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From the "what" to the "how": Teaching integrative medicine-related skills to medical students during COVID-19

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Abstract

Objective: To examine the impact of an integrative medicine (IM) course on self-perceived IM-related communication and research skills.

Methods: A 3-day mandatory "hybrid" (online and in-person) IM course was held within COVID-19 restrictions for 161 pre-clerkship medical students, with workshops facilitated by mentor healthcare professionals (IM and non-IM) and student-directed tasks. Self-perceived levels of 6 IM-related skills were scored (from 1 to 5) for history-taking; communicating with patients with "alternative" health-beliefs; referral to IM consultations; assessing risks/benefits; and working with non-medical IM practitioners.

Results: 137 students (85.1%) completed pre-/post-course questionnaires, with overall scores improving from pre-course (1.98 ± 0.92) to post-course (3.31 ± 0.63; p < 0.0001), for the entire group and student subgroups (with vs. without prior IM experience). Multivariate analysis found no association between age, gender, primary language or prior experience with IM and improvement in skill scores.

Conclusions: The IM course increased self-perceived skill levels, reflecting the course curriculum and workshops. Further research needs to explore the application of these skills during clinical training.

Practice implications: Teaching medical students about IM in a course comprising communication and research skills was shown to be feasible and effective. The application of IM-related skills needs to be evaluated during the clinical clerkship.

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1. Introduction

The use of non-conventional medical practices is widespread, with a third of the general population in the U.S. and three-quarters of cancer survivors reporting having used at least one such modality within the previous year [1,2]. The use of these practices is often determined by patients' health belief models, which are often related to factors such as the potential for harmful effects of conventional medicine, and a cultural affinity to traditional medicine [3]. Non-conventional medicine is often being used without the knowledge of the patient's healthcare professional [4], either because patients do not see the relevance to the conventional medical care; they anticipate an antagonistic or dismissive response; or simply because they are not asked by their healthcare professional [5–7]. Non-disclosure can lead to potentially harmful
effects (e.g., herb-drug interactions), and precludes an evidence-based discussion with patients necessary to make an informed decision on their medical care [8]. The model of care for integrative medicine (IM) has been described as "selectively incorporates elements of complementary and alternative medicine into comprehensive treatment plans, alongside solidly orthodox methods of diagnosis and treatment" [9]. IM therapies are being included in clinical guidelines by official bodies such as the American College of Physicians and the American Society for Clinical Oncology, among others [10–13]. Medical schools across the globe are including IM in their curriculum, with the goal of increasing awareness on the widespread use of these modalities, as well as understanding their safety and effectiveness when integrated into conventional medical settings. To date, very little research has been published on the impact of programs teaching IM in the undergraduate medical school setting. This research has not, to the best of our knowledge, examined the feasibility and acceptability of courses which enhance knowledge and teach IM-related skills to undergraduate medical students. A 2007 study of 15 National Institutes of Health (NIH)-funded IM undergraduate and graduate programs, within the Complementary and Alternative Medicine Education Project, identified a number of barriers and challenges to this agenda. These included an already full medical school curriculum; the need to balance the more disease-oriented and technologically approaches of conventional medicine with the more patient-oriented holistic approach of IM; and clinical inexperience with IM practices among program directors [14]. Introducing IM-related material into medical school curricula requires a dedicated team with resources to make these practices visible to both students and faculty, engendering a cooperative climate with content embedded into the existing curriculum, with active institutional support [15]. Research has highlighted the difference between undergraduate versus postgraduate IM teaching programs. Most medical students are taught the "what" of IM, addressing the philosophy (and controversy) of these practices; enhancing critical thinking skills; allowing them to experience IM modalities; and exploring the evidence for and against their effectiveness [16]. A 2002 survey of 74 U.S. medical schools found that most IM programs (61.6%) set out to provide a "broad survey of complementary and alternative medicine and its diversity" [17]. Similar goals have been described in Korea [18], though in South Africa 2 of 6 medical schools describe teaching the resolution of practical problems by having students sit with traditional healers [19]. In a recently published study from Israel, an elective online IM course for medical students was shown to increase their understanding of the benefits and potential risks of IM for specific outcomes. Students reported acquiring skills related to taking an IM-focused history and referring patients to an integrative physician consultation [20]. In contrast, post-graduate IM training programs are addressing not only the acquisition of knowledge but also the development of IM-related skills, facilitating communication with patients and addressing the non-disclosure of these practices. Physicians, nurses, pharmacists and other healthcare professionals are being taught both the "what" as well as the "how" of IM through reading materials, threaded dialogs, case studies, field trips and other interactions [17]. NIH-funded programs such as the Integrative Oncology Scholars (IOS) Program at the University of Michigan train medical professionals working with oncology patients, facilitating partnerships with complementary practitioners within their communities [21]. IM courses for oncology healthcare professionals teach about the philosophy and practice of IM, while at the same time providing tools for establishing an open and trusting dialog with patients about their use [8]. The present study addressed the need to reduce the knowledge gap in medical education and communication by examining an IM course for pre-clerkship medical students, with the goal of promoting the application of IM-related skills during clinical training and practice. For this purpose, we examined the perceived feasibility and acceptability of both theoretical and practical aspects of the IM course and its educational impact, which is considered "the heart of educational achievement testing...in order to achieve educational objectives set out in the training program" [22]. The findings will be used for the design and implementation of future educational programs teaching IM to medical students.

