The Impact of Online Learning in the Internal Medicine Rotation
Melvin Remulla Marcial
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Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence
Maria Faye Gomez, Leilani Mercado-Asis, et al.
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Medical Professionalism in the Time of the COVID-19 Pandemic and Beyond
Angelics Tan Alora
DOI: 10.35460/2546-1621.2022-SP02

Internal Medicine at 95: An Illustrious Past, A Dynamic and Vibrant Present and A Revolutionary Future
DESCRIPTION OF THE COVER ARTWORK
“Tres Circulos”

Regina C. Yao, MD
Graduate of the Residency Training Program in Internal Medicine and Cardiology Fellowship Training Program, University of Santo Tomas Hospital

The iconic University of Santo Tomas Main Building which incidentally was also inaugurated on 1927, the same year that the Department of Medicine was established, serves as the solid background of the three circles representing the theme of our 95th anniversary.

The first circle represents the illustrious past of UST represented by Saints Cosmas and Damian. The second circle features the medical frontliner: the modern day hero with the vaccine in hand representing a vibrant present that exudes hope for the end of the pandemic. The third circle illustrates artificial intelligence with a heart paving the way for a revolutionary future.

At the forefront is the Thomsonian Tiger: a symbol of strength, courage and standing for truth, justice and integrity.
DEPARTMENT OF MEDICINE 95TH ANNIVERSARY SPECIAL ISSUE JOURNAL OF MEDICINE UST (JMUST)

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Journal of Medicine, University of Santo Tomas (JMUST) is a bi-annual, open-access, peer-reviewed journal. It is the official publication of the UST Faculty of Medicine and Surgery and the University of Santo Tomas Hospital, Manila, Philippines.

JMUST is dedicated to provide healthcare practitioners with the best and most updated information in health science research and education. Its mission is to assist healthcare practitioners through education, in delivering the best care to their patients.

All articles in the JMUST are subjected to a rigorous process of peer-review and editing before publication. This is to ensure that anything thereon is scientifically accurate and is free from any form of plagiarism.

JMUST accepts for contribution qualitative and quantitative original research papers, review articles, commentaries, letters to editor, researches on medical education, and approved research proposals.

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PREFACE

Seed... Blossoms...Fruits...

Juan F. Torres, Jr, MD
Chairman, Department of Medicine, 1995-2000

As we tread into the threshold of our centennial, the Department of Medicine acclaims with pride... our founding fathers, all luminaries of Medicine of their time... the department they organized to integrate and enhance the teaching of various subjects/topics in the medical curriculum... the countless medical students who came under their tutelage yielding the bounty of generations of physicians imbued with the Thomasian character of education... in the ambit of the Faculty of Medicine and Surgery.

The past ninety five (95) years have seen the development from a handful of dedicated pioneers to a continually increasing genre of medical educators committed to their calling and responding to pedagogical demands of the time. Part of the growth was the inclusion of several medical disciplines to the fold of the department thus introducing multiple and diverse subjects.

The years following World War II marked the influx of well-prepared alumni returning from training abroad. Together with the established teaching staff, they imparted knowledge, engaged in clinical practice and pursued a wide range of research activities. New and novel teaching programs and modules were introduced attuned to the trends. Post graduate programs were initiated and fortified for residents and fellows in various specialties. Several disciplines originally in the wings of the department have been elevated to their own department status. Specialty sections were formally set up. The high “esprit de’ corps” and camaraderie in the department was so evident.

The illustrious period was punctuated by the distinctly prominent men and women, the leading lights of Philippine Medicine of the time... eminent clinicians, accomplished educators and noted researchers; well known in medical circles; organizers and leading figures in medical societies; recognized, cited and multi-awarded by Medicine, both national and international.

Our esteemed predecessors laid the path for the many graduates of the training programs. Several joined the teaching staff to compose our present family of physician educators... the biggest in the faculty... a premiere department.

