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• Medical Education

The evolution of integrative medical education: the influence of the University of Arizona Center for Integrative Medicine

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ABSTRACT

The University of Arizona Center for Integrative Medicine (AzCIM) was founded in 1994 with a primary focus of educating physicians in integrative medicine (IM). Twenty years later, IM has become an internationally recognized movement in medicine. With 40% of United States' medical schools having membership in the Academic Consortium for Integrative Medicine and Health it is foreseeable that all medical students and residents will soon receive training in the principles and practices of IM. The AzCIM has the broadest range and depth of IM educational programs and has had a major influence on integrative medical education in the US. This review describes the fellowship, residency and medical student programs at AzCIM as well as other significant national drivers of IM education; it also points out the challenges faced in developing IM initiatives. The field of IM has matured with new national board certification in IM requiring fellowship training. Allied health professional IM educational courses, as well as integrative health coaching, assure that all members of the health care team can receive training. This review describes the evolution of IM education and will be helpful to academic centers, health care institutions, and countries seeking to introduce IM initiatives.

Keywords: integrative medicine; integrative health; fellowships; integrative health coaching; medical education; competencies

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1 Introduction

In 1994, the University of Arizona College of Medicine embarked on an experiment in medical education. The Dean of the College of Medicine, Dr. James Dalen, authorized Dr. Andrew Weil to establish a Program in Integrative Medicine (IM) within the College of Medicine. The primary focus of the program was to educate physicians in this new field. Twenty years later, IM has become an internationally recognized movement in medicine. It is instructive to examine how the program at the University of Arizona evolved and how it has influenced medical education.

This article will describe major milestones in the growth of the educational activities of the University of Arizona Center for Integrative Medicine (AzCIM) as well as other

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major developments in the field and the challenges faced; the information should be helpful to other academic centers and health care institutions seeking to replicate its accomplishments.

2 Evolution of integrative medical education

2.1 Early history at the University of Arizona

The seeds for the Program in IM were sown in 1975 when Dr. Weil was first asked to teach medical students. Initially invited to lecture on marijuana, he then gave lectures on drugs and addiction, alternative medicine, mind/body interactions, and placebos and healing. While his lectures were well received by the medical students, some senior faculty members were skeptical. By the 1980s, these lectures were a part of the regular curriculum. In 1993, Dr. Weil proposed the creation of a new residency in IM; foreseeing the critiques, Dr. Dalen recommended beginning with a fellowship instead.

A national advisory board was assembled and planning began to create a two-year residential fellowship in IM. While the structure was conventional in that it accepted board-certified physicians from primary care fields for a two-year onsite program, the content was intended to address gaps in medical education. Generous and visionary philanthropists supplied all funding for this new program, which assuaged concerns from the Dean's critics who complained that state funds ought not be used to develop an unproven field. The Dean took a significant risk amongst his peers as well, many of whom complained about the lack of evidence for some of the theories and practices included in the curriculum.

2.2 The residential fellowship

From 1997 to 2007 the University of Arizona Program in IM offered a two-year residential fellowship to primary care physicians. Thirty fellows participated with board certification in family medicine (9), internal medicine (8), pediatrics (5), Med-Peds (2), emergency medicine (2), preventive medicine (2), Ob-Gyn (1), and radiology (1). Between four and ten fellows were in training at any one time and received a modest stipend.

The curriculum addressed the evidence for nutrition, dietary supplements, exercise, and mind-body influences on health. Fellows deepened their understanding of the spiritual needs of patients and studied the fundamentals of traditional Chinese medicine, Ayurveda, homeopathy, manual medicine, and energy medicine. Patients were seen at the University of Arizona Medical Center in a consultative clinic and presented to a multidisciplinary case conference with both conventional and alternative medicine practitioners. Fellows learned from the varying perspectives, researched the literature, and then developed comprehensive treatment plans for their patients. Skill-building in communication along with a focus on relationship-centered care prepared the fellows to interact in partnership with their patients. In addition, fellows spent two days together each month in facilitated reflections. This time was used to meditate, experience healing ceremonies, and investigate the ways in which medical training shapes physicians. In their clinical encounters, fellows practiced the art of medicine, attended to the role of language and motivation, and sought clues to enhance healing[1].

The residential fellowship served to develop and refine the first academic curriculum in IM as well as to train early IM leaders who went on to establish new IM programs at other academic centers. While the residential fellowship was a transformational experience for the majority of physicians who participated, it depended on philanthropy to sustain it and could train only limited numbers of physicians. Scalability and financial sustainability were critical to the long-term needs of the field.

