

The attainment of knowledge

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Writing two and a half millennia ago, Confucius stated that “*By three methods we may learn wisdom: First, by reflection, which is noblest; Second, by imitation, which is easiest; and Third by experience, which is the bitterest.*” The edict fully applies to modern medical education and training. The attainment of knowledge through experience may be the fruit of the personal and/or collective compilation of knowledge gathered by personal observation of individual cases or case series. It may also incorporate formal randomized clinical experimentation to compare outcomes attained from two or more different management options. Originally transmitted down the generations by oral tutor-student communication, it eventually was more widely made available by the publication of case presentations, case series, or randomized controlled trials. This compilation of knowledge by experience is the most bitter since for every success story documented, there would be several failures that would have fallen by the wayside or eventual successes that were only accepted after a pendular shift in attitudes towards their use. The importance of experiential knowledge in current practice can be best illustrated by Isaac Newton’s comment that “*If I have seen further it is by standing on the shoulders of giants.*” We are where we are today because of the giants that have preceded us. With their experiential, experimental and rational acquisition of knowledge throughout the ages, they have laid down the foundations of knowledge that we have developed and rely upon in modern practice.

A good example to illustrate the pendular nature of the acceptance of a discovery in medical therapeutics in western medicine based originally on oral tradition is that of the use of the plant foxglove (*Digitalis purpurea*) to treat cardiac failure. William Withering in the 18th century had become aware of the potential role of foxglove in treating cardiac dropsy after observing the effect of a 20-ingredient decoction prepared by a folk herbalist. Over the subsequent nine years, he carefully teased out the active ingredient, identifying this to be foxglove and carefully experimented to identify the best way to use this highly effective but toxic medication. He published his findings in 1785 in the work entitled “*An account of the foxglove and some of its medical uses; with practical remarks on the dropsy, and some other diseases*”. The use of this powerful cardiotoxic agent was quickly adopted and abused by his contemporaries leading to the realization that potentially serious and lethal side-effects accompanied its non-judicious application. Its general acceptance as a useful agent in the pharmaceutical armamentarium only took place when safety margins for use were redefined and generally adopted. The active ingredient digoxin, formally isolated in 1930, has since enjoyed over two hundred years of service, improving the lives of many cardiac sufferers. Many other such folklore remedies have been incorporated within the modern-day pharmacological armamentarium. Others remain to be identified, studied and potentially become important medicinals. In 1972, Dr. Tu Youyou extracted artemisinin from the plant sweet wormwood (*Artemisia annua*) and confirmed this to be a useful pharmacological agent for treating malaria – a fact that had been known through experiential knowledge within the Chinese Traditional Pharmacopeia. For her contribution in this field, Dr Youyou was awarded the Nobel Prize for Medicine in 2015, a clear example of how traditional knowledge can help develop and provide modern treatment options especially in an environment of increasing drug resistance being developed by microorganisms.

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In Confucian thought, the easiest way to learn is by imitation. This refers to the practitioners who simply imitate and apply the knowledge of others without themselves acquiring an integral understanding of the principles involved and without undertaking experimentation to expand on the corpus of knowledge of their predecessors. Imitational practice should be limited only to young trainee practitioners who need clear guidelines to ensure safe standard practice until such time that the trainee has acquired a sufficient foundational knowledge to empower him/her to better identify management options in the particular circumstances of each individual case. The rigid adherence to guidelines designed on general principles, often incorporating cost-effective considerations, may not be the best management option for a particular patient or situation. Guidelines present the practitioner with recipes that generally (but not invariably) result in a palatable meal. When accepted without a true understanding of the principles involved in drawing up the recipe, this imitational practice prevents professional cooks from developing their speciality. Unfortunately, in modern medical practice, imitational practice is often resorted to because it is an easy way of learning without the need to inquire, experiment and rationalize. To fully serve the needs of the individual, one must strive to practice 'patient-designed management' based on fundamental precepts rather than 'case-designed management' based on standard guidelines.

The most difficult but noblest learning process is that of rationalization. This involves attaining a deep understanding of the fundamental basic tenants on which the body of knowledge is based upon, and rationalizing the management options proposed by experiential or experimental knowledge. This type of learning should reflect the markings of a true master within the speciality. It is the true meaning of evidence-based practice. Evidence-based medicine has become quite a buzzword in modern medicine. However, the concepts of evidence-based medicine are based on the results of randomized controlled trials or meta-analysis of these studies. This definition of evidence-based practice continues to limit knowledge and practice to an experiential level without truly seeking the *rationale* behind that practice – the how and the why of any particular practice. In reality, evidence-based medicine should

be defined as the application of experimental medicine based on an understanding of the associated fundamental precepts following due consideration of all the components involved, thus building an overall picture of understanding from the jigsaw pieces available to us. When challenged about his/her choice of management, the true specialist should not respond by stating that management was chosen because the standard published guidelines advise this option. Such an attitude simply reflects a Confucian easy-way imitational form of practice rather than the noble mature rational form.