suffered severe, often fatal or bizarre adverse effects, using disparaging and inflammatory language, and generally siding with the prevailing government advice. Conversely, sources of public information from complementary medical organizations tend to focus on the benefits of remedies prescribed by trained practitioners or those that can be self-prescribed and administered. Essentially, conventional healthcare authorities focus on the potential negative effects of NRs whilst complementary medicine organizations focus on the positive side as an alternative to pharmaceutical preparations.

All of this is sensible, if slightly ambiguous, advice, on both sides of the dilemma, but it does not take account of the tsunami of ill-informed self-administration of NRs, particularly when combined with conventional healthcare. Nowhere is this more significant than in maternity care. There are some women in whom NRs should be avoided completely (see above), whilst for others there will be some precautions, based on their individual medical or obstetric history and current condition. Despite this, Kennedy *et al*.'s comprehensive survey (2013) identified 126 specific herbal medicines being used by pregnant women, of which 27 were contraindicated at this time and 60 were classified as "requiring caution in pregnancy".

As a basic rule of thumb, women in the preconception, antenatal, intrapartum and postnatal periods, whose medical and obstetric conditions fit into the spectrum of physiological normality, may be eligible to use certain NRs if they so choose, subject to the issues previously discussed in respect of appropriate selection and doses, recognition of adverse reactions and avoidance of any remedies contraindicated at this time. For all other women, it is necessary to determine those for whom NR use is an absolute contraindication and those in whom caution may be required. In reality, this can be difficult and tends to be a matter of degree. It may be related to the specific condition and its severity, such as whether it is acute or chronic, obstetric-related or a general medical condition. Safety may depend on the specific NR the woman intends to use and whether it is prescribed by a suitably qualified practitioner or is self-administered. The modality of the NR may dictate whether or not it is safe in any given situation, for example herbal or homeopathic medicines.

Any woman with maternal, fetal or general obstetric pathology, especially those requiring medical intervention or pharmaceutical drugs, should avoid all NRs. Those with pre-existing medical conditions or incidental non-obstetric-related pathology developing during pregnancy should also avoid using NRs. The interaction between the disease process and the normal physiological adaptations of pregnancy place an already heavy burden on the woman's system, which the use of NRs can only complicate further. Major pre-existing hepatic, renal, cardiac and neurological conditions, as well as women living with cancer, fall into this category (Damery *et al*. 2011). Indeed, any woman requiring hospitalization during pregnancy for any reason other than physiological labour must be asked if she is taking any NRs and be strongly advised to stop. She should be advised that continuing to do so may compromise her condition and may affect the medical treatment she is able to receive. Should a woman decide to continue her use of NRs, medical staff, including obstetricians, paediatricians, anaesthetists and other

attending physicians, must be advised, and the fact of her self-administration highlighted in the medical notes. Similarly, maternity carers providing NRs such as essential oils in the form of aromatherapy should discontinue their use in the event of pathological complications developing.

Table 3 identifies some of the medical and obstetric contraindications and precautions to the use of NRs. A few major medical or obstetric conditions are considered absolute contraindications; all others are precautions to the use of NRs and healthcare professionals should employ all normal judicious decision-making to determine the appropriateness or otherwise of NR use for individual use.

Table 3: Contraindications and precautions to NRs

System	General medical conditions	Pregnancy-induced conditions
Hepato-biliary/ renal systems	Severe renal disease* Liver disease, cirrhosis, transplant* High intake of substances metabolized by liver including recreational drugs, alcohol dependence* Gall bladder disease, gall stones, renal calculi	Obstetric cholestasis* Acute fatty liver of pregnancy* HELLP syndrome* Recurrent urinary tract infections
Cardiovascular/ haematological systems	Anticoagulants, antiplatelet drugs* Coagulation disorders, e.g. von Willebrand's disease, thrombocytopaenia, haemophilia, antiphospholipid syndrome History of embolism, DVT, severe thrombophlebitis* Essential hypertension Iron deficiency, sickle cell, other anaemias, folic acid deficiency	Prophylactic aspirin, heparin, warfarin, enoxaparin, etc. Threatened miscarriage, antepartum haemorrhage Severe primary or secondary postpartum haemorrhage Symptomatic uterine fibroids Deep vein thrombosis, pulmonary embolism* Disseminated intravascular dissemination due to major postpartum haemorrhage* Severe varicose veins Gestational hypertension, pre-eclampsia Pregnancy-induced anaemia, folic acid deficiency

