# Medical education in non-conventional therapeutics in the world (homeopathy and acupuncture)

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## Abstract

Background: Used as complementary to, alternating or integrated with mainstream medicine, the population's demand for non-conventional therapies has substantially increased in the past decades, requiring from doctors knowledge on the basic notions of such therapeutics to orient their patients regarding treatments different to the ones they usually prescribe. Among them, homeopathy and acupuncture are considered medical specialties in Brazil for various decades. Aim: To describe the current state of medical education in non-conventional therapies (homeopathy and acupuncture) around the world. Methods: We updated data resulting from studies and reviews published until 2013 through a review of more recent studies included in database PubMed. Results: In all countries the teaching of non-conventional therapies is considered a relevant topic for the training of doctors as a function of the increasing interest of the population in their use, with a broad range of approaches targeting undergraduate and graduate students, medical residents and doctors from other medical specialties. Conclusions: The Brazilian medical schools must provide undergraduate and graduate students and medical residents accurate knowledge on the theoretical assumptions and clinical-therapeutic approaches proper to homeopathy and acupuncture, among other non-conventional therapies.

## Keywords

Medical education; Complementary and alternative medicine; Homeopathy; Acupuncture; Attitude; Curriculum

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## Introduction

Use of non-conventional therapies for treatment of several diseases and health disorders has substantially increased in the past decades. Such therapies are used alternating, complementary to or integrated with mainstream medicine in all countries and population strata. This situation demands from doctors mastery of the fundamental notions underlying such therapies to be able to orient patients wanting to perform treatments different from the ones they are used to prescribe.

As in the United States millions of individuals (30% of adults and 12% of children) employ some form of non-conventional treatment, the National Institutes of Health (NHI) include an agency specifically devoted to research, divulgation and control of such practices (National Center for Complementary and Integrative Health - NCCIH) [1]. These practices are categorized as "complementary health approaches" when concern non-conventional practices or products, and as "integrative health" when they consist of complementary resources added to conventional health care.

In Brazil, after the Health Ministry launched the National Policy of Integrative and Complementary Practices (PNPIC) in 2006, expression "integrative and complementary practices" (PICs) began to be used in the national literature. However, since term "complementary and alternative medicine" (CAM) is still widely used in studies on this field, we also used in the present review to designate non-conventional health practices, approaches and treatments.

Although the Brazilian Medical Association (AMB) and Federal Council of Medicine (CFM) acknowledge homeopathy and acupuncture as medical specialties since 1980 and 1995, respectively, they are poorly available at public and private health services vis-à-vis the actual demand. Paradoxically, a survey conducted by the Regional Medical Council of the State of São Paulo (CREMESP) and CFM in 2013 (*Medical Demography in Brazil*) [2] evidenced that acupuncture and homeopathy ranked 22$^{nd}$ and 28$^{th}$ in number of professionals, respectively, among 53 analyzed medical specialties. A similar survey performed in 2015 [3] showed they ranked 27$^{th}$ and 31$^{st}$, respectively.

Since these approaches are not included in the standard curriculum of medical schools, doctors are not prepared to discuss the various CAM with patients, resulting in a gap in therapeutics and/or in the doctor-patient relationship. This fact alone ought to serve as trigger for medical schools to teach undergraduate and graduate students and medical residents the basic foundations, scientific evidences and clinical-therapeutic approaches of non-conventional medicine. In addition, effective incorporation of PICs into health services as adjuvant to conventional treatment will increase the efficiency, efficacy and effectiveness of medical interventions in the various specialties and fields of action.

To contribute to the debate on the need to accept and incorporate CAM into the curriculum of medical schools that we promote since 2004 [4-9], we performed the present up-to-date review on the validity of teaching homeopathy and acupuncture to undergraduate and graduate students (medical residents), the attitudes of users and doctors in this regard, corresponding medical educational initiatives in several countries, and the benefits of these efforts for society at large and for the training of doctors.

## Materials and methods

The primary sources for the evidences gathered in the present studies were studies and reviews we published until 2013 [4-9] to which new studies published from 2013 to 2017 were added. Such studies were located in database PubMed using keywords "medical education", "attitude", "curriculum", "CAM", "homeopathy" and "acupuncture". We described the Brazilian initiatives for medical education in Brazil comparatively to other countries.

