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Applying the principles of the Five Phase (Wu Xing) model to inform good practice for studies of Chinese herbal medicine

Andrew Flower[a,*], George Lewith[a], Jian-Ping Liu[b], Roz Gibbs[c], John Hicks[d]

[a] Complementary and Integrated Medicine Research Unit, Department of Primary Care, University of Southampton, UK
[b] Centre for Evidence-Based Chinese Medicine, Beijing University of Chinese Medicine, Beijing, China
[c] School of Pharmacy and Biomedical Science, Portsmouth University, Portsmouth, UK
[d] College of Integrated Chinese Medicine, Reading, UK

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ABSTRACT

Introduction: There is a need for a structured approach to defining good practice of herbal medicines. This will enable a more targeted and efficient researching of individual herbs and herbal combinations. We explore the Five Phase model as a means of defining good practice of Chinese herbal medicines (CHM) which can be applied during clinical research.
Methods: The Five Phases (Wu Xing) are a traditional model used in Chinese culture and medicine to describe cycles of change and development. We have adapted this model to provide a multifaceted approach to describing good practice, so that each phase in this cycle represents a specific stage of enquiry relating to good practice. These phases include reflective practice, basic CHM theory, in vitro and in vivo research, reference to classical texts, and the development of professional consensus. This approach was applied to defining good practice for a clinical trial of CHM for Recurrent Urinary Tract Infections (RUTIs).
Results: The Five Phases provided an iterative and inclusive model for exploring the knowledge base of CHM. Each phase generated different insights into the practice of CHM which contributed to the development of standardised and individualised treatments for RUTIs.
Conclusions: The Five Phases offer a useful conceptual model that we believe can be applied to CHM, and possibly other medical systems, to elicit diverse sources of data and to integrate these data in a meaningful and practical manner that can inform clinical practice.

1. Introduction

1.1. The current view

Recent years have seen a renewed interest in exploring the potential contributions of traditional herbal medicines to mainstream health care. There are several factors underlying this. Probably the most pressing is the development of microbial resistance to antibiotics that is threatening to undermine our management of infectious diseases [1–3]. The complex regulatory structures and vast costs of developing and then purchasing new pharmaceuticals, including novel antibiotics, inhibit the provision of replacement therapies and place great strain on healthcare systems around the world [4,5]. In these instances where conventional medicine has become ineffective or unaffordable, herbal medicines are being considered as possible alternatives.

The standard pharmaceutical approach to identifying potentially medicinally useful plants has relied on large screening programmes, coupled with a more targeted focus on how plants are actually used by traditional healers. The end point of these 'bioprospecting' endeavours is usually to extract a single active compound found within a plant that can then be synthesised, standardised and developed into a new pharmaceutical drug. This pathway has, in some instances, been productive and it has been estimated that natural products and their derivatives contribute more than 50% of drugs currently used worldwide, with least 25%

Abbreviations: CHM, Chinese herbal medicine; NIHR, National Institute of Health Research; PCOS, polycystic ovarian syndrome; RUTIs, recurrent urinary tract infections; TCM, Traditional chinese medicine.

* Corresponding author.
E-mail addresses: Andrew.Flower@soton.ac.uk (A. Flower), glewith@scmrt.org.uk (G. Lewith), jianping_l@hotmail.com (J.-P. Liu), roz.gibbs@port.ac.uk (R. Gibbs), john.hicks@cicm.org.uk (J. Hicks).

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of these developed from higher plants [6]. This process is on going and not just a historical phenomenon, with over 70% of new anti cancer drugs originating from a natural source [7].

However there are disadvantages to this pharmaceutical model. The process of screening and testing large numbers of plant compounds can be inefficient, expensive and is frequently unproductive [8,9]. The emphasis on the identification, extraction and concentration of a single, highly potent, compound may also increase the risks of unwanted adverse effects, influence bioavailability, and will exclude potential synergies of compounds that can occur both within a herb, and between herbs in a herbal formula that typically comprises of several different plants. These synergies may contribute to therapeutic effectiveness and also provide intrinsic buffering systems to reduce these side effects. In Chinese medicine, for example, the potential of compounds from the herb Ban Xia (*Pinellia ternate*) to irritate and inflame the gastrointestinal membrane is significantly reduced by preparing this herb together with ginger (*Zingiber officinale*) [10].