Neurological system	Epilepsy* Migraines, frequent or requiring medication Multiple sclerosis History of stroke	Eclampsia* Guillain-Barre syndrome* Intractable headaches, cluster headaches in pregnancy Bell's palsy or stroke occurring during pregnancy/postnatal period
Gastrointestinal system	Irritable bowel disease, Crohn's disease, diverticulitis, ulcerative colitis, gastric/peptic ulcer Excessive vomiting of unknown cause	Severe oesophageal reflux requiring medication Hyperemesis gravidarum*
Endocrine system	Diabetes mellitus Thyroid disease Cushing syndrome, Addison's disease Pituitary tumours	Gestational diabetes Gestational thyroid conditions Molar pregnancy, chorioncarcinoma, phaeochromocytoma Postpartum hypopituitarism
Respiratory/ pulmonary system	Asthma Pneumonia, tuberculosis	Dyspnoea – consider differential diagnosis, e.g. gestational anaemia
Immune system	Major infections of any type or origin; pyrexia Tendency to/history of allergic reactions Cancers of any type or origin Systemic lupus erythematosus Antiphospholipid syndrome HIV/AIDS	Major infections of any type or origin; pyrexia Autoimmune conditions precipitated by pregnancy*
Integumentary/ musculoskeletal systems	Skin sensitivities, severe eczema, psoriasis Any musculoskeletal condition requiring regular medication, particularly if metabolized via the liver	Obstetric cholestasis*
Psycho-social issues	Schizophrenia, bipolar syndrome* Substance misuse/dependency* Morbid obesity	Antenatal/postnatal depression requiring medication*

System	General medical conditions	Pregnancy-induced conditions
Reproductive system	Uterine fibroids, endometriosis Fertility issues – notably assisted reproduction Hormone-sensitive cancers – breast, ovary, uterus, cervix* Sexually transmitted infections Polycystic ovarian syndrome	Maternal obstetric complications, identified by systems above Preterm labour, history of precipitate labour Multiple pregnancy, especially higher multiples Abnormal presentation/lie – breech, transverse, unstable, etc. Placental insufficiency, fetal growth retardation or macrosomia History of repeated fetal loss, i.e. miscarriage, stillbirth Fetal abnormalities Booked for elective Caesarean section*

Note: * = Absolute contraindication.

It is essential that maternity carers are able to differentiate between a normal healing reaction, a reverse proving, an adverse reaction to a therapeutic dose or a side effect of inappropriate administration or overdose. In reality, it can be difficult to differentiate between a reaction to a normal therapeutic dose of a remedy and adverse effects caused by overdose. Furthermore, maternity professionals must distinguish between NR-related reactions and the normal physiological effects of pregnancy or emerging pathology. For example, if a woman has used a remedy and then develops a headache, this could be due to tiredness, stress or dehydration, it may be a direct or indirect reaction to the remedy, or it could herald worsening pre-eclampsia. Skin irritation may be a normal healing reaction to an NR, an adverse reaction, a side effect of inappropriate administration, physiological pruritis or developing pathology such as cholestasis. It is paramount that pregnant women are asked about their use of NRs, since any true adverse reactions may be missed or misinterpreted and a diagnosis of toxicity may therefore be delayed. There is also a need for vigilance when women self-administer TMs from their own cultures with which midwives and obstetricians are almost certainly unfamiliar, even when TMs are integrated into family life (Singh and Zhao 2017).

It is also possible that true adverse effects of NRs in pregnancy and childbirth are seriously under-reported, both through lack of knowledge of

individual remedies and ignorance of women's self-administration (Walji *et al*. 2009). In the UK, adverse drug reactions, side effects and interactions are reported to the Medicines & Healthcare products Regulatory Authority using the Yellow Card system; the same mechanism can be used to report adverse reactions to herbal, homeopathic and traditional remedies. Plant adverse reactions can also be reported to the Poisons Unit at Guy's Hospital in London, which works in conjunction with Kew Gardens to document all reports. Similar reporting systems are in use in the USA (via the MedWatch system of the FDA), Canada (MedEffect), the EU (European Medicines Agency), Australia (Therapeutic Goods Administration), South Africa (SA Health Products Regulatory Authority) and in most other countries.