2.3 Adaptation to distributed learning fellowship

In 2000, a second significant educational experiment began at the University of Arizona Program in IM. The fellowship curriculum (Table 1) was adapted as an online program with three weeklong residential intensives. Initially named the Associate Fellowship, it is now called the University of Arizona Fellowship in IM.

Currently 130 fellows are trained each year. They are mostly board-certified, mid-career physicians from a full range of medical specialties. Given a commitment to interprofessional education, the fellowship also trains nurse practitioners, nurse midwives, physician assistants, and PharmDs.

Tuition now fully funds the educational program, meeting the challenge of sustainability. Unexpectedly, from the earliest classes, the fellows have described transformational experiences. A majority reports a renewed sense of calling to the ideals that originally brought them to medicine; they often make profound lifestyle changes and alter their professional practices. With over 1 060 graduates, the University of Arizona Fellowship is the largest fellowship program in the nation. Over its 15-year history it has trained academic leaders who practice at Duke, Johns Hopkins, Mayo, Scripps, UCSF, UCLA, UCSD, Yale, the National Institute of Health (NIH), the CDC, and other prestigious institutions. Academic institutions frequently fund faculty members' tuition so as to have a fellowship-trained IM faculty member on staff.

While the fellowship scaled from training four residential fellows per year to 130 and was financially sustainable, it did not address the need to embed training into conventional medical education. This would require a

Table 1 The curriculum

Unit 1	Introduction to Integrative Medicine • IM Intake and Treatment Planning • Motivational Interviewing • Leadership • Medical Informatics	Year One
Unit 2	Nutrition: Macronutrients, Micronutrients, Diet & Meal Patterns, Phytonutrients • Anti-inflammatory Diet • Common Dietary Supplements • Botanical Medicine Foundations	
Unit 3	Spirituality and Health • Mind-Body Medicine • Integrative Approach to Mental Health • Sleep • Contemplative Care	
Unit 4	Manual Medicine • Integrative Approach to Pain Management • Integrative Approach to Rheumatology	
Unit 5	Life-enhancing Environments • Integrative Medicine Business and Legal Issues	
Unit 6	Whole Systems Introduction • Homeopathy • Naturopathy • Traditional Chinese Medicine • Ayurveda • Aromatherapy • Energy Medicine	
Unit 7	Integrative Approach to Cardiology • Nutrition & Cardiovascular Health • Integrative Approach to Diabetes	
Unit 8	Integrative Approach to Gastroenterology • Integrative Approach to Respiratory Health • Integrative Approach to Dermatology	Year Two
Unit 9	Integrative Approach to Women's and Men's Health • Environmental Medicine • Integrative Approach to Endocrinology	
Unit 10	Integrative Approach to Integrative Oncology • Nutrition and Cancer • Prostate Cancer or Breast Cancer	
Unit 11	Integrative Approach to Neurology • Reflections	

substantial IM curriculum integrated into the foundational training of physicians. While altering medical school education had been an initial goal, with a moderate degree of success at the University of Arizona, growing realization of the difficulty of adding hours to the already packed undergraduate curriculum led to a decision to focus on residency training instead.

2.4 Addressing conventional medical education: integrative family medicine

In 2004, with the support of the US Department of Education, a third major initiative brought IM training into residency education. The AzCIM developed a combined residency-fellowship program in partnership with six family medicine residency programs. To make sure the experience was generalizable, six family medicine residency programs were selected from urban and rural settings, community-based and academic programs. All six extended family medicine training from three to four years and offered one or two positions in the IM fellowship each year as an elective track. Residents applied for a spot and completed family medicine residency and the full University of Arizona fellowship within those four years. The Accreditation Council for Graduate Medical Education (ACGME) approved the extension of family medicine residency training to four years. To date approximately 50 residents/fellows have graduated; half chose faculty positions upon graduation and another quarter are working in underserved settings[2].

We studied the model and found that despite being an elective track, the joint program brought many advantages to the participating residencies. They were seen as innovative and enjoyed improved match rates. While only one or two residents completed the program each year, gradually the culture of the residency programs became more open to IM[3]. As of 2015, three of the original six residencies continue to self fund the program, and a seventh joined the model.

While Integrative Family Medicine can be considered a successful initiative, as a national strategy to shift medical education it is limited. The 4th year salary became more difficult for residencies to obtain as budgets shrank. The curriculum and pacing of the fellowship, was designed for experienced, board-certified practicing physicians, as opposed to time-crunched residents who are just beginning to learn clinical medicine. Also, the cost of the fellowship was a challenge to several sites. Finally, the model was not scalable, given the limited fellowship spots available each year.