2. Methods

2.1. Course design and structure

The study setting was a course for fourth-year (of a 6-year program) medical students at the Hebrew University Hadassah School of Medicine, within a more extensive preparatory course for clinical clerkships. The course was designed by leading educators from the faculty of medicine at the Hebrew University of Jerusalem; and led by 2 of the authors (EBA, ES) from the faculty of medicine at the Technion, where IM has been taught for over a decade. The design process of the IM course included creative solutions to the challenges faced in teaching medical students educated in a wholly conventional environment, addressing the criteria defining an "innovation" (Table 1) [23].

The course took place over 3 consecutive days (November 22–24, 2020), with days 1 and 3 online (via Zoom); and day 2 at the faculty of medicine of the Hebrew University in Jerusalem, with the participation of mentors from both faculties of medicine. The "hybrid" structure of the course comprised both online and in-person interactions. Online content included live discussions, some preceded by short presentations by national and international leaders in the field of IM, including physicians and nurses from a broad range of medical specialties.

2.2. Compliance with COVID-19 restrictions

The "hybrid" IM course took place in accordance with the restrictions of the Israel Ministry of Health COVID-19 Task Force Committee. These restrictions required that all in-person educational interactions take place in separate rooms, in small groups of students and mentors. Participants were required to wear protective face masks at all times, and to remain within their isolated groups throughout the day.

2.3. Course content

A detailed description of the 3-day course is presented in Appendix 1. Seven pre-recorded videos (approximately 30 min each) were created specifically for students to watch and then discuss in their interactions with the course mentors. The videos covered the following subjects: traditional herbal medicine in supportive cancer care (from a Coursera course on this subject [24]); traditional Chinese Medicine; Mind-Body-Spirit medicine; integration of IM in the clinical oncology and surgical settings; relevance of IM within the context of student well-being (e.g. use of IM to reduce stress and anxiety); and overcoming challenges related to the student's compassion, resilience, dealing with "burnout", etc. Each of the seven videos began with a live online introduction by a leading researcher, clinician, or medical educator from the field of IM. The course videos were followed by either online (on days 1 and 3) or in-person (on day 2) workshops, facilitated by course mentors and addressing the content presented. Workshops were followed by student-directed tasks, which included viewing pre-recorded content (lectures, doctor-patient video simulations and discussions) and completing a short series of questions addressing the application of
the learned IM-related skills. On the second (in-person) day of the program, IM practitioners from the faculty of medicine at the Technion joined each workshop group, sharing their experience and providing demonstrations of IM modalities. These interactions emphasized a “hands-on” experience, with IM practitioners teaching students manual techniques such as acupuncture or acupressure; movement therapies such as Tai Chi or Chi Gong; and mind-body medical modalities such as mindfulness/meditation and guided imagery.