Added to the pharmacological effects of NRs are the human factors that influence women's use of NRs. Pregnant women's desires to avoid prescribed drugs, to use "natural" rather than manufactured substances, to expedite the birth and to retain control over the childbearing process may contribute unwittingly to a more serious situation requiring medical intervention and, in labour, possible transfer from home or a low-risk birth centre to an obstetric unit. The ready availability of information sources (whether correct or incorrect, both by inclusion or omission) and of over-the-counter remedies multiplies the risks of using NRs in pregnancy, labour or the postnatal period.

Healthcare providers working with pregnant, labouring and newly birthed mothers must be able to assess women who choose to self-administer NRs or who seek professional advice outside the conventional maternity services. Maternity professionals who integrate NRs such as aromatherapy or homeopathy into their practice must be conscious of the individual clinical implications as well as the local, regional, national and international regulations pertaining to NR use and work within the legal parameters of their own professions. Midwives and doctors must also be vigilant to the potential for interactions of NRs with any medication the mother may require.

4

Guidelines for Healthcare Professionals

General notes

- The definition of "natural remedies" (NRs) includes all herbal remedies, herbal teas, aromatherapy essential oils, homeopathic medicines, tissue salts and flower remedies, plus traditional (indigenous) medicines, whether sourced from plants, minerals or animals.
- All NRs should be treated with the same respect as that given to pharmaceutical drugs. It is essential to differentiate between herbal and homeopathic/energy-based remedies – the Latin name may be the same, but safety concerns differ depending on the mechanism of action.
- NRs may be prescribed by appropriately qualified independent practitioners, self-administered by pregnant women from over-the-counter remedies, or integrated into conventional maternity care by midwives, doctors and doulas. They may be taken orally, applied to the skin, inhaled or prescribed by qualified NR practitioners for administration *per rectum*, *per vaginam* or, rarely, by intravenous or subcutaneous injection.
- "Natural" does not mean that all NRs are safe, or safe for all, particularly during pregnancy and childbirth. No NR should be used routinely for prolonged periods of time. Natural remedies should not

be used as a replacement for proven medical treatment, especially in the event of an emergency.

Gaining information about NRs from pregnant, labouring or breastfeeding women

- It is wise to assume that a large proportion of women using the maternity services may be self-administering NRs and that some will decline to reveal their use, even when questioned.
- Women should be advised to avoid ALL NRs before and during pregnancy, labour and breastfeeding unless under the supervision of an appropriately qualified, insured professional.
- Women should be asked at their first antenatal appointment if they are using any NRs and their answers recorded in the maternity notes. It may be necessary to be explicit about the definition of "natural remedies" to encompass the wide spectrum of modalities. Women should be asked again about their use of NRs in the third trimester as they prepare for the birth, and in early labour, to ascertain if they are using any remedies that may compromise maternal or fetal wellbeing or progress. In labour, any NR use should be documented in the labour record and correlated with any technological monitoring systems (such as a cardiotocograph). Lactating mothers should also be asked about their use of NRs.
- Practitioners of herbal, homeopathic or other traditional medicines and complementary therapies, as well as pharmacists and point-of-sales staff in natural health stores, should ask women seeking NRs if they are, or could be, pregnant, are breastfeeding or undergoing fertility treatment.

Advice to women taking NRs

- Women should be advised to seek professional advice on NRs and not to rely on information obtained from the internet, social and other media or friends and family. Women should avoid using NRs given to them by non-professionals – what one woman uses may not be appropriate or safe for another.

- Women should be informed that not all NRs are approved, regulated or evidence-based. NRs obtained from the internet may be falsely labelled, contaminated with chemical impurities or contain banned or toxic ingredients.
- Women should be informed about the possible risks of taking pharmacologically active NRs, including adverse effects such as allergies and interactions with other NRs, prescribed medications or foods. They should also be helped to understand healing reactions and reverse provings caused by energetic medicines such as homeopathy. They should be advised to report any untoward symptoms to their maternity carers and, if relevant, to their independent NR practitioners.
- If a woman reveals her use of NRs, the precise remedies must be identified (by Latin names where possible) and recorded. She should be advised to commence with the lowest dose and not to exceed the recommended maximum dose.
- Advise women against combining several different NRs/complementary therapies: take only one remedy at a time, particularly at term, when women may seek to expedite labour.