OUR MEDICAL STAFF, all belonging to an intra department specialty section, are active clinical practitioners and teachers. Hands on supervision of modules and teaching, coupled with personal mentoring are at a level beyond the norm and distinctly Thomasian. Notably visible in their specialties, they lecture in organized fora and are avidly devoting the required time for relevant and innovative research. Recognitions, citations and awards, national and international, are natural rewards for their efforts.
Fruits of the labors of the Department members are featured in this issue of the Journal. Select research works, lectures, personal perspectives, treatises and other notable papers are highlighted. Caliber and quality of these publications are reflective of the scientific worth and ken of the authors. We proudly present them.

Today, the entire staff of the Department of Medicine continues our commitment to Thomasiian Medical Education, despite the Pandemic. We are resolved to blaze new trails and conquer the future. The Department of Medicine’s quest for excellence moves on… ever onward…
As we commemorate the 95th founding anniversary of the Department of Medicine of the UST Faculty of Medicine and Surgery and the UST Hospital, allow me to express my warmest felicitations to all.

We recognize the immense contribution of the department and staff from its inception to the present time in educating and honing thousands of medical learners and trainees to leading national, regional and global organizations in medicine and health.

It is but fitting to dedicate a special issue of the Journal of Medicine (JMUST) featuring noteworthy, timely and relevant research in medical education, Internal Medicine, and its subspecialty fields. This tool for timely dissemination and assimilation of research-based discoveries shall continue the tradition of excellence in medical education and research.

May you continue to flourish, lead, and set the best examples for the next generations of Thomasonian medical learners and practitioners.

Again, my heartfelt congratulations to all!
MESSAGE

Charito Malong-Consolacion, MD, MHA
Medical Director
University of Santo Tomas Hospital

The 95th anniversary of the Department of Medicine is a time to reflect on our celebrated past and consider what more we can give to the future as trailblazers of success, illuminating the path of our future doctors. As part of history, we have helped so many in the course of their training and have touched the lives of so many patients.

Internal Medicine is the ultimate platform where we develop holistically. We learn to be smart and resourceful, provide opportunities for the growth of all, most especially for the well-being of our patients. The Faculty of Medicine and Surgery and the University of Santo Tomas Hospital have been our home with friends, students, and allied specialties working with us all year long.

Now that our beloved Department of Internal Medicine is in its 95th year, I am beaming with so much pride in being a part of this community. Challenged again by this pandemic, we have shown resilience and strength in being united towards a common goal of truly caring and committing to excellence. With a PROUD history and a future full of PROMISE…

All for the greater glory of God Almighty…. for the service and wellness of our patients!!!

Congratulations Department of Internal Medicine!!!
MESSAGE

Raymond L. Rosales, MD, PhD
Editor-in-Chief, Journal of Medicine, University of Santo Tomas

JMUST fittingly hosts this present Special Issue dedicated to the FMS-Department of Medicine, as it celebrates a strong, 95 years of academic excellence. The commemorative theme of, “An illustrious past, a dynamic and vibrant present and a revolutionary future,” bespeaks of its scholarly reputation. The anniversary issue will contain original articles on clinical research and medical education research plus viewpoint articles from luminaries and pioneers.

Thus said, the event is set in stone and made perpetual through this kind of collaboration.

Kudos to department staff and leaders, then and now, ably chaired by Dr. Melvin Marcial. Special mention goes to the indefatigable JMUST Guest Editor, Dr. Marcellus Francis Ramirez, for the efforts poured to actualize the process.
MESSAGE

Melvin Remulla Marcial, MD, MHPEd
Chairman
Department of Medicine
University of Santo Tomas Faculty of Medicine and Surgery