1.2. A 'good practice' approach

An alternative approach is to embrace the 'whole system' model of herbal practice used by traditional healers around the world, who combine relatively un-refined parts of plants (such as roots, rhizome, bark, stems, leaves, flowers and seeds) into complex herbal formulae. In these instances no attempt is made to identify a single active compound. Instead the end point is a complex polypharmacy comprising of numerous physiologically active compounds and synergies. These herbal practices are predicated on long histories of traditional use where herbs and combinations of herbs are reported as being helpful for certain conditions. Treatments in these instances are frequently individualised, and are often prepared as herbal teas, soups, or alcohol based tinctures. Herbal medicine is commonly used across the globe either independently or as an adjunct to bio-medicine and it has been estimated that up to 80% of the population in developing countries still relies on these medical practices as a form of primary healthcare [11].

There are a number of challenges facing these traditional practices, including problems of quality assurance, product standardisation, ecological sustainability, cost, and the strong taste of many herbal medicines, which can prove problematic for people whose experience of medicine is a pristine, tasteless tablet or capsule. There are solutions to these issues. For example the application of the new high throughput screening 'omic' technologies, such as metabolomics, proteomics and epigenomics, might be able to map the complexity of components operating within a herbal medicine, and thereby inform the development of true gold standards to enable more reliable quality assurance [12]. There is also some evidence of a welcome development of sustainable farming techniques being implemented in geographical areas that have historically provided herbs picked from the wild [13]. Taste and cost may still be issues but, as the means of herbal production continue to develop, they may become less important.

From the perspective of research programmes with limited time and funding one of the key issues in investigating herbal medicines is to identify which are the most likely candidates that may be developed into successful treatments. It seems reasonable to assume that many ineffective treatments are likely to have been 'weeded out' of herbal practice through the experience and observation of generations of herbalists. This suggests that accepted good practice is a reasonable place from which to start research. However, in order to do this we need a process that could be used to define 'good practice'.

We use the term 'good practice' as opposed to 'best practice' advisedly, because without clear, unbiased, comparative effectiveness data that is simply not available at the present time, it is presumptuous to assume that one particular approach could be defined as the 'best' option. There are two components incorporated within this notion of 'good practice'. The first equates to a form of model validity, which can be defined as 'the likelihood that the research has adequately addressed the unique theory and therapeutic context of the . . . system being evaluated' [14]. Good practice in this sense means that the herbal medicine being tested conforms to a reasonable approach to treatment that is consistent with the logic of its traditional use. It would not be considered 'good practice', for example, if a treatment traditionally used for an exudative type of eczema was tested for a non-exudative variant.

The second component of 'good practice' goes further than just model validity by conveying the sense that a particular treatment is, within the confines of existing knowledge, considered exemplary. Thus the herbal medicine being tested is not only

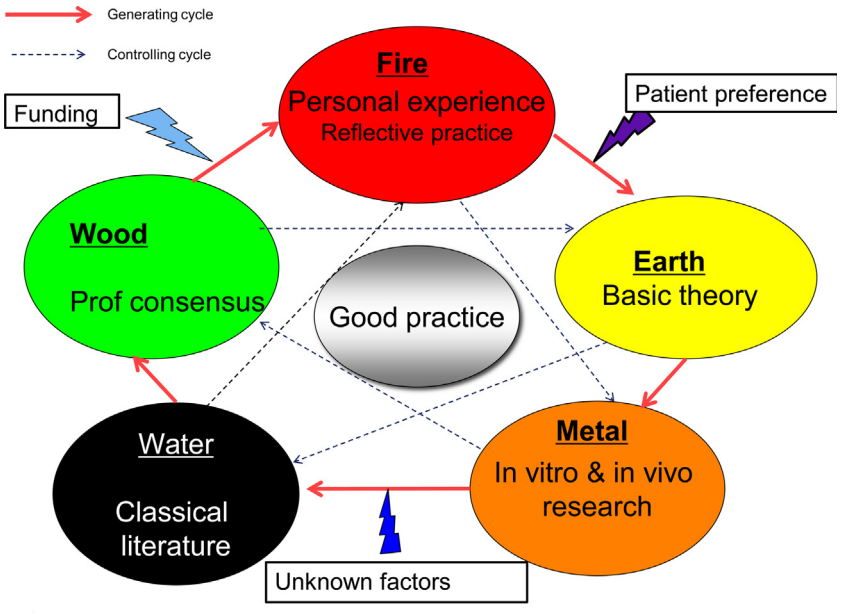

Fig. 1. Five phase model.

located within the broad church of its particular tradition, it is also a treatment which is most likely to show therapeutic benefits. Another way of describing this is 'therapeutic plausibility'. Good practice in this respect may vary according to factors such as climate, culture, and socio-economic status. However, within the constraints of these contextual factors, a description of 'good practice' can convey the accumulated experiences of senior practitioners to their more junior colleagues and may also enhance the prospect of the reproducibility of a particular therapeutic approach used within a clinical trial.