Specific information on using essential oils in aromatherapy

- Women should generally be advised to avoid all essential oils during pregnancy unless professionally prescribed. If they disclose their self-use of essential oils, this should be documented.
- Women should be advised to purchase good quality essential oils; they must be stored in a refrigerator and discarded after the expiry date or if the aroma changes (which may be a sign of chemical deterioration). They should be advised to use essential oil doses of no more than 1.5 per cent in pregnancy and 2 per cent in labour and postnatally.
- Essential oils should not be applied to the skin neat; they should not be taken orally, rectally or used in or around the vaginal opening; keep them away from eyes.
- Essential oils should not be used in the birthing pool in labour, or in the bath once the membranes have ruptured, and should be discontinued once the second stage commences to avoid exposing the newborn baby to the vapours (chemicals).

- Aromatherapy should not be used concomitantly with homeopathic remedies that may be antidoted by the strong aromas.
- It is unsafe to use diffusers/vaporizers in an institutional setting such as a maternity unit or birth centre, particularly in public areas where mothers, staff and visitors may inhale chemicals that are unsafe or that may trigger adverse reactions. Aromatherapy diffusers in the home should be used for no more than 15 minutes in any hour; do not use near babies, children, older people or animals. Maternity professionals attending women at home in labour who choose to use diffusers should be alert to the adverse effects on themselves which may arise from inhalation of specific chemicals from the oils.
- Pregnant maternity professionals must avoid working with women using oils intended to promote uterine contractions during labour, for example clary sage and jasmine. Birth companions who may be pregnant should also not be exposed to vapours from uterine-contracting oils.
- Caution should also be employed to ensure individuals in contact with the chemical vapours do not have major medical conditions or allergies that could be adversely affected by inhalation of the essential oil chemicals.
- Newborn babies should not be exposed to essential oil aromas during the birth, when breastfeeding or in the room where they sleep; *never* use essential oils directly on, or for, babies.

Women who choose to continue using NRs against professional advice

- Unless under the supervision of a qualified NR practitioner, women should be encouraged to stop or reduce their use of NRs. Discontinuation may need to be gradual to reduce the risks of sudden withdrawal.
- Women who continue using NRs against medical advice should be advised to leave two hours between administration of the NRs and any prescribed medications; their decision to continue should be documented in their maternity notes.

- Women with any medical, obstetric or fetal pathology, either pre-existing, gestationally induced or occurring incidentally during pregnancy, labour or the early postnatal period, should be advised to avoid self-medication of all NRs.
- NRs are completely contraindicated for pregnant women with major hepatic, renal, cardiac and neurological conditions and cancers of any type, irrespective of whether they currently require pharmaceutical medications. Those taking medically prescribed drugs, by whatever route of administration, should be strongly advised against using NRs at any time.
- Maternity professionals should be alert to the possibility that deviations from normal progress in pregnancy or labour may be linked with undisclosed use of NRs and should question women about their possible use of NRs. It is vital that maternity professionals can identify women's symptoms and differentiate between adverse reactions to NRs, normal obstetric physiology or emerging pathological complications, and recognize interactions between NRs and drugs.
- Women admitted to the antenatal ward have, by definition, pathological complications requiring medical attention; they must be asked directly if they are self-administering NRs. It is not appropriate for midwives and other maternity professionals to advocate NRs for these women or to use essential oils for aromatherapy in the antenatal ward area.
- Women should be advised to discontinue all pharmacologically active NRs (herbal and traditional medicines) at least two weeks prior to elective surgery or dental extraction to reduce the risk of excessive bleeding. Anaesthetists and dental surgeons should check whether women have continued to use NRs immediately prior to surgery, some of which may have an adverse effect on blood clotting.

Interprofessional communication

- Conventional maternity records should routinely incorporate a question on women's use of NRs, in the antenatal history and labour records, to ensure all care providers are aware of the potential for adverse effects and interactions with drugs. Maternity professionals should encourage women seeking independent NR advice to inform

pharmacists, NR practitioners or point-of-sales staff in natural health stores that they are pregnant or breastfeeding.