In celebration of the 95th Foundation Day of the UST Department of Medicine, we have thought of the best way to document this once in a lifetime event by publishing a dedicated JMUST issue featuring the legacy of the Department of Medicine as well as the academic prowess of the faculty staff in the field of research, both in medical education and clinical research. This project is a prelude to the Department’s 100th year foundation day celebration in 2027. The UST Department of Medicine, since its creation in 1927, has produced the brightest and the most competent Thomasian Internist trailblazers in the different fields of Internal Medicine. Since the UST Faculty of Medicine and Surgery has just celebrated its Sesquicentennial year (150 years), this dedicated JMUST issue of the UST Department of Medicine is just a fitting follow through and tribute to it. In the tradition of excellence, progressive and innovative minds, the UST Department of Medicine continues to lead the way.
MESSAGE

Sjoberg A. Kho, MD
Chairman
Department of Medicine
University of Santo Tomas Hospital

Greetings my dear Thomasians!

This year, we celebrate the life of our department - the Department of Medicine. To have reached 50 years was a blessing, but to reach 95 years is nothing short of a miracle. We do not only celebrate the length of time it has stood strong, but we also celebrate the efforts of each person who has contributed to its growth. This year, we celebrate the successes, the obstacles triumphed, the relationships built. Beyond celebrating, we thank the countless individuals who have worked endlessly to make the department better with each year that goes by.

When we were planning this anniversary a few months back, we thought of different ways we could celebrate. Oscar Wilde once said that “Anybody can make history. Only great men can write it.” So I am here now, not because I am a great man (or a great writer at that), but because I believe that the Department of Medicine has made history and it deserves to be put in writing. This simple message will be forever etched in this issue of JMUST and I hope it will be an inspiration for future generations to continue this legacy.

Again, to the Department of Medicine, cheers to 95 years!
THE DEPARTMENT OF MEDICINE LOGO

The Department of Medicine logo is composed of 9 interconnected pillars symbolizing the 9 subspecialties of the Department standing in semicircular position.

Though the columns representing the subspecialties are different from one another, they are connected both in the base and the entablature on top representing the holistic aspect of the internal medicine specialty. The year 1927 is engraved on the top of the columns signifying the foundation year.

In front of the 9 pillars is an open book, the symbol of knowledge. The left page features a stethoscope wrapped around a cross representing the Thomasian Internist. The right page shows a burning torch, symbolizing the burning desire for medical knowledge and education.

On the upper left segment is the Rod of Asclepius, a serpent entwined pole symbolizing medicine and healing, and representing the Faculty of Medicine and Surgery. Occupying the upper right segment is the iconic structure of the University of Santo Tomas Main Building, which incidentally was also inaugurated in 1927, and also commemorates its 95th year together with the Department of Medicine.

The new Department of Medicine Logo was created by Charles John Fortaleza, UST Medicine Batch 2024, and Anthony Joseph Marzan, UST Medicine Batch 2022
EDITORIAL

AN OPEN LETTER TO DR. WILLIAM BURKE
(and the Pillars of Medicine that followed)

Marcellus Francis L. Ramirez, MD

Dear Dr. Burke:

Greetings in the Thomasian Spirit, sir!

Today, five years to our centennial year, we celebrate your legacy and we thank you for laying the foundation of the Department of Medicine. The year 1927 must have been quite challenging, not to mention an uncertain time – the world was in turmoil and economic hardship, barely nine years after the end of World War I and the Spanish Flu pandemic, and three decades after the end of the Spanish-American war, and yet, history also described it to be an exciting time for innovation and technological progress. How ironic. And yet we find ourselves in a slightly similar situation today.

The years that came after started a colorful era in the history of Philippine medicine and in the history of the Department of Medicine. In a span of nine and a half decades, the Department has achieved milestones and victories in the field of medicine, healthcare and education. The vision, hard work and commitment given by our past leaders – the pioneers, the pillars and the prime movers in medicine who succeeded you, along with the brilliant minds and great thinkers and doers who came along the way and joined the Department have made it grow and flourish into the premiere department of the Faculty of Medicine and Surgery.

