Medical Mythology: Its Etiology, Prevention and Treatment

**Corresponding Author:**
Dr. Thomas F Heston,
Physician, Internet Medical Association, 848 N Rainbow Blvd #1289 - United States of America

**Submitting Author:**
Dr. Thomas F Heston,
Physician, Internet Medical Association, 848 N Rainbow Blvd #1289 - United States of America

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Author(s): Heston T F, Gosselin M

Abstract

Myths are widely held beliefs that are false or of unverifiable existence. In medicine, they are not just unproven theories or mistaken conclusions, rather, they are fictitious ideas that weave their way throughout the profession. In order to prevent and treat medical myths, they need to be recognized as a disease that is harmful to patient care. Using established principles of medicine, the myths then can be medically managed and a cure attempted. To accomplish this, the myths need to be understood in terms of their etiology and pathopsychology. A firm understanding of biostatistics and the principles of evidence based medicine is essential to the prevention, management, and cure of medical myths.

Medical Mythology

Throughout the history of medicine, whenever new ideas are found, we have traditionally gone back to mythology. Much of our medical terminology, anatomy and disease names have origins from mythology, such as Achilles, Atlas, Narcissus and Panic (from the God Pan). This may be secondary to man’s discomfort of change, resulting in an immobilization of newer ideas by offering a feeling of security in tradition (1).

In medicine, a myth is a widely held belief that is false or of unverifiable existence (2). It is more than just an unproven theory or mistaken conclusion. Rather, medical myths are fictitious ideas that weave their way through the group psyche of our profession (3). In order to both prevent and treat these myths, we need to recognize them as a disease, and use our medical skills to treat and prevent them. First, we need to thoroughly understand medical mythology and its etiology. With this understanding, we can then design ways to systematically prevent and eradicate the myths. In this article, we will define medical myths, explore their etiology, and finally, propose methods to eradicate old myths and prevent new ones.

Medical myths are irrelevant standards of care that do not help a patient, and occasionally, actually cause harm. They become widely disseminated throughout the profession during medical training through lectures, opinion articles, and textbooks (4). Oral transmission of the myth by other students is perhaps the most powerful vector, however, outside of academic institutions, myths continue to thrive when consultants repeat the fallacies.

An example of a medical myth was the widespread use of hormone replacement therapy (HRT) in women for the primary prevention of coronary artery disease (5). This practice started in the late 1980s and flourished in the 1990s. It quickly became the standard of care. HRT was metaphorically viewed as an elixir of life, and those who did not prescribe HRT were considered uninformed or bad doctors.

The story of HRT for the primary prevention of coronary artery disease highlights a couple of etiologies that are common in the development of a medical myth. First of all, there was solid physiological evidence suggesting a cardioprotective effect of HRT (6, 7). Secondly, there were significant biases in the research, e.g. one major study only looked at caucasians (8), and another only members of a regional health maintenance organization (9). The inappropriate extrapolation of such physiologic evidence and biased research to clinical medicine helped feed and nurture the myth of HRT for primary cardiac prevention.

Ultimately, a large, randomized clinical trial found that HRT was not indicated for the primary prevention of coronary artery disease, or any other chronic disease for that matter (10). Subsequent randomized clinical trials have subsequently refuted the conclusions from the earlier, biased observational studies that HRT was effective as a primary cardioprotective measure. These new clinical trials reached a different conclusion partly due to the fact that they included an evaluation of confounding variables not examined in the previous studies.

For example, while earlier observational studies concluded there was a positive effect of HRT on coronary artery disease, a subsequent randomized clinical trial found that HRT actually increased the risk of stroke and overall cardiovascular disease (11). Furthermore, when the total mortality was evaluated, it was determined that the overall risks of HRT clearly outweighed any possible benefit (12).

Such medical myths are dangerous not only because of their inherent falseness (resulting in suboptimal medical care), but also because they are highly resilient and resistant to change. Myths become...
especially powerful when they involve issues of life and death, because this emotional component helps turn a myth into a widely distributed meme (13). These memes, which circulate units of cultural information much in the same way genes pass on biological information (14), can become pathological when they propagate false ideas. The memes that transfer false ideas throughout our profession can act like thought viruses (15). If we are to provide the best possible care for our patients, we need to attack these thought viruses head on. We start the process by understanding the etiology of a medical myth.