2.4. Course mentors

All 38 course mentors were healthcare professionals and leading educators from both IM and non-IM-related disciplines. This included 15 physicians from a wide range of medical specialties from the faculty of medicine at the Hebrew University of Jerusalem; and 23 mentors from the faculty of medicine at the Technion (10 physicians and 13 non-medical IM practitioners), also from varied medical specialties. Many of the mentor physicians from the Hebrew University had little if any experience or training in IM or related modalities. This was in keeping with a course goal of including a diverse group of mentors to facilitate workshop discussions about different aspects and settings of IM in clinical practice; and exposing students to a wide range of perspectives on these practices, whether positive, negative or neutral. Non-IM physicians expressed an interest in learning about IM and its implementation in clinical practice, some participating in order to ensure that students received an objective and evidence-based perspective on these therapies.

All course mentors were required to view the seven pre-recorded videos and participate in five preparatory meetings, including a day at the Hebrew University in Jerusalem; and a day at the faculty of medicine at the Technion, where mentors from both faculties reviewed the course program and simulated the “hands-on” workshops. The remaining meetings were conducted online via Zoom.

2.5. Study outcome design

The primary study outcome was the change in self-perceived student scores for 6 IM-related skills. Student attitudes toward IM were examined both quantitatively and qualitatively (to be reported in a separate publication). Students were asked to voluntarily and anonymously complete a digital questionnaire presented on the Moodle platform (Appendix B). The questionnaire was designed and developed by a multi-disciplinary team of 5 physicians board-certified in family medicine, hematology, radiology and internal medicine, 2 of whom were integrative physicians; and 3 researchers from the field of medical education and qualitative methodology.

Students were asked to provide demographic information (age, gender, mother tongue); describe prior experience with IM; grade 6 consultation; 4) evaluate the effectiveness and 5) safety of IM treatments; and 6) work with non-medical IM practitioners. Post-course attitudes to IM were examined through 4 questions asking students about 1) the extent to which they felt that IM can improve a patient’s medical condition, or 2) cause them harm; 3) the breadth of scientific publications on clinical benefits of IM; and 4) whether the effects of IM on chemotherapy-induced nausea in patients with breast cancer were the result of specific (i.e., physiological) effects. Scores ranged from 1 (“to a very small extent”) to 7 (“to a very large extent”).

2.6. Statistical analysis

Demographic parameters, past experience with IM and pre-/post-course scores for the 6 IM-related skills were entered into a Microsoft Excel 2010 program, and analyzed with SPSS software (version 27.0). Descriptive statistics (mean, SD, and percentage) were calculated for whole parameters, for which two groups were defined: students with prior IM experience, and those without. Normal distribution of the skill-related questions were demonstrated with a Kolmogorov-Smirnov test. As a result of this test, parametric (T-Test) and non-parametric tests (Mann Whitney U) were used to examine differences between groups. A Fisher exact test was used to compare categorical parameters between the two groups; and a T-test to compare differences between the two groups when normal distribution was assessed. A p-value < 0.05 was considered significant.

2.7. Ethics approval

The study protocol was submitted to and approved by the Hebrew University of Jerusalem Faculty of Medicine Ethics Committee. While participation in the course was compulsory, completion of the study

Table 1

| Criteria for Innovation | Current Course | Future Courses |
|-------------------------|----------------|---------------|
| 1. There is a clear and thorough description of the problem. | Addressed the need to teach not only the “what” but also the “how” of implementing IM in clinical settings, communicating with patients | Address other aspects of IM (e.g., pre-clinical research) |
| 2. There is a statement about the degree to which the problem is generalizable. | Required courses on IM in medical schools curriculum, provide awareness about IM without practical skills | Integrate existing IM programs for medical professionals into the medical school curriculum |
| 3. Key issues of the stakeholders are stated. | Students need to have skills to communicate and provide patients evidence-based guidance | Expand to other healthcare faculties (nursing, pharmacy, etc.) |
| 4. There is a delineation of the array of potential solutions | Inclusion of non-medical IM practitioners with non-IM physicians | Expand to include IM nurses, pharmacists, etc. |
| 5. The details of why a particular solution was selected and/or developed are presented. | Participation of non-IM physician mentors in workshops exposed students to a diverse range of perspectives | Include non-IM mentors from other medical and non-medical fields |
| 6. The implementation of a particular innovative solution is described. | Students and mentors practiced learned skill in workshop setting | Examine implementation of the learned skills during clinical clerkship training |
| 7. There is a critical analysis of the quality of the innovative solution. | The collaboration between 2 faculties of medicine in Israel | Include other faculties of medicine (Israel, worldwide) |
| 8. There is an assessment of the innovation’s potential influence on the field, discipline, or area of study. | Pre- and post-course levels of IM-related skills, and post-course attitudes were evaluated | with different environment but shared goals |
| 9. There is an account of the degree to which the innovation described is a sustained innovation. | Feedback indicated an interest in further study of IM among both students and non-IM mentors | Conduct follow-up evaluation of skills and attitudes during clinical clerkship training |