We are happy and elated to report to you that in commemoration of our 95th anniversary, we will be proudly showcasing the works from our distinguished faculty and staff through a special issue of the Journal of Medicine of the University of Santo Tomas (JMUST). This issue contains a total of seventeen original articles which include five clinical research articles, six medical education research articles, three perspective articles and two reviews. We are deeply thankful to the editorial team and the members of our peer review committee, and to all authors who contributed to this issue. This is our tribute to you and to all the luminaries and leaders who followed you and led us to where we are today and who will lead us into the next ninety five years.

We hope that we have made you proud as much as we are proud of your legacy in Philippine and Thomasian medicine. Thank you once again sir and may God bless us all! Cheers!

Sincerely,

A Department looking forward to a Revolutionary Future
DESCRIPTION OF THE THEME FOR THE 95TH ANNIVERSARY OF THE DEPARTMENT OF MEDICINE

Internal Medicine at 95: An Illustrious Past, A Dynamic and Vibrant Present and A Revolutionary Future

Priscilla B. Caguioa, MD,1 Marcellus Francis L. Ramirez, MD2

Internal Medicine as a medical specialization is as old as antiquity. Medical specialization existed in the Hellenistic world and in Rome. This development during the latter part of the 19th century and early 20th century is credited to the rapid expansion of medical knowledge which made it impossible for a single doctor to encompass all the different spheres of the profession. With this historical perspective, we stand on the shoulders of giants: eminent pioneers, trailblazers, physicians and scientists of the previous centuries.

Inspired by the illustrious and colorful past – nine and a half decades defined by valuable lessons, historic accomplishments and milestones which have revolutionized medical education and healthcare in the Philippines, the Department of Medicine, the premiere department of the University of Santo Tomas Faculty of Medicine and Surgery, and the University of Santo Tomas Hospital, carries with it the wisdom of its pillars and pioneers who have laid the foundation for the dynamic and vibrant state that we have today – indeed an extraordinary era in medicine.

Amidst a time of uncertainty - a pandemic that has affected millions of lives and continues to wreak havoc on health systems and global economies, a world in crisis brought about by the ripple effects of a geopolitical standoff, a country whose fate remains unpredictable and precarious amidst an economic recession, and an academic institution that continues to face the challenges and threats in the fast-paced medical landscape, the Department makes a bold declaration and a fearless forecast for a revolutionary future - a tomorrow filled with hope and promise, where we will continue to fulfill our academic mission and stay true to and uphold the values enshrined in the mission and vision of the University and the Hospital, and where we will evolve with the changing and rapidly accelerating progress in medicine and transform healthcare and medical education in the community and in the country.

Evolutionary change is incremental and takes place gradually, over time. By contrast revolutionary or transformational change is profound. Revolutionary change reshapes and realigns strategic goals and often leads to radical breakthroughs in beliefs, behaviors and practices. In our efforts to stay ahead of the curve and reach evolution, outstanding institutions like us often pursue revolutionary change.

The challenge in today’s organization is not learning how to accept change but in how to

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https://www.jmust.org
orchestrate the most efficient change leading to organizational evolution. Staying in touch with our core values, maintaining a culture of innovation and learning to make the most of resources during change is the key to success.

We look back to a magnificent past and move ahead forward to the future with a gallant and visionary move for cutting edge education in medicine, and compassionate and patient-centered healthcare.

(Nota: The theme for the 95th anniversary of the Department of Medicine was suggested by Dr. Priscilla B. Caguioa)
Medical Professionalism in a Time of the Covid 19 Pandemic and Beyond

Angeles Tan Alora, MD, MAEd

The Coronavirus-19 (Covid-19) pandemic disrupts our medical world. There are substantial demands on our overstretched, understaffed, and under-resourced health systems. Physicians continuously adjust to “crisis standard of care” and new skills for on-line or face to face restricted practice. Physician health and well-being suffer stress, burn-out and moral injury. Many get sick and some die. They ask: “How should I behave as a medical professional in a time of the Covid-19 Pandemic and Beyond?”