2.5 Scaling residency training

In 2008, a fourth major milestone was initiated to address the national need for an IM residency (IMR) training model[4]. With funds from forward thinking philanthropists and the US Department of Education, a 200-hour curriculum was developed and evaluated. No longer an elective, the eight residency programs that piloted the initiative agreed that the curriculum would be a required element of education

for all entering residents at their programs. Roughly 80% of the curriculum is web-based, in a modular format, with the remainder consisting of individual on-site activities. The curriculum was designed to meet the needs of physicians in training and was divided into courses that can be adapted to the schedules of individual institutions. The results of a needs assessment of residents, faculty, and residency program directors as well as IM competency development informed the content of the IMR[5,6]. A robust evaluation was designed, and four control residency sites participated in measuring medical knowledge through standardized testing and a knowledge self-assessment. Changes in wellbeing and wellness behaviors over time were also assessed using validated scales for burnout, perceived stress, emotional intelligence, depression, mindfulness, gratitude, mood and affect[7].

2.6 IMR results

IMR pilot site residents showed significant gains in medical knowledge from baseline to graduation on a standardized test when compared to control site residents[8]. In addition, the self-assessment of knowledge and skills demonstrated a marked increase from start of residency to the time of graduation in the pilot residents and when compared with the control site residents. Participating IMR residents evaluated the IMR curriculum positively in meeting its learning objectives and having content with sufficient depth that was clinically relevant. In an exit survey at the completion of the residency, pilot residents stated their intention to utilize IM approaches in future practice and continue IM education after residency. Another important effect of incorporating the IMR curriculum into residency training is the increase in recruitment of quality medical students into primary care[9]. Results from wellbeing and wellness measures are still being analyzed.

2.7 Expansion from family medicine to pediatrics

As IM matured, it became clear that pediatrics was ready to incorporate its tenets. The American Academy of Pediatrics formed a Section on Complementary, Holistic and Integrative Medicine in 2005, whose mission was to further education about complementary and integrative approaches for children[10]. A 2015 national report estimated that 12% of US children use complementary and alternative medicine (CAM); prevalence increased to more than 50% in children living with chronic illness[11]. Despite the high prevalence of IM use by children and their families and pediatrician interest, few training programs existed in pediatric IM. Indeed, only 16 of 143 pediatric academic programs reported offering any training in IM[12].

The Pediatric Integrative Medicine in Residency (PIMR) program was initiated in 2012 to address this gap. PIMR is a 100-hour online educational curriculum embedded into existing residency training programs and facilitated by onsite fellowship-trained IM faculty. The national pilot program is being implemented and evaluated at five pilot sites: University of Arizona, Stanford University, University of Chicago, Eastern Virginia Medical School/Children's Hospital of the King's Daughters, and the University of Kansas[13]. Early adopter programs that have licensed PIMR include Vanderbilt University, Cardinal Glennon Children's Hospital, University of New Mexico, Children's Hospital of Philadelphia, and the University of Southern California. In 2015, 456 pediatric residents were enrolled in the training program.

Modeled after the IMR, the PIMR curriculum is also modular, allowing flexible use in a variety of training programs. Programs use the curriculum as a teaching tool in resident continuity clinic, during specialty electives, and as a year-long seminar series on IM.

A significant innovation in the PIMR curriculum is a unit on resident self-care. This addresses the new ACGME core competencies focused on burnout prevention and promotion of resident wellness and resilience[14]. PIMR content also covers nutrition, dietary supplements, mind-body medicine, mental health, whole medical systems, environmental health, motivational interviewing and pediatric IM intake and treatment planning.

2.8 From IM to integrative health

While physician education has been a focus of the AzCIM, demand for intensive training for allied health professionals continues to grow. In response, the Center developed a six-month online program with a four-day residential retreat. Launched in 2014, the Integrative Health and Lifestyle program (I-HeLp) has enrolled more than 120 licensed health professionals including nurses (57), behavioral health specialists (22), social workers (20), registered dieticians (15), physical therapists (4), and a variety of other providers.

A second phase of the training, Integrative Health Coaching was launched in 2015. Evaluation of both programs is in progress and the coaching program will certify providers' coaching skills as well as prepare participants for the new national health coaching certification.