The question is, in the absence of definitive evidence of comparative effectiveness, how do we ensure that the herbal medicine we test has both model validity and therapeutic plausibility? At Southampton University we have reflected on these challenges whilst developing protocols for previous studies of Chinese herbal medicine (CHM) for endometriosis, PCOS, and asthma. In response we have adopted a model commonly used in traditional Chinese medicine-The Wu Xing or Five Phases-that we believe covers the key concepts required to meet these criteria. This model has been applied to a current study exploring the possible role of CHM for the treatment of recurrent urinary tract infections (RUTIs). The RUTI trial is an NIHR funded double blind, randomised controlled, feasibility study comparing standardised, individualised, and placebo herbal treatment administered to 80 women over a 16-week period. This paper will discuss both the principles and practice of this process using our current strategic approach to the RUTI as examples.

1.3. The 'Wu Xing' or Five Phases

The Doctrine of the Five Phases is commonly attributed to Tsou Yen (ca. 350-270 BCE) [15]. It emerged from a philosophical movement that attempted to define key principles operating within the natural world that could be extended to make sense of other aspects of human experience. The Five Phases are symbolically represented as Fire, Earth, Metal, Water and Wood. Although the language is archaic, these phases describe dynamic cycles of development and change that have been historically applied to diverse phenomena including the progression of the seasons, Confucian theories of political order, and the physiological and pathological processes occurring in the human body [16]. The Five Phase model embodies a complexity of thought and understanding that belies its apparent simplicity, and provides a useful structure to understand and promote other forms of change and development. It is our contention that Five Phase theory can provide a practical model that may be applied when trying to define good practice (Fig. 1).

Within the confines of this paper it is not possible or, we believe, necessary to provide a full account of the underlying logic and range of applications of Five Phase theory. We are proposing a particular interpretation of this model that is relevant to research. For those readers who are unfamiliar with Chinese philosophy we ask that you suspend disbelief and instead focus on how we have applied this model as a means of ensuring an integration of the diverse domains of reflective practice (Fire), basic theory (Earth), systematic review (Metal), classical understanding (Water), and professional consensus (Wood) to generate an evidence synthesis to define good practice. Whilst we believe that using the Five Phases enhances this process, we also maintain that that this approach can stand alone, independent of the trappings of ancient Chinese thinking.

1.4. The role of the practitioner-researcher

An important caveat to this approach is the centrality of an experienced herbal practitioner within the research team. The model we describe is not some algorithm that can be impersonally applied to result in the identification of a therapeutically plausible herb or formula. It is possible to make statistical correlations that can be used to inform clinical practice by, for example, analysing large databases containing patient information, herbs used, and outcomes achieved [17,18]. However this kind of approach does not take into account the context of herbal treatment, or how treatments may be individualised or modified over time, and it may end up with recommendations that have poor model validity and bear little relation to real world practice. A simple example of this would be to scan all the herbal prescriptions reported in Chinese herbal trials treating patients with lung cancer. It is likely that liquorice (*Glycyrrhiza uralensis* Fisch or Gan Cao) will feature highly in this list. This is because it is frequently used to harmonise (improve the taste and protect against unwanted adverse effects) a formula rather than because of its potent anti-cancer properties, but this would not be apparent without an informed view of CHM. Although this paper focuses on issues relating to Chinese medicine the same emphasis on the importance of context can be applied to conventional medicine, with issues such as multi-morbidity in patients defying simplistic treatment guidelines and requiring instead a flexible approach based on knowledge and experience.

