






Collaborative Teaching and Curricular Integration in Pre-Intern Clinical Placements: Insights from the Greater Bay Area

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Introduction: The rising demand for knowledge updates and technological innovations in China has made clinical placement teaching challenging. Reforms for innovative teaching models through pilot classes have shown to improve students' academic performance. This novel integration led to the announcement of healthcare collaboration in the Guangdong-Hong-Kong-Macao Greater Bay Area for projects within China's "Global-Innovation-Hub" zones. First Affiliated Hospital (FAH) of Sun Yat-sen University (SYSU) in Guangzhou and the Faculty of Medicine (FMD) of Macau University of Science & Technology (MUST) in Macau have developed an inaugural project for FMD/MUST medical students to perform pre-internships at FAH-SYSU. This study aimed to reflect on students' experiences with collaborative teaching and learning through medical curricular integration in the "Global-Innovation-Hub" zones designed by both institutions for developing integrated curriculum.

Methods: FMD/MUST students attended medical clerkships at FAH-SYSU using a system-integrated curriculum in China's "Global-Innovation-Hub" zones, allowing different education systems at different locations. Post-clerkship surveys ranked teaching models in conjunction with written reflections in response to post-clerkship questionnaires for all participating students. The teaching models were defined by the way supervisors' interaction with students, and written reflections in response to the post-clerkship questionnaire were descriptively and semantically analysed.

Results: The top-ranked teaching models include first "Student-led consultation under supervision in observers' chair with discussion", second "Observe consultation and discuss with the teacher in-between patients in observers' chair" and third "Student-led consultation under supervision in consultants' chair with discussion". The post-clerkship questionnaires showed positive outcomes.

Conclusion: This study demonstrates the successful delivery of collaborative teaching and learning through medical curricular integration in China's "Global-Innovation-Hub" zones. This integration enables the development of a consistent and student-preferred teaching model being introduced into clinical placement curriculum. The unique location of China's "Global-Innovation-Hub" zones in the Guangdong-Hong-Kong-Macao Greater Bay Area allows this integration to significantly improve students' clinical reasoning learning.

Keywords: Guangdong-Hong Kong-Macao Greater Bay Area, Global Innovation Hub, teaching model integration, clinical placement teaching, clinical reasoning learning

Introduction

The quality of medical education is directly influencing the academic performance of medical students and subsequently affecting the competency of graduate medical practitioners within the healthcare system.¹⁻⁴ With the rising demand of introducing updated knowledge, innovative teaching models and modern technology into medical education and healthcare system in China, medical education especially clinical placement teaching has encountered many challenges

in China.⁵ These challenges were three-fold: 1) Chinese students' perception of clinical placement teaching being observation-based teaching only, which is usually used in the East instead of "hands on" apprenticeship-style bedside teaching, which is routinely applied in the West; 2) Most of medical educator still applied the traditional placement teaching model of letting students being the observers only; 3) Patients were hesitant and reluctant to consent for students leading the consultation or being the main operator/surgeon during the procedure/operation. Reform is imminent to overcome these challenges to raise the standard of clinical placement teaching and clinical reasoning learning in China, which have become the cornerstones of the medical education reform proposed and introduced by Chinese government entitled the "Education and Training Programme for Excellent Physicians".^{1,6}