## Relevance of CAM teaching to undergraduate medical students

### *Interest in and use of CAM by the world population*

In the first survey (1990) on the prevalence, cost and use of CAM in USA, Eisenberg et al. [10] estimated that 34% of the country adult population used this type of treatments, corresponding to 427 million visits/year with non-medically qualified practitioners. This study was repeated in 1997 [11] when it detected increase in the search for CAM (42% of the population, 629 million visits/year), representing an additional cost of USD 27 billions to the US population, as such treatments were not available at public health services and were not reimbursed by health insurance. A survey performed later, in 2002 [12] found that the prevalence of use of CAM remained constant, 2 or more forms being used by 72 millions of US adults. A study conducted in Europe [13] evidenced similar results; 46% of German and 49% of French citizens reported use of CAM.

In a survey conducted in Florida, USA, in 1998 [14] 62% of the adult residents reported having used 1 or more CAM among 11 modalities included in a list, with greater predominance of home remedies (31%), diets (24%), relaxation (20%) and herbal medicine (18%). In 2002 [12] the therapeutic practices most often used were herbal medicine (18.6%; 38 million users) and chiropraxy (7.4%; 15 million users). A broad-scope survey on use of CAM in USA (National Health Interview Survey, 2007) [1,15] showed that the 10 modalities most used by adults were: natural products (17.7%), deep breathing (12.7%), meditation (9.4%), chiropraxy and osteopathy (8.6%), massage (8.3%), yoga (6.1%), diets (3.6%), deep relaxation (2.9%), guided imagery (2.2%) and homeopathy (1.8%).

The heterogeinity among studies notwithstanding, a systematic review estimated the prevalence of use of CAM in the United Kingdom [16] comprising 89 studies (2000-2011) and 97,222 participants. Varying according to the quality of studies, the average prevalence use of CAM was 41% per year and 52% along life. The modality most often used was herbal medicine, followed by homeopathy, aromatherapy, massage and reflexology. Concluding that a large part of the population used CAM, the authors stressed that healthcare providers need to have knowledge sufficient to provide responsible advise to patients.

Studies on the reasons that lead the USA population to seek non-conventional treatments showed that dissatisfaction with mainstream medicine was the main one [17,18]. A second reason was to attain a holistic understanding of illness (body-mind-spirit interrelation) [19]. Analogously, studies conducted in Brazil [20,21] showed that patients seek homeopathy due to the following reasons: dissatisfaction with

conventional medicine, avoidance of the side effects of conventional drugs, improvement of the doctor-patient relationship, and treatment that considers the individual as a whole (body-mind-spirit). Among cancer patients, improvement of the immune system is also mentioned [22,23].

Recent studies conducted in several countries once again showed that CAM is used by a significant part of the population (more than 50%) in a complementary or integrative manner for countless disorders and diseases: Germany (cancer) [22-24], Korea (neuropsychiatry) [25], Germany (epilepsy) [26], Canada (pediatric neurology) [27], Saudi Arabia (dermatology) [28], Serbia (cancer) [29], Australia (cancer) [30] and Taiwan (brain trauma) [31], among others.

***Relevance of CAM teaching for doctors***

The second survey conducted in USA [11] showed that more than 60% of CAM users did not report this fact to their doctors. Research performed with breast cancer patients revealed they avoid discussing concomitant CAM use with their doctors for expecting reprove, due to the mistrust and lack of knowledge of professionals in this regard [32,33]. Lack of interest of doctors in complementary CAM use might mean risk to patients due to possible drug interactions or adverse effects [34,35].

The vast majority of doctors are not prepared to answer questions or orient their patients as concerns the mechanisms of action, therapeutic indications and adverse effects of CAM or on drug interactions [35,36]. Additional factors, such as insufficient dialog between conventional and non-conventional doctors, doubts on the professionals' skills and risk of unreal expectations of cure, place patients in a position of uncertainty vis-à-vis CAM. Systematic inclusion of information on CAM in the curriculum of medical schools, in addition to reducing ongoing prejudice would afford future doctors the knowledge needed for their patients to properly benefit from CAM [6,37-43].