* IM, integrative medicine.
3. Results

3.1. Demographics and prior experience with IM

Of 161 students participating in the course, 137 (85.1%) completed both pre- and post-course study questionnaires. Most respondents (53.6%) were female, with a mean age of 25.3 years. Less than a third (43; 30.7%) reported prior IM experience, among which 18 (41.9%) reported a beneficial effect; 16 (37.2%) no benefit whatsoever; and 9 (20.9%) no response.

3.2. Self-perceived IM-related skills

The primary study outcome of pre- vs. post-course self-perceived levels of IM-related skills are presented in Table 2. The mean overall pre-course score (range: 1−5) was 1.98 ± 0.92, the highest (2.23) for conducting a discussion with patients regarding the increase in the level of IM-related knowledge as a specific effect of IM (SK2). Mean overall post-course scores increased significantly (to 3.31 ± 0.63) for all 6 IM-related skills, from pre- to post-course values (p < 0.0001) in both sub-groups of students (with vs. without prior IM experience). The highest post-course scores were given for working with a non-medical IM practitioner (SK6; from 2.09 ± 1.12 to 3.60 ± 0.91), and asking patients about IM use (SK1; from 1.94 ± 1.09 to 3.52 ± 0.78). A multi-variate analysis examining pre- and post-course IM-related skill scores found no relationship with age, gender or primary language. Nor was any difference found between students with previous experience with IM and those without regarding the increase in the level of IM-related knowledge as a result of the course.

3.3. Post-course attitudes toward IM

Post-course scores for student attitudes toward IM and patient health are shown in Table 3. Mean scores were low-to-moderate regarding the beneficial effects of IM (Q-1; 3.75 out of a possible 7); the breadth of scientific publications on IM (Q-3; 2.41); and the specificity of positive effects observed in clinical research (i.e., physiological effects), for indications such as chemotherapy-induced nausea and vomiting (Q-4; 3.16). Scores addressing the harmful effects of IM were low (Q-2; 3.11). No significant differences were
found between attitude scores among students with or without prior experience with IM.

4. Discussion and conclusion

4.1. Discussion

The present study examined the impact of a mandatory hybrid course on IM for medical students, addressing the knowledge gap in medical education and communication in the teaching of IM to undergraduate medical students. A significant increase was observed from pre- to post-course scores for all 6 IM-related skills, independent of demographic or IM-related characteristics. This may have resulted from the exposure of students to a wide range of IM clinical settings and skill-directed workshops, facilitated by mentor IM and non-IM healthcare professionals. IM undergraduate courses are most often of short duration and focus on the "what", as opposed to the "how" of IM use. The present course taught students IM-related skills which included determining the safety and effectiveness of these practices; establishing effective and non-judgmental communication with patients; and helping make an informed and evidence-based decisions regarding patient care.

There are many challenges which present to those teaching IM to medical students, including unfamiliarity among most medical educators with concepts and paradigms of care which may contradict those of conventional medicine. The number of IM-trained medical professionals who can "translate" concepts and terms to medical students while addressing research-based evidence is limited. In addition, communication with patients who have an "alternative" model of health care (often negating or contradicting evidence-based conventional medicine) needs to be non-judgmental, while at the same time provide evidence-based guidance for making informed decisions on their care. It is for this reason that educational programs for IM are invariably taught by medical and non-medical IM practitioners with extensive training and experience in the field [16,25].

In addition to these challenges, teaching IM has become even more difficult during the COVID 19 pandemic, shifting much of in-person and "hands-on" classroom teaching to an online format. This is especially challenging for those teaching manual (acupuncture/ acupressure, reflexology) and movement modalities (yoga, Tai Chi/Chi Gong), for which hands-on experience is essential.