Chinese medical schools nominated by the Ministry of Education and the National Health Commission of the People's Republic of China have established pilot classes as part of reform for integrated curriculum and innovative teaching models of undergraduate clinical education.^{1,7} These pilot classes were designed by integrating the student-centred teaching model with problem-based learning used in the system of the west into the clinical placement curriculum of China. These approaches have been shown to effectively improve students' academic performance by applying relevant clinical reasoning skill during clinical placements,¹ as well as identify the barriers including insufficient investment of teaching resources and lacking teachers' training.⁸ Another major achievement of this reform is the integration of core principles of international reform, namely Competency-Based Medical Education which is an innovative approach to specify the health problem, identify the competency requirement of graduates, and assess capability and capacity.^{9,10} This novel integration reform has led to the announcement of healthcare collaboration in the Guangdong-Hong Kong-Macao Greater Bay Area including projects with greater bay cities and global institutions for health and education management as well as sciences and technology.¹¹ Guangdong-Hong Kong-Macao Greater Bay Area is uniquely located with geographic proximity for the novel integration reform of health and education system encompassing the western-based system used in Hong Kong and Macau as well as the eastern-based system used in Guangdong. One focus of these healthcare collaboration is to encourage cooperation and exchange among higher education institutions in Hong Kong, Guangdong and Macao highlighting the enormous benefits from collaboration in some of China's "Global Innovation Hub" zones.¹² The successful initiation is with the medical faculty at Chinese University of Hong Kong and Guangzhou's Nansha district health bureau signing a framework agreement to build a high-end medical talent training and research innovation platform in the Guangdong-Hong Kong-Macao Greater Bay Area.¹³

To take the reform to a new level, First Affiliated hospital (FAH) of Sun Yat-sen University (SYSU) at Guangzhou and Faculty of Medicine (FMD) of Macau University of Science & Technology (MUST) at Macau have signed an agreement for medical undergraduate teaching exchange with the inaugural project for FMD/MUST medical students to do pre-internship and internship in disciplines of medicine, surgery and paediatrics at FAH-SYSU. This project, being the core components of this study, was conceptualised by the leadership groups of both institution and coordinated by the international office and department of medical education at FAH-SYSU.

The primary aim of this study is to reflect on students' pre-intern clinical placement to showcase the collaborative teaching and learning through medical curricular integration in China's "Global Innovation Hub" zones by the joint expertise teams from the international collaboration offices and medical education departments at both institutions. The modern definition of medical curricular integration has the vertical and horizontal axis, and is to integrate basic and clinical sciences, humanism, and health population in the vertical axis, not only in the early years but also throughout the curriculum in the horizontal axis, presupposing the use of active teaching methods based on problems or cases in small groups.¹⁴ More recent studies have emphasized the importance of multidisciplinary-approach curriculum integration by incorporating multidisciplinary collaborative teaching and learning.^{15,16} However, there's no documented evidence with respect to different medical education system integration through collaboration in curricular management and education system. Therefore, the secondary aims of this study may provide such evidence through the collaborative project's implementation of clinical placement curriculum of FMD/MUST at FAH-SYSU during FMD/MUST students' pre-internship. This study also aims to seek students' reflection and feedback for developing a consistent and students' most preferred teaching model to be introduced into the clinical placement curriculum at FMD/MUST.

Materials and Methods

Study Design

This study used a post-clerkship survey to rank teaching models (Table 1) during a medical clerkship in conjunction with written reflections in response to post-clerkship questionnaires (Table 2) for all participating students. The teaching models were defined by the way supervisors interacted with the students to ensure learning-point delivery (Table 1 Footnotes). The supervisors applied all six teaching models with the routine weekly schedules in various settings including inpatient bedside teaching (Module 1,2,4,5,6), outpatient clinic teaching (Module 2,3,4,5,6) and operating theatre teaching (Module 4,5,6). The teaching model “student-led consultation under supervision in consultants’ chair with discussion” is a three-party clinical interaction including the student in consultants’ chair leading the consultation, supervising doctor in observers’ chair overseeing as well as assisting the consultation at clinical decision-making points, such as clinical assessment, investigation, diagnosis and management, and the patient receiving a consensus management plan after extensive condition-specific education through student doctor’s explanation and discussion. During the consultation using this model, either the supervising doctor or student initiated a three-party clinical discussion at three different points: 1) end of clinical assessment when completing focus history taking and physical examination to