2.9 Integrative health and the underserved

In 2014, the National Center for Integrative Primary Healthcare (NCIPH) was formed by the AzCIM and the Academic Consortium for Integrative Medicine and Health in cooperation with the Health Resources and Services Administration. NCIPH is a collaborative effort across disciplines and professions whose goal is to advance the incorporation of competency- and evidence-based integrative health curricula and best practices into primary care education and practice. NCIPH has developed a set

of interprofessional competencies[15]. These integrative health competencies provide educational programs a matrix upon which they can build curriculum and experiences to offer an integrative approach to primary care. NCIPH is currently creating educational materials that will advance the incorporation of an integrative health approach into the care of diverse patient populations in primary care settings. The educational materials will include a short introductory online course as well as patient education materials.

2.10 Circling back to medical education: the Distinction Track

In 2011, in response to increasing demand on the part of the University of Arizona medical students, as well as the desire to introduce the tenets of IM at an early stage of training, a Distinction Track in IM was proposed. Distinction Tracks are elective programs of additional study available to medical students at many schools. A combination of coursework, experiences, and/or capstone projects is required in order to graduate "with distinction". The University of Arizona College of Medicine had tracks in research, global health, and community service at the time that the IM Distinction Track was proposed. Requirements included completion of in-depth online modules, participation in interdisciplinary patient conferences, and a capstone project or research paper. The University of Arizona College of Medicine unanimously approved the proposed IM Distinction Track in 2012. It has steadily gained popularity and in 2015, 15% of first-year medical students enrolled.

3 Notable national advances in IM

Most efforts in integrative medical education have been local. A few important exceptions that helped shape the national IM educational landscape are described below.

3.1 The Consortium

In 1999, the University of Arizona, together with eight other medical schools, founded the Consortium of Academic Health Centers for Integrative Medicine. Recently renamed the Academic Consortium for Integrative Medicine and Health, it has grown steadily with 62 current North American medical school members[16]. Its mission is to support and mentor academic leaders, faculty, and students to advance integrative health care education, research, and clinical care; to disseminate information on rigorous scientific research, educational curricula in integrative health and sustainable models of clinical care; and to inform health care policy. The Consortium has played a critical role in advancing IM medical school curricula. Members have published papers on medical school, residency and fellowship competencies[6,17,18]; established standards for research in IM and sponsored a bi-annual conference; and helped advance the integration of complementary treatments into clinical care[19].

3.2 Board certification

The decision to develop board certification in IM was complex. On the one hand, it was considered important that all physicians learn the foundations of IM; on the other, growing popularity of IM in the US made it unclear whether physicians claiming to practice IM were adequately trained. Much discussion among IM faculty, practitioners, and fellows led to the realization that in the maturing field, a measure of competence was required—not just to benefit IM, but also to help the public identify physicians with demonstrated expertise. Inquiries to the American Board of Medical Specialties to consider a new board were turned down, as was a request to the family medicine residency review committee to create a certificate of added qualification.

In 2010, the AzCIM entered into negotiations with the American Board of Physician Specialties (ABPS). Established in 1952, ABPS is one of the three most prominent nationally recognized multi-specialty certifying entities in North America.

The American Board of Integrative Medicine (ABOIM) was formally founded in 2013. Founding board members are national thought leaders in IM representing diverse specialties. The content and areas of competency were determined, a validated exam was created, and in 2014 the first diplomats were awarded board certification. Beginning in 2016, eligibility for board certification will require completion of a fellowship in IM. Board members are currently defining the criteria for fellowship training programs.

3.3 National Center for Complementary and Alternative Medicine educational initiatives

From 2000 to 2003 the National Center for Complementary and Alternative Medicine (NCCAM) at the NIH funded 15 projects to incorporate CAM information into the curricula of conventional health professions. The goal was to accelerate the integration of CAM and conventional medicine[20]. The challenges at the time were considerable: to develop successful strategies given already dense curricula; to create authoritative resources about the risks and benefits of CAM; and to identify appropriate roles for CAM practitioners in educating conventional health professionals. Two NIH NCCAM projects that continued beyond the initial funding are a faculty development model and a student leadership development course.

3.4 Faculty development

Developing faculty expertise in IM is critically important for many academic programs. A novel training was developed at the University of Michigan with the NIH R25 grant, maintained with philanthropy and fees, and

replicated by another academic institution. The University of Michigan Faculty Scholars Program (FSP) in Integrative Healthcare is an interdisciplinary professional development program for faculty and teaching staff. The FSP prepares faculty to incorporate theoretical, scientific, and clinical information related to complementary, alternative, and integrative therapies into their respective disciplines. The program meets one day per month in person, and requires completion of a curriculum, research or clinical service project related to integrative health. Scholars receive mentoring by the University of Michigan IM program faculty.