This article explores medical professionalism: its meaning, its core values and challenges in the time of Covid-19. Its aim is to help doctors and medical students improve their professionalism, and mature into more dedicated physicians who derive joy and pride in what they do.

MEDICAL PROFESSIONALISM

In 2005 the Royal College of Physicians defined medical professionalism as “a set of values, behaviors and relationships that underpins the trust the public has in doctors” [1].

Professionalism encompasses who doctors are, how they work, what they value, and how they view themselves.

Professionalism is fundamental to good medical practice. It benefits patients, doctors, and health systems.

Medical professionalism commits to patient welfare and public health with the core values of excellence, service, humanism and solidarity [2,3].

PATIENT WELFARE

Doctors have a primary responsibility to act for the patient’s welfare [2,4]. They protect, preserve and defend the life, health, integrity and dignity of the
patient. These they do by providing quality patient healthcare and by being a patient advocate.

**PROVISION OF QUALITY PATIENT HEALTHCARE**

**Basis for duty to provide healthcare**

The duty to provide healthcare is based first on our shared humanity. Members of the human community have a Duty of Easy Rescue: to aid others in great need when one can do so at minimal risk to oneself. In addition, the duty to provide healthcare is based on the physician’s trust relationship with patients. This covenant of trust arises first on the reciprocal obligation of physician to society: the community supported the physician’s learning and provides them special privileges. Second, the covenant arises from the physician’s possessing special abilities. This trust relationship obliges physicians to take greater than the minimal risks required by our shared humanity.

The Philippine College of Physician’s Code of Ethics states: “The internist must provide appropriate service and care to patients irrespective race, age, gender, disease, disability, sex orientation, social standing, creed or political affiliation or ability to pay”[2].

**CHARACTERISTICS OF QUALITY PATIENT CARE**

Quality healthcare is competent: scientifically and ethically sound, holistic and attentive.

Competence is when a physician, given a patient, is aware of the need to act, obtains relevant information, integrates updated research evidence, local experience, patient/community/physician values and context in deciding what to do, can do what should be done and chooses to do it.

Competence is also not doing what one should not do. The competent physician recognizes futility and acknowledges proportionality. When no benefit will result or when risks or burdens outweigh the benefits of a particular test, drug, procedure or referral for the specific patient, he does not use it.

In many countries, the battle against Covid-19 has provoked medical schools to speed up their graduation process, and push students out of classrooms into clinical practice [5]. In the Philippines, the Department of Health called for volunteers, regardless of experience or readiness (including fresh graduates without certificates of registration from the PRC [6]). The impact of such measures on the provision of competent care has not been reported. Supervisors have the responsibility to ensure quality healthcare is provided and patients are not harmed.

Quality Healthcare is holistic. It cares for the whole patient: body and spirit. The physician listens to the patient’s doubts, fears and anxieties, then clarifies and reassures. He prays with and for his patients.

Quality healthcare is attentive. The physician is physically present when needed. The fear of getting infected, bringing the infection home, or the lack of health-team support are not justifications for negligence or abandonment during the pandemic.

The holistic and attentive aspects of healthcare underscores the role of doctor as a healer, more than just a curer; a great more than a good doctor.

**LIMITATIONS TO PROVIDING PATIENT CARE**

The duty of the physician to provide quality patient care is not absolute. Limits are set both by what can be done and what ought to be done.

Limited resources in a pandemic do not allow a physician to admit a patient into the hospital where there is no space for the patient. Neither can the physician provide a respirator if there is none.

Ethical principles and physician’s conflicting duties to self and others define what ought to be done.

A physician may refuse to treat a Covid patient for ethically defensible reasons. Examples include when the care requested is contrary to the physician’s value such as requests for futile or non-standard care; when more capable physicians are available; when harms outweigh benefits as when risk to the physician outweighs benefit to the patient. Refusal does not end with saying “Sorry”. The physician explains to the patient/family the reason for the refusal and offers the patient the appropriate alternative in a timely effective manner. He also continues to be a patient advocate and supports healthcare in other ways.