The current study has a number of limitations which need to be addressed in future research. These include the "hybrid" format required by COVID-19 restrictions, and the fact that the course took place in a single medical school in Israel, precluding reaching any conclusions on the generalizability of the findings. The fact that the course was mandatory (as opposed to elective) may have influenced student attitudes which were measured only post-course (another study limitation) and tested self-perceived levels of IM-related skills. In addition, the level of students' IM-related skills was self-reported, and not evaluated by an outside observer. Nevertheless, the significant increase in scores for all 6 self-reported IM-related skills should encourage the development and inclusion of such programs in the medical school curriculum. This would increase the understanding of IM and promote IM-related skills for better communication with patients, creating a safe and evidence-based environment for their use.

4.2. Conclusions

Teaching medical students about IM, especially IM-related communication and research skills, was shown to be both feasible as well as acceptable to the majority of students surveyed. The "hybrid" format of the IM course may have enhanced this process. The study also showed that teaching medical students IM-related skills can be implemented even within COVID-19 restrictions. It is possible that the use of online teaching, with mentor-facilitated workshops and discussions, may have enhanced this process. It is also possible that the participation of non-IM mentors from a wide range of medical disciplines may have augmented the educational process, though this needs to be investigated further.

4.3. Practice implications

The study's limitations need to be addressed in future research of the program, with the goal of achieving a better understanding of the implications of IM teaching programs and the application of the learned skills during clinical clerkship training and practice. Qualitative analysis of student narratives from the course, reflecting attitudes and IM-related skills, will be presented in a separate publication.

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CRediT authorship contribution statement

All of the authors listed fulfill the Uniform Guidelines for Biomedical Journals Requirements of the ICMJE for determining authorship (Vancouver Group Guidelines, 2010):

1) Substantial contribution to conception and design (NS, DS, ES, DBY, AF, LL, SR, EBA), or acquisition of data (MB), or analysis and interpretation of data (NS, EBA).
2) Drafting the article (NS, EBA) or revising it critically for important intellectual content (all authors)
3) Final approval of the version to be published (all authors)
4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Appendix A. Outline of the 3-day "hybrid" (online and in-person) course in complementary and integrative medicine (IM) for pre-clerkship medical students

### Day 1

| Online Lecturers and Presenters, Israel. |
| Dr. Zachi Arnon, Dr. Meron Barak, Yael Barak, Prof. Moshe Frenkel, Dr. Rafi Goldman, Prof. Ofer Lavie, Lily Perlman, Liora Preis, Dr. Alon Reshef, Dr. Yaron River, Tuviah Scott, Dr. Galiah Shoffman, Pessi Israely. International: Prof. Adi Haramati (U.S.), Dr. Emanuela Portalupi (Italy). Dr. Catherine Zollman (U.K.), |

### Introduction

**INTRODUCTION**

Opening Remarks

Dean of the Medical School

Why learning about IM is important

**Introduction to IM**

Course leaders

Presenting the differences between alternative, complementary and integrative models of care

**Workshop 1**

Meet the International Expert: Student-Patient Communication

Students & Mentors

Pre-Course attitudes to IM

Communicating with patients about IM; a U.K. experience/perspective Simulations: How to promote an open and non-judgmental physician-patient discussion about IM?

**HERBAL MEDICINE**

Self-learning

Students

Introduction to Herbal Medicine (pre-recorded video)

**MIND-BODY-SPRIT MEDICINE**

Meet the Expert: Herbal Medicine

Course Leaders

How to discuss herbal medicine use with patients

Meet the International Expert: Medical Education

Self-learning

Task #1

Students

Answer questions on how to ensure effective communication about herbal medicine use

Meet the Expert: Traditional Chinese Medicine

Reflections and Self-Experience

Task #2

Students

Open-ended questions about attitudes and skills to emotional/psychological/spiritual distress

**Day 2:**

**TRADITIONAL CHINESE MEDICINE (TCM)**

Self-learning

Task #3

Students

Introduction to Chinese Medicine (pre-recorded video)

Meet the Expert: Traditional Chinese Medicine

Integrating IM in medical education: a U.S. experience

Pre-recorded video: Mind-Body-Spirit Medicine

**INTEGRATIVE ONCOLOGY**

Meet the International Expert: Medical Education

Self-learning

Task #4

Student, Mentors & IM practitioners

What is Integrative Oncology?