3.5 Developing student leadership

A national medical student initiative was initiated in 2003 through a collaborative effort between the American Medical Student Association (AMSA) Foundation and the NIH grant-sponsored Educational Development in Complementary and Alternative Medicine Leadership Training Program. The Leadership Training began as a weeklong summer program designed to foster the development of aspiring medical student leaders in complementary, alternative and integrative medicine. Twenty medical students from across the country gathered for workshops and leadership skill enhancement with a focus on personal self-healing, wellness, and community development. Students then committed to implement a project to promote IM at their respective medical schools.

To date, more than 200 medical students have attended. In 2010, a collaboration between AMSA, the Kripalu Center, the University of Connecticut School of Medicine, and the Academic Consortium for Integtive Medicine and Health re-launched the program as Leadership and Education Program for Students in Integrative Medicine or LEAPS.

4 Discussion

The AzCIM's growth, range, depth and breadth of educational programs are unique to the time and context of the development of the field of IM in the US. Still, other institutions and countries can learn from its experience as they seek to implement and grow their own initiatives. While skepticism was common in the Program's early years, it is notable that there was unanimous support from the College of Medicine at the time that the University of Arizona Board of Regents conferred Center of Excellence status on it in 2008. This was due to the rigor of the AzCIM's educational programs, the innovative inter-institutional collaborations, and its internationally recognized success.

Online education was in its infancy in medical education when the AzCIM initiated its fellowship in 2000. Creating a mostly online fellowship was a fruitful gamble. The online platform made it possible to partner with eager learners and gifted faculty anywhere in the world. The technology also made it possible for the field to link all content to citations validating the evidence base for IM. Unlike local initiatives in which high resistance in a department or institution could stall an initiative, residency and fellowship training in IM could now easily penetrate those fields and institutions that were ready to participate.

Medical student education was an initial high priority for the AzCIM, and many efforts were made to bring lectures in IM into a variety of courses. Ultimately, we found that targeting residency was a better strategy. Residents serve as role models for medical students, their curriculum is not as densely packed, and their work-hour ceilings make online education a valuable strategy to capture all learners. Broad incorporation of IMR was facilitated by linking it to new residency requirements — including professionalism, cultural competency, and ethical issues. The online platform made it easy to show regulators how these topics are covered in residency training.

Over time, the enthusiasm and passion of medical students at the University of Arizona led to the more in-depth distinction track experience. At the University of Arizona, students formed their own IM club, asked AzCIM faculty members to serve as advisors, designed unique learning opportunities, and eventually created a groundswell that led to an expansion of the medical student elective, and to the development of the IM Distinction Track.

Medical students have frequently been the initiators of IM programs across the nation. They often take an active role in their education, and effectively make their needs known to the deans and administrators of the Colleges of Medicine. Similarly, residents have been able to drive incorporation of IMR at their institutions.

A synergism between the fellowship and IMR programs became apparent almost at once. Fellowship-trained faculty knew of the high quality of the online educational curriculum and championed the residency training program at their institutions. Institutions without trained IM faculty often simultaneously licensed the IMR and enrolled a faculty member in the University of Arizona fellowship. Today, all 65 IMR and PIMR programs have a University of Arizona fellowship- trained faculty member in a leadership role.

The development of a certifying board in IM is an important step toward assuring uniformity of curriculum and high educational standards for the field. While most leaders in the field welcomed board certification in IM, it challenged the field's commitment to interdisciplinary collegiality. Nurses, nurse practitioners, physician assistants, and others bemoaned

the fact that the certification exam was only open to physicians. While the ABOIM favors certification of all IM practitioners, each field has its own unique skills, qualifications, and governing boards, and thus needs its own certifying board.

5 The future of IM education

With 40% of US medical schools having membership in the Academic Consortium for Integrative Medicine and Health it is realistic to expect that soon all medical students will receive foundational training in the principles of IM. The steadily growing number of primary care residency programs that incorporate the 200-hour IM curriculum bodes well for post-graduate education that fully addresses health promotion, prevention, and lifestyle approaches that reduce the risk and incidence of chronic disease. Allied health programs and integrative health coaching address the training needs of the entire health care team. Fellowship programs train physicians, nurse practitioners, and physician assistants who wish to achieve advanced integrative skills to approach a broad range of conditions. And, the new ABOIM assures that standards will remain high.

While significant work remains at all levels of medical education, as well as for faculty development, it is possible to foresee a time when IM is broadly practiced and valued as the most comprehensive and cost-effective way to care for patients.

6 Competing interests

The authors declare no competing interests.

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