**PATIENT ADVOCATE**

A physician promotes patient integrity and dignity by being an advocate for all patients, both present and future.
The physician empowers patients to be self-carers. He provides accurate information regarding disease, tests and treatment. He educates towards critical decision-making: how to weigh benefits/burdens in line with personal goals, values and obligations, and apply the principle of proportionality. He involves patients in management plans. He explains the pros and cons of specific actions, including their financial and spiritual implications, provides time for questions and reflection, then obtains free consent before acting.

The physician protects patient safety. Medical “errors” are mostly preventable. The physician works towards a “just culture” that demands high standards of care and expects accountability from both the health system and the individuals involved.

PUBLIC HEALTH

Doctors commit to the second responsibility of seeking the welfare of society: the common good. This duty is based on their membership of society and is achieved by promoting public health.

The physician participates in public health programs like vaccination. In public fora, the physician educates the public, regarding healthy living and prevention of disease. He corrects misinformation and disinformation regarding tests, wonder drugs and miracle cures. He is a good steward: using limited resources optimally and distributing benefits and burdens fairly. He is involved in policy creation/advocacy for a healthy environment including tobacco, alcohol, climate change issues. He finds alternative ways to fill gaps of the healthcare system.

Many measures done to contain the pandemic (converting public buildings to isolation centers, etc.) are temporary. Healthcare maldistribution is part of the larger national socioeconomic inequities [7]. The physician promotes social justice by advocating effective permanent measures directed to lift the underprivileged and vulnerable before, during and beyond the pandemic.

CORE VALUES

In seeking patient welfare and public good a physician possesses the core moral values of excellence, service, humanism and solidarity.

Excellence

Excellence is the quality of being outstanding or extremely good or at least, the best of oneself. The excellent physician has competence and integrity.

Competence

Competence requires knowledge, skills and attitudes to perform the physician’s duties of providing patient care and participating in public health. The many on-line learning activities: webinars, postgraduate courses, scientific meetings update knowledge. Health institutions and professional organizations offer programs for physicians to improve manual skills. Developing the right attitudes of patient welfare and common good before self, lifelong learning with a commitment to evidence-based practice needs strong support from colleagues, health institutions and professional organizations.

Integrity

Integrity is “a virtue consisting of soundness of and adherence to moral principles and character and standing up in their defense when they are threatened or under attack. This involves consistent, habitual honesty and a coherent integration of reasonably stable, justifiable moral values, with consistent judgment and action over time” [8].

An honest physician does not bear false witness against a colleague, does not provide false data in a medical certificate or up-case a medical claim.

The coherence of his moral values with his judgment and his action is reflected as he walks the thought, does what is right for the right reason. In relating with patients, research participants, colleagues, institution and pharmaceutical industry, the physician with integrity avoids conflict of interests.

He chooses a particular action primarily because it serves the patient’s best interest, not his own. Referrals are made to provide better patient care and not to reduce physician responsibility, reduce physician stress or provide earning to a colleague.

Professional fees are fair compensation for service rendered. They provide the physician with a comfortable and secure life but never lavish living.

Tests/procedures/treatment purely for “academic” reasons are not done. When trainees “practice” on patients, supervising physicians must ensure that the
“practiced” test/procedure/treatment is scientifically and ethically justifiable as for the patient’s good, supervision is intimate to protect patient from harm, the patient knows and agrees to have someone in-training do the test/procedure/management and the patient is not charged a fee for the test/service.

When human participants are involved in research, the physician-researcher ensures clinical equipoise, protects the participants from harm, benefits them, obtains their free and informed consent and selects, recruits, and assigns them fairly.

The physician works with rather than against his colleagues, seeking to complement rather than compete, support rather than find fault.

He is loyal to his institution living its mission and protecting its name.