Table 1 The Duration of Various Teaching Models Applied During Medical Clerkship

Teaching Model	Average Hours per Week in Different Teaching Models with All Participants
1. Student-led consultation under supervision in consultants’ chair with discussion	Approximately 3 hours per week mainly during medicine and surgery disciplines stated by supervisors
2. Student-led consultation under supervision in observers’ chair with discussion	Approximately 3 hours per week mainly during medicine and surgery disciplines stated by supervisors
3. Student-led consultation independently in consultants’ chair	0 hours per week
4. Observe consultation and discuss with the teacher in-between patients in observers’ chair	Approximately 20 hours per week mainly during medicine and surgery disciplines stated by supervisors
5. Observe consultation only in observers’ chair	Approximately 3 hours per week mainly during medicine and surgery disciplines stated by supervisors
6. Observe consultation and discuss at the end of a clinic in observers’ chair	Approximately 10 hours per week mainly during medicine and surgery disciplines stated by supervisors

Table 2 The Post-Clerkship Questionnaires for Written Reflection

I. Communication: Non-verbal, Verbal & Virtual, Interpersonal	<p>1.1. What have you learnt from the clerkship in terms of Empathy Competence including non-verbal (body language of both supervisor and patient) and verbal (relevant language suitable to individual patient)? Explain what your understanding of empathy competence in clinical practice?</p> <p>1.2. In terms of patients’ and doctors’ knowledge interaction for communicating diagnosis, investigation and management plan with patients, have you learnt and adopted what the supervisor demonstrated that you can apply for your future doctoring career?</p> <p>1.3. Is there any cultural/regional difference between what you learnt/observed in Macau (communication style of the West) and what you learnt/observed in Guangzhou (communication style of the East)?</p> <p>1.4. What is the most memorable communication case you observed/managed during your clerkship at FAH? Give a real clinical case with examples: breaking bad news (cancer diagnosis discussion), explain the potential side effects of procedure complication (coronary angioplasty), emotionally challenging consultation with angry/violent or medico-legally complicated patients.</p>
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(Continued)

Table 2 (Continued).

<p>2. Applied knowledge & Skills: Patient care & Medical Knowledge</p>	<p>2.1. Do you understand clinical reasoning learning (clinical reasoning is to describe the process by which clinicians collect cues, process the information, come to an understanding of a patient problem or situation, plan and implement interventions, evaluate outcomes, and reflect on and learn from the process, a critical thinking disposition and is influenced by a person's attitude, philosophical perspective and preconceptions and an ongoing learning process)? Have you observed how clinical reasoning done in clinical practice, have you learnt to practice clinical reasoning learning through this program at FAH?</p> <p>2.2. What's your definition of clinical competency? Please give a <100 words definition and reflect on whether this program improve your clinical competency?</p> <p>2.3. Are you able to summarise many salient learning points from empathy, history taking, physical examination, investigation, and management through this program at FAH?</p> <p>2.4. Do you feel that you have enough feedback time for discussion with supervisor during the clinical placement through this program at FAH?</p> <p>2.5. What kind of impact on your OSCE exam preparation through this program at FAH?</p> <p>2.6. Do you observe any enablers and barriers of using this teaching model from the perspectives of the supervisors, the patients, and the students?</p> <p>2.6.1. Any enablers and barriers of using this teaching model from the perspectives of the supervisors?</p> <p>2.6.2. Any enablers and barriers of using this teaching model from the perspectives of the patients?</p> <p>2.6.3. Any enablers and barriers of using this teaching model from the perspectives of the students (yourself)?</p> <p>2.7. What's the impact of this program on your readiness to become an intern in 2025?</p> <p>2.8. What's the impact of this program on your career choice in medicine or other health-related fields?</p>
<p>3. Population health: Systems-based practice</p>	<p>3.1. Explain your understanding of the definition of population health and systems-based practice?</p> <p>3.2. Do you observe any research evidence of population health used in clinical practice through this program at FAH?</p> <p>3.3. Have you used any research evidence of population health used in clinical case study through this program at FAH?</p>
<p>4. Professional & Ethical role: Professionalism, CPD</p>	<p>4.1. Explain your understanding of professionalism and ethics in clinical practice</p> <p>4.2. Have you observed any cases with focus learning in executing professionalism and ethics in clinical practice through this program at FAH?</p> <p>4.3. Please provide the most memorable case of executing professionalism and ethics in clinical practice.</p>
<p>5. Medical and Legal Dimension: Defensive Medicine</p>	<p>5.1. Explain your understanding of medico-legal element in clinical practice</p> <p>5.2. Have you observed any cases with focus learning relevant to executing medico-legal element in clinical practice through this program at FAH?</p> <p>5.3. Please provide the most memorable case relevant to medico-legal element in clinical practice.</p>

reach clinical diagnosis; 2) end of investigation leading to final differential diagnosis or problem lists; and 3) end of management plan discussion summing to patients' understanding, implementation, and adherence to the consensus management plan.