Case scenario followed by integrative physician presentation: How to I weave a patient-tailored program to the patient?

Discussion of a case scenario and learning how to implement integrative medicine in the oncology setting

Pre-recorded video: Presenting 4 patients' narratives of their experience in the integrative oncology setting

**INTEGRATIVE SURGERY**

Meet the International Expert: Medical Education

Self-learning

Task #5

Student, Mentors & IM practitioners

What is Integrative Surgery?

Case scenario followed by integrative non-MD practitioner presentation: How to I weave a patient-tailored program to the patient?

Discussion of a case scenario and learning how to implement integrative medicine in the surgical setting.

Integrating IM in the gyneco-oncology surgical setting: an Israeli experience.

**INTEGRATIVE MEDICINE AND THE MEDICAL STUDENT**

Meet the Expert: Integrative Psychology

Self-learning

Task #6

Head of Psychiatry Dept.

Students

How integrative medicine can help you deal as a medical student with physical (e.g., pain) and emotional (e.g., stress) concerns?

Pre-recorded video presenting medical students' experience and training in IM aimed to promote their health

Self-experiencing integrative medicine techniques for the reduction of stress and pain

**Day 3**

**DEVELOPING IM-RELATED SKILLS**

**Live Online Lecture**

Students

Searching online for guidance on the effective and safe use of herbal medicine (e.g., herb-drug interactions)

**Task #5**

Students

Case scenario and exercise on how to search online for information on the effective and safe use of herbal medicine.
Appendix B. Study questionnaire for self-assessment by students of pre- and post-course IM*-related skills and attitudes and beliefs about the impact of IM on patient health (IM, integrative medicine)

Part I: Self-perceived level of IM-related skills.

Please assess the level of your skill with respect to the following aspects of IM care:

[1–very low; 2-low; 3- moderate; 4- high; 5- very high].

1. Taking a history (anamnesis) from a patient on their use of IM
2. Talking to a patient who has an “alternative” approach to health care
3. Providing an educated referral of a patient to an IM service
4. Assessing the effectiveness of an IM treatment
5. Assessing the safety of an IM treatment
6. Working with a non-medical IM practitioner

Part II: attitudes and beliefs about the impact of IM on patient health.

[1 – to a very small extent; 7 – to a very large extent].

1. What, in your opinion, is the extent to which IM can improve the medical condition of patients?
2. What, in your opinion, is the extent to which IM can cause harm to patients?
3. What, in your opinion, is the breadth of clinical publications on IM in the medical literature?
4. Let us say that a randomized clinical trial (RCT) published in a peer-reviewed journal indicates a beneficial effect of IM in relieving chemotherapy-induced nausea in patients with breast cancer. To what extent, in your opinion, is the finding the result of specific effects of the IM treatment (i.e., a direct result of the treatment via a physiological effect)?

IM in the here and now: Mindfulness, strength and compassion

Live online lecture
Live online lecture
Workshop #7

Students & Mentors
Students & Mentors
Students & Mentors

Discussion of personal experience (students and mentors) regarding burnout, compassion, resilience and salutogenesis: How can IM modalities empower the student’s spiritual journey during the clinical years and beyond?

Meet the International Expert:
IM during COVID-19

Students, Mentors & IM practitioners

Treating oncology patients with IM during the COVID-19 pandemic: an Italian perspective

IM MODALITIES and SETTINGS (students to choose 1 of 6 sessions)

Short Online Lectures:
Part I

i. Integrative medicine in the hospital
ii. Debate on homeopathy in the oncology setting
iii. Integrative approach to the patient with headache
iv. Anthroposophic medicine in primary care
v. The nurse and the doctor in the integrative setting
vi. Chiropactic approach for back pain

Short Lectures:
Part II

i. IM challenges in the Internal Medicine Department
ii. Shiatsu in the pediatric oncology setting
iii. IM for palliative End-of-Life care
iv. IM in community family medicine practice.
v. IM in the pediatric in-patient department
vi. vi. Battleground acupuncture

Course summary

Students & Mentors

Input, suggestions

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