When pharmaceutical industry representatives offer the physician gifts, food and various forms of “return-to-practice support”, he asks “For what and for whom?”. He refuses benefits given in exchange of his prescriptions/endorsements or for his personal individual use.

**Service**

Service is giving to others or to a larger purpose without selfishness or self-interest. It is performing a task without expecting anything in return, it is self-forgetfulness. Service relates to altruism- the selfless concern for well-being of others as against self-preservation.

The physician serves those in need, and those who serve/will serve those in need.

**Serving those who serve those in need**

The physician serves those who serve those in need by supporting his front-line colleagues. These colleagues expose themselves, even risk their lives, to situations where others are not willing to go, to do tasks others are unwilling to do. They experience higher workloads, psychological distress, shortage of personal protective equipment, social exclusion/stigmatization, lack of support, and improper management [9]. They are vulnerable, anxious of bringing home the virus and weary from their pleas for justice. Only their faith in God, dedication to their profession and the mutual support from colleagues strengthen them to face these difficulties.

The physician cooperates in preventive control policies to reduce their risks. He volunteers to take over some of their duties so they can care for Covid-19 patients: activities like public health vaccination programs, training of the juniors, interns and students. He uplifts their flagging spirit by bearing witness to their problems and by joining their fight for a just healthcare system.

**Humanism**

Humanity is seeing the other as a fellow human being who feels, suffers, and needs help. The physician is neither forgetful nor indifferent of the increased burdens that has accompanied the pandemic. He expresses his attention through empathy and compassion to the marginalized and the wounded spirit.

**The marginalized**

The Covid-19 pandemic has disproportionately affected the marginalized in our society. The poor cannot stay home if they must go out to earn their daily living, they cannot isolate if they live in only one room and cannot maintain proper ventilation if they have no window. The privileged can. The physician acknowledges these inequalities. He is sensitive to the feelings of the poor and does not repeat statements like “we are all in this together”. He does not display on social media pictures of beach vacations, parties, travels abroad and similar activities only the rich
enjoy. He lives simply and shares his resources to whoever and whenever he can.

The wounded spirit

Self-preservation and infection precautions are critical to reduce the spread of Covid-19. By their very nature however, they are “isolating”, create a more distanced approach [10] and wound the spirit. The physician seeks solutions to mend these wounds.

The physician hears the cries of the dying intensive care unit (ICU) isolated patient separated from her loved ones, unable to have her family come near, to say “I love you” or “goodbye”. He is resourceful in crafting ways to connect patient and family through the phone, or whatever on-line platform he can make available. He becomes a proxy family member who holds the patient’s hand or spends a few extra minutes at the foot of her bed to “be near”. He feels the anxiety of the hearing and visual impaired older person, lacking manual dexterity, trying to make sense of technology and challenged to use telemedicine or receive no healthcare. He spends additional time explaining how teleconsultation works, guides her through the process and puts her at ease. He waits patiently as she tries to cope. Many reminder mnemonics such as ICARE or AIDET are particularly useful heuristic tools [10].

He listens to the frustrated families of critically ill patients refused admission or refused resuscitation. He explains the reasons why their wishes were not granted, how policies reduce spread of the disease and protect all, how everyone is doing their best. He tries to put himself in the shoes of the distressed resident unable to do what he thinks he should be doing, the pressured admission officer “forced” to give in to a superior demanding special treatment for a relative. He assures them that doing one’s best is all the Lord expects; bad things will happen and finding meaning and lesson may make it good.

The guiding principle in being humane is caring and showing that one cares. It is being trustworthy to tell the truth and do what is right consistently. It is replacing cruelty with kindness and empathy, reaching out and listening.

Solidarity

Solidarity is an attitude of teamwork with others: one of collaboration, respect, mutual support, belonging, commitment, and sacrifice. It is how we understand and enact our collective responsibility to and relationship with each other.