Setting of Participants and Data Collection

Eighteen year-4 medical students from FMD/MUST attended a pre-internship equivalent medical clerkship in the disciplines of medicine, surgery, and paediatrics at FAH-SYSU. All eighteen students including 8 males and 10 females were raised up in Macau before entering the medical course at FMD/MUST. The international collaboration offices at

both institutions coordinated the medical clerkship with a special plan for education system integration, in light of the two different medical education systems in China's "Global Innovation Hub" zones. FMD/MUST predominantly uses the Western-based system to design its medical education curriculum, whereas FAH-SYSU mainly uses the modified Western-based system with the incorporation of Chinese culture to design its curriculum. The core innovation of the integrated curriculum is to incorporate teaching model 1, 2 and 3 into the traditional teaching model 4, 5 and 6 for clinical placement teaching. Survey and reflection data were collected from 13 participating students after they completed their medical clerkship. Five students were unable to complete the survey and reflect on it.

Data Analysis

Qualitative written reflections in response to post-clerkship questionnaire were descriptively and semantically analysed by the authors.¹⁷ All participating FMD/MUST students were emailed the post-clerkship questionnaires by authors at the international collaboration office at FAH-SYSU. The post-clerkship survey of different teaching models used statistical reverse-scoring analysis to minimise response bias.¹⁸ Reverse scoring analysis means that the numerical rating is rotated in the opposite direction for analysing negatively worded questions to reduce measurement errors or inconsistencies.

Ethics

Ethical approval was granted by the ethics committees of Macau University of Science and Technology and First Affiliated Hospital of Sun Yat-sen University.

Consent for Participation

Informed written consent was obtained from all participants via electronic invitation including informed consent with publication of participants' anonymized responses.

Results

A ranking survey of teaching models was completed by thirteen students (Figure 1).

"Student-led consultation under supervision in observers' chair with discussion" was ranked the most preferred. "Observe consultation and discuss with the teacher in-between patients in observers' chair" was ranked second best, while "Student-led consultation under supervision in consultants' chair with discussion" was ranked third best.

The written reflections in response to post-clerkship questionnaires reflect the design of the questionnaire based on five domains of general practice training¹⁹ in conjunction with the five domains of clinical reasoning learning.¹⁷ A few individual student's reflections post-semantic analysis is illustrated under the domain-generated themes:

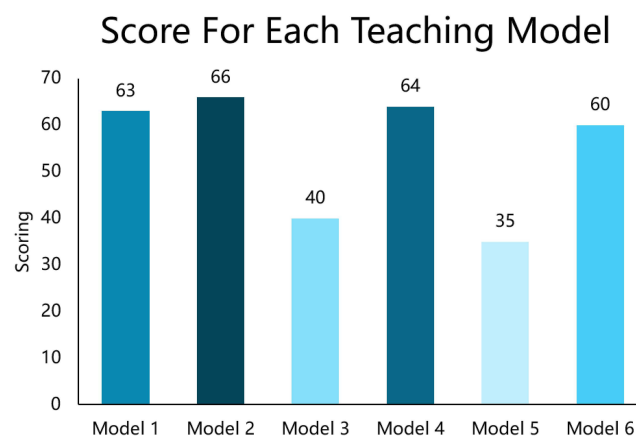


Figure 1 Score for each teaching model.