Moreover, inclusion of CAM topics in the medical school curriculum would add humanizing and health-centered components to health care [7,44] by disclosing the broad scoped, complex and uncertain nature of medical practice, with development of additional skills for clinical decision-making and promotion of new grounds for future research [45-47].

Systematic adjuvant use of CAM in severe [22-27] and hard to treat [48-51] diseases might improve the therapeutic response and quality of life of patients. In several initiatives [52-54] integration of conventional and non-conventional practices improved the quality of care delivery and the cost-effectiveness ratio.

## Doctors and students' attitudes toward CAM

### *Doctors' attitudes*

Ignorance of the fundamentals of CAM by doctors leads to frustration among the patients who use them concomitantly to conventional treatment. The reason is that they are deprived of safe guidance as to the main indications and possible risks of CAM [55-57].

Parallel to the increasing interest of patients in CAM, a need rose among doctor to meet such demand, which in USA is channeled to non-medically qualified practitioners. Together with the disgust of patients for the conventional health system, the dissatisfaction of doctors with that same approach increased the latter's interest in CAM [58,59].

Meta-analysis of 12 surveys of conventional doctors' attitudes toward CAM showed they rated them moderately effective [60]. A study on the attitude of general practitioners in Victoria, Australia [61] toward CAM showed that acupuncture, hypnosis and meditation had good acceptance, being mentioned by 80% of their patients and used by 50% of them. The surveyed doctors reported to have training in several modalities: meditation (34%), acupuncture (23%), vitamin-mineral therapy (23%), hypnosis (20%), herbal medicine (12%), chiropraxy (8%), naturopathy (6%), homeopathy (5%), spiritual healing (5%), osteopathy (4%), aromatherapy (4%) and reflexology (2%). About 30% of the interviewees expressed interest in learning chiropraxy, herbal medicine, naturopathy and vitamin-mineral therapy.

In a survey of doctors in Denver, CO, USA [62] on their personal and their patients' experience with CAM, 76% of the interviewees reported to have patients who used CAM, 59% were questioned about particular modalities, 48% had recommended CAM to patients and 24% had used it themselves. Few doctors reported to feel comfortable upon discussing CAM with their patients, and most of them (84%) believed they needed to learn more so as to dispel their patients' doubts in an adequate manner.

A study of the attitudes, knowledge and interest of pediatricians of Michigan, USA, in regard to CAM [63] showed that more than 50% of them had interest in taking training courses, would use it in themselves and recommend it to patients. The modalities preferred were: biofeedback (23.6%), self-help groups (23.3%), relaxation (14.9%), hypnosis (13.8%) and acupuncture or acupressure (10.9%). Other surveys conducted in other locations with doctors from various specialties (surgeons, oncologists, etc.) evidenced a similar interest in the use of and training in CAM [64-69].

Recent surveys of doctors with various specialties and from different countries, including China [70], Hungary [71], México [72], Germany [73,74], Iran [75], USA [76,77], Australia [78] and United Kingdom [79], among others, found similar results. Doctors expressed interest in learning about CAM, and the results evidenced the need for doctors to have knowledge on the fundamentals, scientific evidences and clinical-therapeutic approaches of the various modalities of CAM.

***Medical students and residents' attitudes***

A survey conducted with medical students at Düsseldorf University (Germany) [80] evidenced that the interviewees had knowledge of CAM, personal experience as users and interest in learning 1 or more modalities. The preferred modalities were: acupuncture (55.7%), homeopathy (42.1%), autogenic training (24.9%) and reflexology (11.4%), because they believed these were the most efficacious ones. A study performed with 800 medical students at 2 schools in Melbourne (Australia) [81] found positive attitudes toward CAM and interest in learning about, while few students had actual knowledge of this subject. A survey conducted with medical students in Singapore [82] detected positive attitudes toward CAM: 92% of the interviewees believed that the notions and methods of CAM might benefit conventional medicine, 85% had interest in learning about and 91% asserted CAM might play a significant role in their future medical practice.