2. Method

The Five Phases provide a model that allows the synthesis of a number of different methodologies ranging from reflective practice to systematic review. It is an interpretative process, undertaken by experienced practitioners, where data from numerous sources are evaluated and integrated. It is both a deliberate, rational assessment and an intuitive synthesis that deploys tacit knowledge built up through years of clinical practice. This combination of objective data and subjective interpretation of the evidence is at the heart of clinical decision-making [19,20] and is a key feature of the early writings on evidence-based medicine [21], before the more recent 'tyranny' of algorithmic best practice guidelines [22]. As such we make no apologies for its central role in our process for defining good practice.

In this paper we would like to illustrate how the Five Phase model was applied. We provide a general account of the methods employed during each phase, with a more specific description of how each of these phases contributed to the development of the protocol for the RUTI trial.

3. Defining good practice

3.1. FIRE-reflective practice

> 'Fire symbolizes wakefulness and the development of wisdom and compassion' [23]

Our entry point into the Five Phase cycle is reflective practice. At the outset of the search for good practice a practitioner either explicitly or implicitly begins a process of detailed self-evaluation of their clinical experience. Trends of what is successful or unsuccessful in practice are identified and analysed, and tacit knowledge is deliberately brought into more explicit awareness. This can be a formal, structured process of audit using one of the many models available for reflective practice or, more commonly, a fluid on going activity that is familiar to anyone trying to improve their practice.

Reflective practice is both the starting place but also an end point of the Five Phase cycle, as it marks the point where data collected from the other phases are integrated and synthesised by the practitioner into treatment strategies and good practice guidelines.

For the RUTI trial this phase began with a recognition that over a 2–3 year period a number of patients had presented with recurrent urinary tract infections demonstrating, from the perspective of Chinese medicine, similarities in the aetiology, pathology, and symptomatology of the illness. On reflection, and after a review of case notes, an association was noted between a particular approach to herbal treatment and definite signs of clinical improvement. It also became apparent that, despite the effectiveness of prophylactic antibiotics, the tendency for recurrence after prophylaxis, patient preference to avoid antibiotics [24], and concerns over antibiotic resistance, meant that the long-term conventional management of RUTIs was far satisfactory. There was therefore a clear 'effectiveness gap' in treating this condition that could, in part, be addressed by further research into herbal medicines.

3.2. EARTH-basic theory

> 'Earth represents our centre of gravity, the point of reference around which all other aspects of character and structure orientate themselves . . . ' [25]

The second phase in this process is to establish that the theoretical and therapeutic models used in a herbal intervention are rooted in the basic theory of the Chinese medical tradition. This correlates to the Earth phase. For those not familiar with herbal traditions this is a vitally important phase that is surprisingly easy to overlook. This process must be conducted with a critical and open mind. Chinese medicine is frequently characterised by a hiatus between theory and practice. Much has been written about the way in which the Maoist re-organisation of East Asian medical practices into the single 'nationalised' system of TCM has led to over-simplification, an emphasis on materiality, a neglect of emotional or spiritual considerations, and a deliberate attempt to gain credibility by mirroring the developments and discoveries found in bio-medical science [26,27]. For these reasons the theory of Chinese medicine presented in the basic educational texts may contribute to validating a particular understanding and treatment of disease, but it should never be considered as a complete account.

In the instance of the RUTI trial it was important to revisit accounts of a traditional disease category known as Lin Disorders-which describe a number of syndromes relating to painful or difficult urination. Over the 2000 year recorded history of CHM there have been different descriptions of these conditions but it is now generally accepted that there are 6 types of Lin disease, defined according to the presentation of the urine (so for example Blood Lin is associated with haematuria, and Cloudy Lin is associated with pyuria). Lin Disorders incorporate a broad range of bio-medically defined diseases such as prostatitis, renal disease and urinary tract infections. RUTIs correlated well with Hot, Damp, Qi and Blood Lin disorders, and in some cases, particularly older patients, with Fatigue Lin. The basic theory underlying these conditions contributed to an understanding of the aetiology, patho-physiology, and treatment of recurrent UTIs-including herbs and formulae that have been clinically applied down the centuries.

3.3. METAL-refining data from the research evidence base

> Metal 'likes definition, structure, and discipline . . . and the power of Metal comes from the capacity to shape and refine' [28]

This phase of the cycle involves refinement and increased definition of the therapeutic intervention. It correlates well with both clinical and laboratory-based research. Lab based data can provide important pharmacological information to clarify the biological mechanisms underlying herbal activity, and to support the plausibility of a traditional herbal approach. For example Stavri et al. [29]. describe the synergy between the mildly antibacterial berberine and an efflux pump inhibiting compound (flavonolignan 50-methoxyhydnocarpin-D) found in the same herb *Berberis fremontii*. This results in a 16 fold increase in the antibacterial activity of the herb. This kind of insight provides a cautionary note to those who see herbs as the source for simple compounds, rather than as operating via the different and potentially synergistic principles of poly-pharmacy.