Notes: Model 1: Student-led consultation under supervision in consultants' chair with discussion. Model 2: Student-led consultation under supervision in observers' chair with discussion. Model 3: See/Consult patients independently in consultant's chair or as consultant's role at separate room with supervisor's remote supervision in another consultation room. Model 4: Observe consultation and discuss with supervisor in-between patients in observer's chair. Model 5: Observe consultation alone. Model 6: Observe consultation and discuss with supervisor at the end of a clinic in observer's chair.

Embedding Communication into Clinical Reasoning Learning (Clinical Reasoning Concepts in Practice)

Student One

What have you learned from clerkship in terms of Empathy Competence including non-verbal (body language of both supervisor and patient) and verbal (relevant language suitable for individual patients)? Explain your understanding of empathic competence in clinical practice. This clerkship has provided enormous opportunities to improve empathy competence, which is defined as the ability to think from a patient's perspective and to understand their doubts and concerns. During the clinical ward rounds and outpatient clinics, we observed many examples of nonverbal communication, including communication with patients at the eye level, giving responses by nodding while listening to patients, showing patience and respect, not waking up sleeping patients, and physically supporting patients during physical examinations. The case conference with the patient, patient's next of kin, and multidisciplinary team showcased many verbal communication examples, including words of comfort, explanation starting with softer and simpler terms instead of jargon, and requesting patients to repeat the consensus management plan discussed during the case conference.

Student Two

Trust and rapport building are important elements in clinical communication for obtaining a detailed history of the patient's condition, including the patient's lifestyle, for a better management plan and innovative treatment modality to benefit the patient. I have observed many cases of confirming the patients' understanding of the consensus management plan by supervisors communicating diagnosis, investigation, and treatment with patients in layman terms. The supervisors' style of communication has set a role model that I can apply to my future doctoring career.

Student Three

Communication from cultural/regional perspectives has shown a different style from Macau's West style and Guangzhou's East style.

The different population sizes and reputations of Macau and Guangzhou hospitals imply greater demand for physicians and consultation time. In Macau, the time per patient is sufficient and allows physicians to show more empathy and answer patients' questions. In Guangzhou, consultation tends to be more concise and straightforward than consensus and informed shared decision making.

Student Four

The most memorable case about communication was recorded during vascular surgery ward round in which one patient we saw was actually having severe peripheral vascular diseases or conditions related to the aorta, which are life-threatening. Since the symptoms may be milder than the actual disease progression, the patient may not understand how critical or severe the progression is, and may refuse further appropriate investigation and treatment, especially surgical intervention. In this circumstance, we witnessed the in-charge consultant and registrar spending extra time explaining disease progression and discussing the pros and cons of the most appropriate treatment option, eventually leading to the patient's full awareness, understanding, and acceptance of the treatment.

Student Five

I have learned to gradually explain in detail to patients about their conditions, especially in the case of breaking bad news, ensuring that patients fully understand their treatment options and prognosis, as well as respecting their wishes. This is well reflected in the gastroenterology ward round, where an elderly male patient was diagnosed with late-stage pancreatic cancer. The breaking bad news case clearly addressed the patient's and family's concerns about the prognosis, as well as the financial implications.

Align Applied Knowledge & Skills (Patient Care & Medical Knowledge) with Clinical Reasoning Learning (Hands-on History and Physical Examination)

Student Six

There is no best model for physical examination, while the program taught me to ensure help with the patient before starting and after finishing the exam, ultimately making their experiences more bearable and positive. Hands of

experience improved our skills in history taking, physical examination, and other practical skills, such as suturing and aspiration drainage. Focussed head-to-toe assessment of major organ systems, including inspection, palpation, percussion, and auscultation, makes it more relevant to document objective findings and elicit new clues to confirm diagnosis.

Student Seven

Physical examination is critical can be done tactfully in identifying physical signs to confirm and refine differential diagnoses. In a paediatric clinic, the child was crying and refused to sit for a physical exam, and the supervising doctor used a toy to play with the child to distract him for the full physical examination. The program has provided ample opportunities through real-life physical examinations to practice clinical skills and to receive feedback from supervisors to acquire proficiency in physical examination techniques. These opportunities were provided by competent and well-trained teaching teams and large cohorts of patients with physical signs for teaching purposes.