Analogously, a study performed with 1st and 2nd year students at the medical school of Georgetown University, Washington DC, USA [83] found that most interviewees (91%) agreed on that CAM includes notions and methods that might benefit medicine, 85% asserted that knowledge on CAM is relevant for future health care providers, and more than 75% that CAM ought to be included in the curriculum. The preferred level of information was the one that enables giving advice to patients, and the preferred modalities acupuncture, chiropraxy, herbal medicine and food supplements. Also other surveys evidenced similar results [84-87].

A survey of the attitudes of medical students at School of Medicine, University of São Paulo [5] toward homeopathy and acupuncture found that more than 85% of the interviewees believed they should be included in the undergraduate curriculum; 65% expressed considerable interest in learning about them. Although most had no or little knowledge about the subject (76%), 67% of the participants reported to believe that CAM has some level of efficacy, having chronic diseases as their main indication, exclusively (37%) or together with acute conditions (29%). About 35% of the interviewees were favorable to outpatient clinics for both modalities in public health services; 34% considered they ought to be also available at hospitals; 60% believed in their integration with conventional medicine.

To assess a 4-year medical residency program in integrative family medicine carried out at Washington University (USA), in which CAM is added to the conventional curriculum, a study performed with 39 3rd and 4th year residents found that 80% of the interviewees considered the program ought to provide training in CAM. Most of them had already recommended some CAM modality to patients in the past year [88]. A survey conducted with 153 medical residents from a family health program in Arkansas (USA) [89] found that most had minimal knowledge about CAM, did not ask their patients about CAM use and felt uncomfortable upon discussing potential risks and benefits with patients. Nevertheless, most interviewees expressed interest in learning about CAM.

The Association of American Medical Colleges (USA) stated that medical students ought to have sufficient knowledge on CAM to be able to give advice to their patients on the possible benefits and risks of each modality [90].

Recent studies stress the lack of knowledge on CAM of medical students and residents along their training years, as well as their considerable interest in learning about it, thus reinforcing the relevance of systematic inclusion of CAM in the standard curriculum [91-94].

**Medical education in CAM around the world**

In response to the increasing interest in CAM, medical schools and graduate and residency programs began to include it in the curriculum, after having noticed that thus they broaden the scope of action of medicine and improve the doctor-patient relationship [95].

In the United Kingdom, legislation considers graduate education for doctors. In 1993, the British Medical Association [96] recommended medical schools to offer introductory courses on CAM to all undergraduate students. Three years later [97] 23% of medical schools had included disciplines for teaching basic concepts of CAM. In 1999, 40% of the medical schools in the European Union included courses on CAM [98]. In 1997, the French Order of Physicians acknowledged that homeopathy ought be prescribed by doctors with graduate university training.

In some USA states (Arizona, Nevada and Connecticut, among others) there are agencies to certificate homeopathic practitioners. The American Institute of Homeopathy grants diplomate (advanced specialty) status (DHt) to doctors, and the Council of Homeopathic Certification grants certificates in classical homeopathy. Some states grant licenses to doctors specialized in acupuncture. Reflecting the changes demanded by the country population, the latest edition of the Ethics Manual of the American College of Physicians includes a specific section on "alternative therapies" and recommends doctors to respect their patients' choice of non-conventional treatments [99].

A large number of medical schools in USA offer lectures on holistic medicine or CAM [100]. A survey conducted in 1995 by the Society of Teachers of Family Medicine in 97 medical schools found that 39.2% of them provided some form of training in CAM to medical residents, mostly as optional courses (72.2%). Among non-university-based residency programs for family doctors, 28.1% offered teaching on CAM [101].

A study performed in 1997/98 with 117 medical schools in USA showed that 64% of them included lectures on CAM [102]. A survey conducted in 1998 with medical schools in Canada found that 81% included CAM topics in the curriculum, being acupuncture and homeopathy the modalities most widely taught [103]. In 1998/99, a study with 80 medical schools in Japan found that 20% taught CAM, being acupuncture the predominant modality [104].