- Independent practitioners of complementary therapies who incorporate NRs into their treatment of, or advice to, clients should encourage women to inform their conventional maternity carers or take steps to interact directly with obstetricians and midwives when working with pregnant clients.
- In the event of obstetric complications or exacerbation of pre-existing medical conditions requiring the transfer of a woman from home or a low-risk centre to a high-risk medical facility, maternity professionals must inform those taking over the care if the woman has received or been self-administering any NRs. This is particularly significant in labour.
- Midwives, doctors and doulas and other conventional healthcare professionals working with pregnant women should consult qualified practitioners of the relevant NR modality for more in-depth information, especially in the event of clinical issues arising which may be related to women's NR use.
- Healthcare professionals from all disciplines, whether conventional or complementary, should be encouraged to report any suspected adverse reactions to the relevant national medicines or healthcare products regulatory authority.

Professional education and research

- All relevant healthcare professionals should acquire a basic knowledge of how the metabolism of NRs can affect pregnancy and childbirth and *vice versa*, and particularly how to differentiate between normal physiology, adverse reactions to NRs and emerging obstetric pathology.
- Medical, midwifery and health visitor pre-registration education and doula and antenatal teacher preparation should include an appropriate introduction to the safe use of NRs in pregnancy and childbirth that balances benefits and risks.
- Complementary therapy practitioner education should include a mandatory module, either at pre-registration or post-registration level,

on the application of the specific NR modality or complementary therapy to pregnancy and breastfeeding.

- There is an urgent need for more research on the safety of NRs, not simply their effectiveness. Not all NR modalities can be studied using a randomized, controlled, blinded approach. Healthcare professionals engaged in research projects investigating the effectiveness of NRs should ensure their knowledge of the NR modality is sufficient to ensure the safety of subjects in the trial.

Glossary of Terms

Abortifacient	Capable of causing miscarriage
Acidosis	Increased acid in the blood
Alopecia	Hair loss
Amenorrhoea	Absence of menstruation, as with pregnancy
Amitriptyline	Antidepressant drug
Amoxycillin	Antibiotic drug, part of penicillin group
Anticholinergics	Drugs that block action of acetylcholine
Antihypertensives	Drugs that reduce blood pressure
Antiplatelets	Drugs that inhibit thrombus formation
Aromatase inhibitors	Drugs used for breast cancer in postmenopausal women
Benzodiazepines	Sedative drugs, not commonly used in pregnancy
Bradycardia	A slow heart rate
Bupivacaine	Pain-relieving drug used in epidural anaesthesia
Calcium channel blockers	Drugs to reduce blood pressure, irregular heart rhythm
Calculi	Stones, as in kidney or gallstones
Caput succedaneum	Oedema (swelling) seen on baby's head at birth, usually resulting from difficult birth
Carbamazepine	Anticonvulsant and analgesic drug
Carcinogenic	Causes cancer

Central nervous system depressants	Sedative, tranquillizing, hypnotic drugs
Cimetidine	Drug for heartburn and gastrointestinal ulcers
Clozapine	Antipsychotic drug
Colitis	Inflammation of colon in digestive tract
Cyanogenic glycosides	Naturally occurring plant toxins
Cyclosporine	Immunosuppressive drug to prevent transplant rejection
Diazepam	Calming drug, part of benzodiazepine family
Diclofenac	Non-steroidal anti-inflammatory drug to treat pain, inflammation
Digoxin	Drug to regulate heart rate and rhythm, not commonly used in pregnancy
Dinoprostone	Prostaglandin E2 used for labour induction and postpartum haemorrhage
Diuretic	Drug that increases urination
Dysmenorrhoea	Painful menstrual periods
Dyspnoea	Difficulty breathing
Dysuria	Difficulty in passing urine
Emmenagoguic	Capable of causing menstruation-like vaginal bleeding
Enoxaparin	Anticoagulant drug
Enuresis	Bedwetting
Epistaxis	Nosebleed
Estragole	Essential oil chemical with aniseed-like aroma, may be carcinogenic, toxic
Excoriation	Scraped skin
Expectorant	Promotes secretion of sputum
Fentanyl	Opioid analgesic
Flavonoids	Antioxidant plant pigments
Fluconazole	Antifungal drug
Fluoxetine	Antidepressant, also known as Prozac™
Fluvastatin	Statin drug to reduce high cholesterol
Furanocoumarins	Potentially toxic chemical compounds found in some plants
Galactorrhoea	Excessive milk production