At its foundation, the etiology of a myth is an incorrect conclusion drawn from good data, or a correct conclusion drawn from bad data. This faulty thinking results in the adoption of a falsehood as truth. One example is when we adopt a hypothesis as true, simply because it makes logical, pathophysiologic sense. Another example is when we blindly accept the teachings of a medical expert without examining the basis of their opinion, or the adoption of a common practice which has not been objectively evaluated (16). A third example is when a poor understanding of biostatistics leads to the misinterpretation of medical research. Putting logic ahead of the scientific method, excessively relying upon expert opinion, and an incomplete understanding of biostatistics all contribute to the etiology of a medical myth. In order to eradicate and prevent myths, we need to address all of these core etiologies.

The eradication of a medical myth needs to focus upon the profession as a whole. Because a false medical theory only grows into a myth when it becomes widely adopted, its cure only comes about when the majority reject the false idea and replace it with a truth. In order to bring this about, the focus is upon the small units, the memes, of a larger myth. As these memes evolve, we come closer to the truth and the myth gradually dies off.

This eradication of mythical memes in medicine is already solidly underway. Perhaps the best example of this is the Cochrane Collaboration, which has instituted a rigorous and systemic approach to the evaluation of the medical literature (17). Furthermore, many medical organizations are doing away with blanket expert opinion consensus statements. Instead, guidelines are presented with a strength of evidence score, which helps acknowledge the deficiencies and gaps in our knowledge (18).

The Internet has also served to treat medical myths by allowing a faster and easier way for nonacademic clinicians to peer review journal articles. A good example of this process are journals which allow the online community to post ‘Rapid Responses’ to their articles (19). Typically, they publish just about anything that isn’t libellous or doesn’t breach patient confidentiality, and based on the large number of contributors, the response from the online community has been overwhelmingly positive (20). ‘Rapid responders’, as they are called, note significant benefits, including the aspects of online peer review (21) and greater attention to the original article (22). One rapid responder even suggested posting research articles anonymously on the journal website before publication, to incorporate an online peer review in addition to the traditional ‘expert’ peer review (23).

Treating established medical myths, however, will never be fully effective unless strong measures are taken to prevent myths in the first place. Preventing bad data from getting into the medical literature is a primary goal. One way to do this is to minimize the link between the pharmaceutical industry and medical researchers (24). Having authors state any conflicts of interest at the end of the article is not sufficient, because it is now clear that capitalistic interests and monetary profit can affect what research is published, and how it is presented. In addition to conflict of interest disclosures by authors, journal editors and reviewers also need to disclose their conflicts, because of their large impact upon what ultimately gets published (25). Journals also need a quality control system in place to ensure against statistical abuse, which is very easily accomplished (26), especially when conflicts of interest come into play.

The prevention of a myth also requires us to correctly interpret good data. Unfortunately, the medical profession continues to be plagued by innumeracy. For example, internal medicine residents as a group continue to have a worrisome knowledge deficit when it comes to biostatistics (27). This is not a new finding, but rather a long-standing problem that remains unaddressed (28, 29, 30). One study of Danish doctors even concluded that ‘the statistical knowledge of most doctors is so limited that they cannot be expected to draw the right conclusions from those statistical analyses which are found in papers in medical journals’ (31). While innumeracy pervades society as a whole (32), we must not allow it to be rampant in the medical community. All medical professionals must have at least have a basic understanding of how to interpret biostatistics and understand research methodology. The failure of medical schools and continuing medical education programs in teaching statistics needs to be corrected. One suggestion to help the situation is to require statistical training as a prerequisite to medical school (33).

Although measures are currently underway to treat
and prevent medical myths, there continues to be a problem. Medical mythology, the disease, continues to thrive. The implementation of evidence based medicine is a positive step, by reducing our tendency to rely solely on opinions and biased studies rather than observation and the scientific method. Having practice guidelines incorporate 'weight of evidence' scores has also helped, by decreasing the negative effects of expert opinion. However, there remains a suboptimal understanding of biostatistics and research methodology by medical professionals. This problem requires an aggressive approach.

Medical mythology is a robust and resilient virus. We need to be diligent and persistent in our efforts to eradicate this insidious disease.

Thomas F. Heston, MD, PhD
Medical Director, Global Services
Tawam Molecular Imaging Centre
Johns Hopkins International
Baltimore, Maryland, USA

Marc V. Gosselin, MD
Department of Radiology
Oregon Health Sciences University
Portland, Oregon, USA

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