In one study on education in CAM in USA [105] respondents were 73 course directors (from 53 medical schools). The topics most frequently taught were acupuncture (76.7%), herbs and botanicals (69.9%), meditation/relaxation (65.8%), spiritualism/faith/praying (64.4%), chiropraxy (60.3%), homeopathy (57.5%) and nutrition/diets (50.7%). While the amount of time devoted to individual topics varied widely, most received about 2 contact hours. The 'typical' CAM course was sponsored

by a clinical department (64.9%) as an elective (75.3%) taught in the first or fourth year of medical school, and had fewer than 20 contact hours of instruction (52.1%). Most of the courses were taught by individuals identified as CAM practitioners or prescribers. Most courses sought to teach general notions of CAM (61.6%) while very few emphasized the scientific evidences for and effectiveness of CAM or offered practical training in specific techniques (17.8%).

Although homeopathy and acupuncture are acknowledged as medical specialties in Brazil since 1980 and 1995, respectively, they were incorporated into the curriculum by very few medical schools, mostly as electives [4,6,8].

## Proposals for medical education in CAM

### *Undergraduate courses*

A project was developed in Germany to integrate natural healing procedures into teaching and research at Ludwig-Maximilian University, Munich [106]. This elective for medical students includes teaching on the fundamentals of and research in acupuncture, manual therapy, nutrition, homeopathy, hydrotherapy and herbal medicine. Scientific evidences for the effects and efficacy, indications and contraindications of each modality are addressed, and practical training is offered.

Proposals to integrate Western and Eastern (Chinese) medicine were developed in Taiwan [107] and Japan [108] starting from fundamental medical teaching. The rationale underlying these proposals is the belief that a unified medical care system will reduce the overall expenses with health.

University of Arizona [109], the pioneer in medical education in CAM in USA since 1983, offers 4$^{th}$ year undergraduates a 4-month elective in integrative medicine since 1997. The overall goal is to delve deeper into subjects superficially discussed along the first years of the course and to provide clinical experience. Similar initiatives were established at other medical schools [110,111].

According to the National Center for Complementary and Alternative Medicine (NCCAM-NIH) CAM teaching for medical undergraduate students ought to be oriented by the fundamentals of each modality, with emphasis on scientific evidences [112]. Several levels of CAM competencies are acknowledged in USA: a) low, doctors just have knowledge enough to indicate CAM and refer patients to more qualified practitioners; b) medium, doctors have practical skills sufficient to treat specific conditions; and c) high, doctors are fit to treat various diseases.

In the past decade, NCCAM-NIH funded CAM Education Program aiming at integrating CAM into the curriculum of medical schools so as to train professionals to meet the population demands. Such initiative resulted in various benefits: increase of academic activities related to CAM, development of new programs and increase of intra- and inter-university collaboration. Common challenges included the need for qualified professors, reformulation of curriculum, lack of definition of CAM and future sustainability of programs [113,114].

A similar initiative was developed in Canada to establish programs to integrate CAM into undergraduate medical courses. Activities included development of specific skills, reviews of relevant topics, repository of teaching and learning resources and a guide for the development, implantation and sustainability of the CAM curriculum [115].

A consortium of dozens of medical schools in USA, Canada and Mexico which develop active programs for teaching of CAM and integrative medicine congregates efforts to include these approaches into the curriculum of undergraduate courses and medical residency programs. The Consortium of Academic Health Centers for Integrative Medicine (CAHCIM) [116] influenced the National Board of Medical Examiners (USA) to include questions on CAM and integrative medicine in exams.

A survey conducted at 41 medical schools in Korea (2007-2010) [117] found that CAM was officially taught at 35 of them (85.4%). The most common courses were introduction to CAM or integrative medicine (88.65), traditional Korean medicine (57.1%), homeopathy/naturopathy (31.4%) and acupuncture (28.6%). Educational formats included lectures by professors and demonstrations by practitioners. The value order of core competencies was attitude (40/41), knowledge (32/41) and skill (6/41).

In Brazil, homeopathy and acupuncture at taught as electives [118,119] in just a few medical schools. Inclusion in the curriculum depends on the will of course directors and teaching is usually performed by specialists on a voluntary basis [4,6,8,120].

Just as in Brazil along several decades, also in other countries the idea of including homeopathy and acupuncture into the medical school curriculum as electives is increasing. With this, prejudice is combated and positive attitudes towards these approaches develop in the future doctors [6,121-123].