Gingivitis	Inflammation of gums
Glucocorticoids	Anti-inflammatory corticosteroids
Glucose 6 phosphate dehydrogenase (G6PD) deficiency	Hereditary haemolytic condition, lack of G6PD enzyme
Gynaecomastia	Enlargement of male breasts, usually hormonal imbalance
Haematuria	Blood in urine
Heparin	Anticoagulant drug
Hepatobiliary	Pertaining to liver and gall bladder
Hepatotoxic	Toxic to liver
Hypercholesterolaemia	Excessive cholesterol in blood
Hyperemesis gravidarum	Excessive vomiting in pregnancy, with weight loss and dehydration
Hyperlipidaemia	Excessive fats in blood
Hyperpyrexia	Excessive body temperature
Hypertension	High blood pressure
Hypertonic	Excessive action as in uterine contractions
Hypoglycaemia	Low blood glucose
Hypokalaemia	Low potassium in blood
Hyponatraemia	Excessively low salt levels in the blood
Hypotension	Low blood pressure
Imipramine	Antidepressant drug
Involution	Shrinking of organ, as in uterus after childbirth
Isoniazid	Bacteriostatic drug, primarily used for tuberculosis
Kernicterus	Brain damage due to excessive jaundice in newborn
Lithium	Drug for bipolar disorder
Lochia	Blood loss after labour
Loperamide	Drug to reduce intestinal movement
Maple syrup urine disease	Inherited metabolic disorder, infant's urine has odour of maple syrup
Mastalgia	Breast pain
Menorrhagia	Excessive menstrual bleeding
Methyldopa	Antihypertensive drug

Monoamine oxidase inhibitors	Antidepressant drugs
Mutagenic	Liable to cause genetic mutations
Neonate	Newborn baby up to the age of four weeks
Niacin	Nicotinic acid, part of vitamin B complex
Obstetric cholestasis	Liver condition in pregnancy, causes skin itching
Ondansetron	Drug for nausea and vomiting
Oestradiol	Oestrogen-type steroid hormone, female sex hormone
Oxidation/oxidization	In essential oil, deterioration caused by exposure to oxygen
Oxytocic	Drug used to expedite labour
Pentazocine	Analgesic used in labour
Phaechromocytoma	Rare adrenal gland tumour
Phenobarbital	Narcotic, sedative drug, used in epilepsy
Phenothiazines	Tranquillizing drugs used for some mental health issues
Phenytoin	Anticonvulsant drug used in epilepsy
Photosensitivity	Sensitivity to sunlight
Phytoestrogens	Plant substances with hormonal action
Placental abruption	Separation of placenta in pregnancy
Pneumonitis	Inflammation of lungs
Precipitate labour	Rapid labour, usually less than three hours' duration
Prophylactic	Preventative
Propranolol	Beta blocker, used for cardiac arrythmia
Proteinuria	Protein in the urine, a sign of pre-eclampsia in pregnancy
Raynaud's syndrome	Circulatory disorder characterized by cold extremities
Selective serotonin reuptake inhibitors (SSRIs)	Antidepressants used for major depression, anxiety
Systemic lupus erythematosus	Autoimmune condition affecting joints, skin, kidneys, other organs
Tachycardia	Excessive heart rate/pulse

Tamoxifen	Breast cancer drug
Tannins	Plant chemicals with unpleasant taste, to deter animals eating unripe fruit or seeds
Teratogenic	Relating to, or causing, embryonic malformations
Theophylline	Drug used for asthma
Tramadol	Opioid analgesic for moderate to severe pain
Urticaria	Skin redness, inflammation, swelling, usually due to allergic reaction
Uterine polarity	Physiological balance between upper and lower segments of uterus
Uterotonic	Substance that stimulates uterine contractions
Venepuncture	Insertion of needle into a vein to draw blood
Verapamil	Drug for cardiac arrythmias and kidney conditions
Warfarin	Anticoagulant drug
Wernicke's encephalopathy	Life-threatening vitamin B1 deficiency

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Author Index

About the Author

Denise Tiran, HonDUniv, FRCM, MSc, PGCEA, is an internationally renowned authority on maternity complementary medicine, having pioneered the subject as a midwifery specialism since the early 1980s. She is Chief Executive Officer and Education Director for Expectancy, an independent education company providing complementary therapies courses for midwives, doulas and therapists. Denise was awarded an Honorary Doctorate by the University of Greenwich in October 2020 and a Fellowship of the Royal College of Midwives in 2018 in recognition of her work in this field.