Student Eight

Majority of physical examinations during the program were performed on real patients to facilitate preparation for the OSCE. The program showcased many opportunities for me to practice my OSCE skills, which made me confident about passing the exam. The cohort of patients with physical signs was well trained by the supervisors for the students, despite most patients having to repeat their physical examinations many times. I have many opportunities to perform physical examinations on real patients, with some positive findings matching a real person. Finally, learning proper techniques to make a more accurate diagnosis is a good and challenging experience owing to the excellent joint organisation of an expert bedside teaching team by the international office and department of medical education.

Incorporate Population Health Evidence (Systems-Based Practice) into Clinical Reasoning Learning (Apply Choosing Wisely for Investigation and Interpreting Diagnostic Tests)

Student Nine

During the respiratory medicine ward round, I observed the recruitment of patients for clinical trials by my supervisor by applying evidence-based guidelines for consensus management plan discussions. In this case, the supervisor shared with us about applying research evidence to personalise his choice of medication. On numerous occasions, in our case rounds at both inpatient ward rounds and outpatient clinics, the supervising consultants/registrars used research evidence to choose the most appropriate investigation and interpret diagnostic tests for the evidence-based management plan.

Student ten

The program allowed me to have a deeper understanding of systems-based practice, which is an approach to healthcare that focuses on the interconnectedness of healthcare systems, organisations, and individuals in a more efficient manner. This approach emphasises collaboration, communication, and a holistic view of healthcare, with the goal of providing comprehensive, coordinated, and evidence-based care that addresses the needs of the whole person and the broader community. During the program, we observed educational activities and voluntary consultations as specialty (COPD) public workshops to promote and increase the public's awareness and knowledge about the disease, including how to choose the most appropriate investigation and interpret diagnostic tests from the perspective of the entire person.

Always Play Professional & Ethical Role in Clinical Reasoning Learning (Problem List Creation and Management Framework)

Student Eleven

The programme showcased professionalism and ethics in every observed case. By definition, professionalism in clinical practice is described as having a thorough understanding of medical conditions, being able to explain to the patient, and being able to provide proper management. In clinical practice, all decisions should be made with the patient's right positioned as the first priority. Based on my observations of all encountered cases, professionalism and ethics have been demonstrated in the following aspects.

1. Respect for patients' autonomy and dignity
2. Confidentiality and privacy of patient information
3. Responsibility for one's actions and decisions
4. Collaboration and communication with other healthcare providers
5. Cultural competence and sensitivity
6. Responsiveness to the needs of patients and their families
7. Advocacy for patients' needs and rights
8. Integrity and honesty in all interactions
9. Respect for the boundaries of professional relationships
10. Continuous learning and professional development

Student Twelve

During the program, professionalism was always shown to the supervisors, showing us how a good doctor should be and have the components of being a doctor. It is always important to keep patients' information confidential, and I can see every doctor has this practice. A memorable case highlighting the importance of professionalism and ethics is the clinical case of Acute Myeloid Leukaemia (AML). This case highlights the supervising doctor's important professionalism and ethical role in defining the problem lists and explaining the management plan to a young patient diagnosed with AML who is about to face a difficult treatment journey with potential complication-related problem lists. The supervising doctor and healthcare team demonstrated professionalism by providing clear and honest communication with the patients and their families regarding the problem lists, foreseeable complications, prognosis, and available treatment options. They ensured that the patients fully understood the potential risks and benefits of the different treatment approaches. Ethical considerations came into play when discussing the potential impact of treatment on the patients' quality of life and long-term outcomes. The team actively engaged patients and their families in shared decision-making, respecting their autonomy and individual values.