***Medical residency and graduate education***

In USA, the Society of Teachers of Family Medicine Group on Alternative Medicine developed consensual recommendations on attitudes, knowledge and skills in CAM to include it in family medicine residency programs [124]: cultural influence on convictions and choices relating to health; theoretical and philosophical grounds of CAM modalities; indications and potential adverse effects of each modality; scientific evidences for the efficacy and cost-benefit of each modality.

In 1996, University of Arizona developed a new approach to medical education denominated 'integrative medicine' defined as medicine that emphasizes the doctor-patient relationship and integrates the best of CAM with the best of conventional medicine. Thus it includes humanistic, preventive and curative aspects of the various therapeutic approaches. The goal of integrative medicine is to develop a way for conventional and non-conventional doctors to work together comfortably for the sake of the improvement of their patients.

Program in Integrative Medicine includes a 2-year residential fellowship that educates 4 fellows with 6 years of previous clinical experience, on average, each year. The first year is divided into 3 didactic sections: philosophical foundations, lifestyle practices (health promotion and prevention) and therapeutic systems and modalities (botanical

medicine, manual medicine, Chinese medicine, homeopathy, energy medicine and allopathic medicine). The second year is devoted to 4 process sections, to wit: clinical integration (application of theoretical knowledge to clinical practice), personal development and reflection, research education and leadership. Residents must select 1 CAM modality for additional training during the second year, being encouraged to test the modalities they recommend to patients on themselves. In this adaptation of integrative medicine to the conventional medical residency curriculum, each resident devotes 8-10 hours/week to the study of CAM, to a total of 1,000 hours along the 2 years in the program.

The Bruce Rappaport Faculty of Medicine at Technion (Haifa, Israel) [125] established an elective introductory course in CAM for residents and specialists in the department of family medicine. Four modules in CAM (herbal medicine, traditional Chinese medicine, homeopathy and nutritional medicine) are taught during a 16-session course. This initiative induced a positive change in the students toward CAM based on evidences. As a result, the students began to use CAM on themselves and their relatives and to recommend it to patients.

Based on the various initiatives developed in the past decades, investigators discussed what ought to be taught in CAM courses and how aiming at formulating guidelines for programs to improve and attain their goals [126-131].

In Brazil, residency programs in homeopathy and acupuncture were approved by the National Committee of Medical Residency (CNRM) in 2002 (CFM Resolution no. 1,634/2002). Access is direct (no previous residency program is required) and programs last 2 years. Residency programs in homeopathy are offered at only 3 Brazilian institutions (Federal University of the State of Rio de Janeiro - UNIRIO, Federal University of Mato Grosso do Sul and Regional Public Hospital of Betim) [132]. In turn, acupuncture is offered at 8 institutions [133]: FMUSP; School of Medicine of São José do Rio Preto (São Paulo); Francisco Morato State Civil Servant Hospital (São Paulo); Homero de Miranda Gomes Regional Hospital (São José, Santa Catarina); Prof. Polidoro Ernani de São Thiago University Hospital, Federal University of Santa Catarina; Federal University of São Paulo; Clinical Hospital, Federal University of Pernambuco; and Base Hospital, Federal District.

Overall, in Brazil homeopathy and acupuncture are taught to doctors as specialization courses or non-degree graduate courses offered by training institutions [134,135] with about 1,200 credit-hours. Completion of courses enables doctors to take board certification exams applied by official specialty institutions in agreement with AMB [136,137].

## Discussion

CAM such as homeopathy and acupuncture represent therapeutic options for a broad scope of human diseases. These non-conventional practices have been increasingly sought after by the world population. Homeopathy and acupuncture have wide clinical application for centuries, and even millennia (in the case of the latter), are acknowledged as medical specialties, are available in the Brazilian national health service, reimbursed by health insurance, and their assumptions are scientifically

grounded on fundamental and clinical research [118,119,138-141]. Nevertheless, ignorance of their basic aspects by doctors results in prejudice and groundless criticism, perpetuated as a function of their non-inclusion in the standard curriculum of medical schools.