In the RUTI trial we have collaborated with Portsmouth University to conduct in vitro testing of the pharmacological activity of herbs considered for the two standardised formulae to be used in the trial. These results have not been published yet but they provide promising preliminary evidence that one of the herbs in the formula for an acute infection has quite potent antimicrobial actions. Other herbs demonstrate an ability to increase microbial sensitivity to antibiotics, and influence biofilm formation when tested against clinical isolates of uropathogenic extended spectrum beta-lactamase producing *Escherichia coli*. Preliminary data on the bladder urothelium suggests that some herbs may also influence ATP release from this tissue, potentially alleviating associated symptoms of increased frequency and urgency of urination.

A review of clinical research can provide an evidence base to support a particular herbal stratagem. However although there is a large volume of studies investigating traditional herbal medicines (a search of the Chinese database identified over 60,000 RCTs (personal communication)) unfortunately the quality of the vast majority of these studies is poor and the data they provide has to be interpreted with considerable caution [30,31]. The majority of these trials also tend to use standardised herbal formulae, which do not reflect the process of individualisation and modification that characterises the routine practice of CHM. It is precisely because of these deficits that we need a multi-faceted process to develop good practice guidelines to inform clinical trials.

However, although the poor quality of this clinical evidence frequently undermines any attempts to generate definitive evidence of effectiveness, it may still provide a useful contribution to defining good practice. A review of these studies can elicit interesting data relating to the selection of herbs or herbal formulae, recommended dosage, common diagnostic presentations, the duration of treatment required to see benefits, short and long term prognoses, and the possibility of adverse effects

Table 1
Commonly occurring herbs from fire poison and Qi nourishing categories in 26 trials of CHM for RUTIs (% of trials applying these categories that used these herbs).

Clear fire poison herbs	Invigorate Qi herbs
Pu Gong Ying 34.6%	Huang Qi 50%
(Taraxacum mongolicum Hand. Mazz)	(*Astragalus membranaceus* (Fisch.) Bunge)
Bai Hua She She Cao 26.9%	Bai Zhu 26.9%
(*Hedyotis diffusa* Willd.)	(*Atractylodes macrocephala* Koidz.)
Ban Zhi Lian 11.5%	Dang Shen 19.2%
(*Scutellaria barbata* D.Don)	(*Codonopsis pilosula* (Franch.) Nannf.)
Lian Qiao 11.5%	Gan Cao 6.5%
(*Forsythia suspensa* (Thunb.) Vahl	(*Glycyrrhiza uralensis* Fisch.)

developing. These data are available for extraction from the majority of clinical trials that do not have the methodological rigour to be included in a systematic review. Rather than discard all this information we can use it to confirm or expand the repertoire of what could be used as herbal interventions.

In the RUTI trial a Cochrane systematic review has been undertaken and published [32]. Although initially 43 studies were identified as eligible only 7 studies could be included in the review and these were of relatively poor methodologically quality. Consequently the conclusion of the review was the fairly familiar Cochrane refrain that there was little evidence to support the role of CHM in the treatment of RUTIs and more rigorous trials were required.

and in Chinese medicine they are considered as medical classics. The Anglo-Saxon saga is a clear example of the value of these 'classical sources' in enabling both the model validity and the effectiveness that we have used to define 'good practice'.

For the RUTI trial we collaborated with sinologists at the University of London who were able to conduct a targeted survey of ancient Chinese writings relating to Lin diseases [35]. A few key extracts were translated and examined in more detail. These proved to be remarkably relevant to contemporary presentations of recurrent UTIs. One piece of text in particular identified the importance of emotional stress, over work, and poor diet in creating conditions conducive to the development of RUTIs.

> "If one eats an improper diet, if happiness and rage are ill timed, if vacuity and fullness are not properly adjusted, the *fu* and *zang* organs fall out of harmony, which then leads to Kidney vacuity and heat in the Bladder. ….Kidney vacuity leads to frequent urination; and heat in the Bladder leads to difficult, painful urination."
>
> Chao Yuanfang 巢元方 in *Treatise on the Aetiology and Symptoms of Diseases*, Chapter 14 c610 CE.