Always Integrate Medical and Legal Dimension with Clinical Reasoning Learning (Shared Decision Making)

Student Thirteen

During my program time, we were frequently informed by the doctor about the privacy, the consent, the importance of recording every word and signature from the patient, in which we were taught with the medical ethics of 3 "P"s including privacy, permission, and presence of chaperone. The principles of 3 < ts > P's have been deeply engraved in our hearts. The program provided cases to ensure our understanding of how to integrate medical and legal principles into learning clinical reasoning through shared decision-making in clinical practice. Through the program, I learned to believe that doctors need to ensure that the rights and interests of patients are fully protected, as well as the need to communicate and cooperate fully with the multidisciplinary team, patients, and their families to better understand the needs and expectations of patients. In my perspective, despite establishing a good therapeutic relationship between doctors and patients, many factors may still cause conflicts and misunderstandings among them. If these situations cannot be resolved, they can lead to severe and troublesome consequences. Therefore, a formal, informative, clear, and thorough system of proof created by doctors and multidisciplinary teams is essential in clinical practice that makes medical advice or treatment official and legal in order to protect the right of the treating doctor with the multidisciplinary team and make the unrelated understand the whole story. As I observed the multidisciplinary team meeting during a grand round of case presentation, an informed consent document was signed on every occasion with different specialties when undergoing an operation, performing an invasive procedure, on rare occasions, refusal to be admitted, and commencing new trial medications. Ultimately, the informed consent process protects the privacy and confidentiality of all patient information and remains the cornerstone of the medicolegal dimension in clinical practice.

Discussion

Teaching model survey showed that “Student-led consultation under supervision in observers’ chair with discussion” was ranked the most preferred, followed by “Observe consultation and discuss with the teacher in-between patients in observers’ chair” and “Student-led consultation under supervision in consultants’ chair with discussion”. These results are somewhat consistent with recent studies showing that student-led consultation under supervision is the most student-preferred teaching model in general practice clinical placement teaching²⁰ and residential aged care facility teaching.²¹ The teaching model “Observe consultation and discuss with the teacher in-between patients in observers’ chair” has been documented as one of the frequently used teaching models in undergraduate teaching with international collaborative program.²² As previously stated, the program in this study used similar design of international collaborative program to showcase the collaborative teaching and learning through medical curricular integration in China’s “Global Innovation Hub” zones by the joint expertise teams from the international collaboration office and medical education department at both institutions. This program used the modern definition of medical curricular integration to integrate the individual institution’s clinical placement curriculum²³ in the senior year, presupposing the use of active teaching models based on problems or cases in small groups.¹⁴ The design of our program focussed on multidisciplinary-approach curriculum integration through students’ observing the multidisciplinary team meeting for the development of consensus management plan, and this multidisciplinary-approach curriculum integration have been evidenced by recent studies.^{15,16} In light of all these recent advancement of curriculum integration, the innovation of our program lies in medical education system integration through collaboration in curricular management and education system in China’s “Global Innovation Hub” zones at the Guangdong-Hong Kong-Macao Greater Bay Area of China. The modified Western-based system incorporating Chinese culture for curriculum design has certainly generated positive feedback through students’ reflections with respect to clinical reasoning learning in clinical placement teaching. These reflections from senior medical students were based on theme topics that combined the domains of clinical reasoning learning with those of general practice training in Australia. In terms of professionalism and cultural-appropriateness domains, there was a recent study highlighting students’ excellent reflections on an international exchange elective program at the same institution in the Guangdong-Hong Kong-Macao Greater Bay Area of China.²⁴ This international exchange elective program used the same curriculum integration and system integration approach in our program. One of the novel contributions of this study is to embed communication into clinical reasoning learning in a real-life setting at the Guangdong-Hong Kong-Macao Greater Bay Area of China. This novelty is supported by the students’ reflections in our study and the recent student feedback research showing that clinical communication skills training (CCST) programs in simulations resembling clinical practice can facilitate the transfer of their classroom-learned communication skills to clinical practice.²⁵ Another discussion point of this study is to incorporate population health evidence or systems-based practice into clinical reasoning learning as an eye opener for the students in this program. The students’ reflections showed that they have learned how to incorporate research in real-life clinical practice, which is supported by a recent study with nursing students.²⁶ From our study, one can foresee this evidence-based teaching approach being consistently integrated into the undergraduate clinical placement teaching curriculum of many institutions in the Guangdong-Hong Kong-Macao Greater Bay Area of China. In terms of professional and ethical roles in clinical reasoning learning, students’ reflections have shown their bedside learning by observing that the supervising doctor always integrates the professional and ethical role with sensitive ethical cases, as well as delivering students’ specific learning objectives from a professional and ethical role point of view. These integrated approaches mirrored a recent study highlighting the development and application of a patient care model that integrates ethics, professionalism, and cognitive and technical expertise in resolving ethical issues in clinical practice.²⁷ This integrated patient care model will be a great driver of facilitating the implementation of teaching professional and ethical role in clinical practice as part of clinical reasoning learning for the students of both institutions in the Guangdong-Hong Kong-Macao Greater Bay Area of China. The final point of discussion is students’ reflection on how supervising doctors integrate medical and legal dimensions with teaching clinical reasoning through the lens of the medicolegal dimension to facilitate shared decision-making. Ensuring the rights and interests of patients being fully protected through the entire treatment journey is paramount as evidenced by our students’ reflection and recent curricular recommendations from a European health professions education consortium stating the need to integrate medicolegal elements into every case of clinical reasoning learning.²⁸ This study demonstrated the most relevant integration of medicolegal dimension