To overcome such impasse, homeopathy and acupuncture ought to be included in the curriculum of all Brazilian schools of medicine as elective and mandatory disciplines. Considering the complexity and diversity of both, theoretical disciplines ought to comprise at least 30 credit hours (2 credits) for students to acquire knowledge sufficient to provide advice to patients. The same disciplines might be also taught at graduate and medical residency programs. Outpatient clinics ought to be made available parallel to the theoretical disciples to afford clinical and therapeutic experience to students. Availability ought to be extended in the form of specific non-degree graduate and medical residency programs. In all such instances, the scientific evidences that ground these therapeutic approaches ought to play a foremost role, as they translate concepts different to the ones usually taught into the academic language, thus facilitating the learning of beginners.

In parallel to the need of a considerable number of doctors specialized in homeopathy and acupuncture in the public and private health care networks to meet the repressed demand, specialized professors and investigators should be hired by medical schools to enable an effective formulation of teaching, research and care initiatives. Congregation of such professionals in specific departments would promote the exchange of experiences and actual implementation of such initiatives.

An example of this type of organization is provided by School of Medicine and Surgery, UNIRIO. A pioneer in university teaching of homeopathy, it includes a Department of Homeopathy and Complementary Therapeutics composed of certified professors (homeopathic doctors) responsible for the activities at a teaching outpatient clinic and disciplines Homeopathic Materia Medica (elective, 30 credit hours, 2 credits) and Homeopathic Therapeutics (elective, 30 credit hours, 2 credits) [142]. Thanks to this infrastructure, starting 2004, UNIRIO offers a medical residency program in homeopathy.

Since acupuncture and homeopathy are used in a complementary and adjuvant manner for treatment of countless contemporary diseases, it is difficult to understand why the corresponding specialists are not included in the medical staff of public and private health services. Practically all outpatient clinics and hospital words ought to be able to apply these CAM modalities to minimize the suffering of patients, improve clinical effectiveness in the cure of diseases and reduce the cost and side effects of conventional treatments. Unfortunately, these aspects are not considered by course directors, hospital managers and health policy makers.

Explanations for this paradox were suggested in an analysis of the factors that facilitate or hinder the implantation of public policies for homeopathic conducted among municipal public health managers in São Paulo [143]. Facilitating aspects included: availability of homeopathic doctors in the health care network, user's demand, managers' acceptance of homeopathy, and availability of reference services where homeopathic care might be delivered. Hindrances mentioned were: need to hire homeopathic doctors (the main problem by far), influence of upper management levels opposed to homeopathy, priorities to be met before new projects might be developed,

purchase and delivery of medicines, duration of homeopathic consultations and ignorance of homeopathy rationale.

In 2006 the Health Ministry launched the National Policy of Integrative and Complementary Practices (PNPIC, MS ruling no. 971/2006) [144,145] which ensures the population partial access to CAM. Under PNPIC, patients are provided traditional Chinese medicine/acupuncture, homeopathy, botanicals and herbal medicine care gratis, among others at Health Basic Units (HBU) and Family Health Support Units (NASF), in addition to hospitals.

Tepid, vis-à-vis the huge interest in CAM, the effects of PNPIC illustrate the relevance medical education in non-conventional medicine ought to be attributed. The number of acupuncture procedures in 2007, i.e. the year PNPIC was implemented, was 97,240 to rise to 216,616 (122% increase) the following year. In regard to homeopathy, 312,533 consultations were performed in 2007 [146]. At that time, homeopathy was available at public health services in just 2% of the Brazilian municipalities.

## Conclusions

Through this brief description of the situation of medical education in CAM, we hope to stimulate discussions on the relevance of Brazilian medical schools adjusting the curriculum to the actual demand. The reason is that homeopathy and acupuncture teaching, research and care are likely to meet the demands of the interested population, and doctors should be able to give proper orientation as to their mechanisms of action, therapeutic indications, drug interactions and possible adverse effects so that they might be employed in a safe and efficacious manner.

The evidences provided here should also ground and promote greater support among medical institutions (AMB, CFM, State Regional Medical Councils, among others) to the implantation and availability of homeopathy and acupuncture as medical specialties at the various health care sectors and services, considering their current poor availability and the increasing interest of the population.

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