Despite this conclusion an evaluation of all 43 studies provided data on common diagnostic patterns and the most commonly used herbs and formulae. This information has contributed to the development of the standardised remedies to be used in the RUTI trial, and has enhanced the range of options that may be applied in the individualised arm of the trial. Table 1 presents the four commonest herbs used in reports from these trials with the action of clearing Fire poison (often associated with antibacterial and anti-inflammatory actions) and supporting the 'Qi' or vital energy (associated with immune enhancing actions). These findings encouraged the inclusion of Bai Hua She She Cao (*Hedyotis diffusa* Willd.) and Huang Qi (*Astragalus membranaceus* (Fisch.) Bunge) into the standardised herbal capsules for acute and preventative treatments respectively.

3.4. WATER-going back to the source

> Water 'links past and future, ancestor and descendant, and is the source of our inherited intelligence' [33]

Herbal medicines often have a recorded history of traditional use that can extend back hundreds and in many instances thousands of years. These records are repositories of sophisticated observations made by experienced clinicians of the past and they often constitute an active platform for subsequent medical developments. Recently the potential for old knowledge to have new applications has come to the public attention with a study reported by the University of Nottingham [34] that demonstrated a potent antimicrobial action of a 9th century Anglo-Saxon formula for MRSA related blepheritis. Interestingly early attempts to demonstrate an antimicrobial action failed because the specific instruction, initially deemed irrelevant by the scientists researching the formula, to allow the herbal mixture to ferment for 9 days, was not precisely followed. Once these instructions were adhered to then the herbal remedy was able to eliminate 90% of MRSA bacteria, the same proportion as the antibiotic of last resort, Vancomycin [34].

There is a tendency to patronise these early writings and to miss the potential treasure trove of experience that they may provide. Often they represent the distillation of many years of clinical practice

In addition certain herbs emerged as having a continuous use in the treatment of the symptoms of recurrent UTIs. In some instances (e.g. Hua Shi (Talcum), Qu Mai (*Dianthus superbus* L.)) these are very much in use today, whilst other herbs have fallen out of favour but could be re-examined as potential treatment options (e.g. Dong Kui Zi (*Malva verticillata* L.)). Finally some of the texts explicitly recommended the use of one particular herbal formula for a number of different presentations of Lin disease. This gave a classical endorsement for the use of a standardised herbal formula to comprise one arm of the RUTI trial.

3.5. WOOD-cultivating a professional consensus

> 'Wood represents expansive, outward movement in all directions' [36]

In the Five Phase model Wood correlates with the process of developing professional consensus. This is well established as a viable way of establishing parameters for good practice in the absence of a rigorous evidence base [37]. Methods such as the Delphi process and Action Research have been used in both conventional and herbal medicine research [38–40] to draw on the collective knowledge of experienced practitioners familiar with the particular demands of their geographical and cultural context. Whilst we have already seen definite parallels between ancient Chinese conceptualisations of recurrent disease, there are also obvious and specific differences with contemporary presentations (different lifestyles, diet, previous medical histories etc.) that need to be taken into account. In all traditions of medicine it is vital to listen to the accumulated experience of practitioners applying the available evidence within a real world clinical context.

In the RUTI trial interviews were conducted with 5 experienced practitioners investigating their understanding of the pathophysiology of RUTIs and to asking them to describe their approaches to treatment. These conversations were recorded and the data that emerged from them has contributed to an understanding of the pathophysiology of RUTIs and to the treatment options provided within the RUTI trial.

3.6. Integrating the Five Phases

Each of the Five Phases represent a discrete area of inquiry that can be used to enhance an understanding of the treatment of a particular condition and optimise both model validity and therapeutic plausibility. However it is important that these phases are not considered separately. In traditional Chinese philosophy the Five Phases are described as having a generative ('Sheng') and a controlling or checking ('Ke') cycle. Each phase can encourage a subsequent phase and in turn constrain a different phase. This can be represented schematically in Fig. 1.