with clinical reasoning learning through students' reflection in every case of informed consent process they observed. This integration clearly fulfilled the expected learning outcome of integrated curriculum designed jointly by the international office and medical educational team of both institutions in China's "Global Innovation Hub" zones at the Guangdong-Hong Kong-Macao Greater Bay Area of China. Last but not least, the findings of this study at institutions of China's "Global Innovation Hub" zones may potentially contribute to the development of integrated curriculum for medical education reform in other regions of the world, in particular, the Asia Pacific regions with predominantly eastern-based health and education system.

Limitations

There are a few limitations to this study that will be overcome in future studies. The first is the low number of students attending the medical clerkship at FAH-SYSU from the FMD/MUST. This will be overcome by increasing the recruitment of students through the international offices of both institutions or simply running the program in both the first and second semesters of the academic year (currently, the program runs in the first semester of the academic year). The second drawback is the limited number of well-trained consultant doctors available as supervisors to deliver the program at bedside. The solution is to recruit specialty training registrars with prior training for the role, which is demonstrated in a recent study showing that GP trainees can be capable of delivering GP consultants' teaching during senior medical students' clinical placements.²⁹ The third limitation is the limited number of disciplines allocated to the clerkship. This will be overcome by the collaborative redesigned integrated curriculum by the departments of medical education and international offices at both institutions in the special "Global Innovation Hub" zones at the Guangdong-Hong Kong-Macao Greater Bay Area of China.

Conclusions and Future Perspectives

Our study demonstrates the successful delivery of collaborative teaching and learning through medical curricular integration in China's "Global Innovation Hub" zones by joint expertise teams from the International Collaboration Office and Medical Education Department at both institutions. The curricular and system integrations highlight the innovations of this program in developing a consistent and students' preferred teaching model that can be introduced into the clinical placement curriculum with ongoing and future program delivery. The integrated curriculum addresses the specific challenges with changing students' perception of clinical placement teaching by applying student-led consultation at both inpatient bedside and outpatient clinics teaching under the supervision of the medical educators. The closed supervision of the student-led consultation by the medical educator relieves patients' hesitancy and reluctance to consent for this student-centred curriculum to be used in routine consultation. The unique location of the "Global Innovation Hub" zones at the Guangdong-Hong Kong-Macao Greater Bay Area of China allows this integration to significantly improve students' clinical reasoning learning and contribute to the widening concept of system integration from medical educational perspectives. The program will not be possible without joint coordination between international offices and departments of medical education at either institution. Both institutions agreed to plan ongoing studies with fourth year-4 FMD/MUST visiting students and future studies with fifth year-5 FMD/MUST students in the coming years.

Disclosure

Jianrong Zhang, Shaoting Feng, Io Nam Wong and Dan Xu are equal first authors. The authors report no conflicts of interest in this work.

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