The dynamic nature of this model means that the iterative process is hardwired into the system. Reflective practice generates a review of basic theory that is refined by research data and classical references, and discussed with peers, before being re-processed by the practitioner undertaking this exercise. It is also an egalitarian model with no one phase being ascendant. Thus research data should be checked by reflective practice, which should also be cross referenced with classical texts and modern research methods (both basic science and clinical research) that need to be understood in light of contemporary medical practice.

One question that remains to be answered is how does this process of synthesis take place? Although each phase can be subject to rigorous research and provide meticulously collected, clear data, this is not something that can be simply aggregated to produce a summary statement. The final phase of this cycle of investigation comes back to the starting point-the reflective mind of the practitioner-researcher. It is here that these data are synthesised and it is out of this understanding that treatment will emerge. Although we can see the pieces of the puzzle, exactly how this puzzle is integrated and applied is essentially a complex intuitive process that resists precise definition.

4. Discussion

Although this Five Phase model may appear overly formulaic and simplistic, the principle of using diverse sources of data to guide inquiry into different domains is an important one. It can produce a mosaic of evidence that values different sources of knowledge and doesn't privilege one, commonly RCTs, at the expense of another, such as reflective practice. Its egalitarian approach brings various incomplete pieces together and allows a process of evidence synthesis that can enrich our understanding of a condition and how to treat it. Part of this synthesis also involves the checking mechanisms hardwired into the Five Phase model. Just as it is mistaken to solely rely on RCTs it would also be a limited and unsatisfactory approach to give primacy to reflective practice or classical texts. The cycles of generation and control create a dynamic interplay between phases that give an energy and a tension to the process of defining good practice which is both productive and grounded.

These findings resonate strongly with some aspects of the early writings on evidence based medicine (EBM) that described good doctoring as requiring the use of "both individual clinical expertise and the best available external evidence, and neither alone is enough," for "without clinical expertise, practise risks becoming tyrannised by evidence, for even excellent external evidence may be inapplicable or inappropriate for an individual patient" [41]. Other contributors to EBM were keen to emphasise the equal importance of both accessing and interpreting research data-especially in light of an individual patient's unique bio-medical, personal, and contextual circumstances [42]. However whilst there are important parallels in principle and practice with a Five Phase approach there are also significant differences. The 'Water' phase that ensures data from classical sources are considered, for example, would be irrelevant to the proponents of EBM.

It is important to mention that any model of good practice that emerges from this integrative process is still only a model. Over attachment to any model may blind us to new or existing possibilities that don't seem to fit into our preferred conceptual frameworks, and it is important to apply the model when it works and either discard or adjust it when it is less useful. This is very much the way in which these models are used within the practice of Chinese medicine. The Wu Xing model now needs to be tested and subject to a process of critical review by CHM practitioner-researchers looking to define 'good practice' of CHM. This will help to identify those aspects of the model that are helpful, those that are obstructive, and areas that the model may neglect. We see this paper as very much the starting point in what we hope will be an ongoing process.

In some instances idealised notions of good practice may have to be compromised when transplanted into a real world setting. Factors such as funding, trial regulation, and patient preference may have a profound impact on what can be included in a clinical trial. In the case of the RUTI trial the formulae used in the standardised arm of the trial have had to be limited to three herbs apiece. This is because of the high costs required for stability testing and also the unlikeliness of a herbal product containing more than this number of herbs in receiving UK regulatory approval as an over the counter remedy. In addition one of the herbs that was identified from a number of sources as a candidate for good practice (Pu Gong Ying, *Taraxacum mongolicum Hand.* Mazz) had been reported as having an adverse interaction with ciprofloxacin-a common antibiotic used for urinary tract infections-that precluded its use as a standardised treatment.

5. Conclusion

Herbal medicine may have an important impact on 21st century healthcare-particularly in areas where there is an effectiveness gap and in instances when conventional treatment has become ineffective, unaffordable, or beset by unacceptable adverse effects. There is an urgent need to subject these herbal medicines to rigorous scientific scrutiny. However it is important that we do so in such a way as to maintain model validity of the disciplines we are investigating and to ensure that we are testing agreed notions of good practice. The Five Phases offer an ancient conceptual model that we believe can be applied to contemporary research to elicit diverse sources of data and integrate them in a meaningful and practical manner that can inform clinical practice. This dialectic between the past and the present, mediated and interpreted by experienced herbal practitioners, seems a particularly appropriate method to scrutinise medical practices that are simultaneously ancient in origin and contemporary in their modern day application.

Conflict of interest

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