On an international level, the scale and severity of the Covid-19 outbreak made countries work in a spirit of solidarity. – political solidarity, technical solidarity and financial solidarity [11]. COVAX is an attempt to achieve equitable distribution of vaccines globally.

On a national level key groups of leaders such as politicians, public health experts and scientists work together to craft the nation’s response efforts. The Inter-Agency Task Force for the Management of Emerging Infectious diseases has the immediate priority to contain the epidemic. at the same time responding to its socioeconomic impact. Addressing social and economic inequalities, to reinforce equity, maximize protection for vulnerable groups and the medical workforce requires strong and sustained national solidarity.

On an individual level, the physician expresses solidarity with his colleagues and the community.

Solidarity with colleagues

The physician witnesses and role-models professional behavior for colleagues to follow. He cares for his health, both body and soul. Physically, he eats proper food, exercises and rests. He is not seduced by how much he can earn, so that he works too long or travels too far, but makes time for rest, family, and friends. Spiritually, he recognizes his dependence on God and prays. He is careful of the slippery slope that starts with undeclared income, plagiarized research reports, minor indiscretions, rationalized as “pakikisama”, “palakaran” or obeying orders and slips into fraudulent medical certificates and testimonies, commissions for prescriptions or referrals, solicitation of patients, unnecessary procedures for increased charges, excessive professional fees, even sexual harassment and bullying.

He is a responsible and reliable team member. He is not absent from work so as not to overwork those present, does not abuse power, not criticize colleagues in public. He listens to, values, and obeys policies and living guidelines made by expert colleagues. The physician does not grab every opportunity to promote his self-interests, but sometimes allows a colleague to “seize the day”.

Solidarity
The physician aids in maintaining established professional standards by sharing expertise through health professions education programs. He instructs, guides and supervises trainees. He creates partnerships to enhance and expand both undergraduate and postgraduate learning. He creates more teaching modules and distance learning tools.

Although he accepts that everyone has shortcomings, he does not tolerate incompetence or unprofessional behavior. Instead, he calls attention to misbehavior through legitimate process without resorting to gossip or scandal.

**Solidarity with the community**

The privileged positions of a physician in the community provides special benefits. People give way for him. Still, he respects everyone as his equal. He follows the line and never jumps the queue. He does not push his weight around. He does not bully, but respects; not exploit, but encourages; never talks down to someone lower in the socioeconomic hierarchy.

When community members have laments, the physician hears them, sees them, shows them their worth. He guides them to bring out their best explaining what they can and should do and what they can and should be. He teaches them to use their conscience as their guide. He empowers them to unite, restore their personal dignity and work for the common good; to speak and act against dishonesty, injustice and corruption, for a morally defensible, transparent and consistent governance, if not for themselves, for their children and grandchildren.

The physician prays for transformation: for leaders who seek the common good more than self-interest, who are wise not deluded, for citizens who are generous, not greedy; empowered, not lukewarm and for physicians who are compassionate rather than detached, involved more than isolated.

**CONCLUSION**

The extraordinary and unique times challenged us to rethink, refocus, revise, and transform, to do what must be done, to fight for what must be. We must make the pandemic a positive game change, find our “marketplace” where despite difficulties, pain and sorrow, we can heal, teach, inform and empower with excellence, humanity, service and solidarity, where we can model the nobility of our profession and our person. The disruptions brought by Covid-19 are temporary, but we must maximize indefinitely the gains in professionalism to benefit our patients, our people and ourselves.
REFERENCES


The University of Santo Tomas Hospital (USTH) 2022 Institutional Chest Pain Pathway: Approach to Diagnosis, Risk Stratification, and Management

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ABSTRACT

This clinical pathway for the diagnosis and risk stratification of patients presenting with acute chest pain, including acute coronary syndromes, provides recommendations and algorithms for clinicians to diagnose, risk stratify, and manage acute chest pain in adult patients. The writing committee reviewed existing international and local guidelines. Modifications to the algorithm following face-to-face and virtual meetings resulted in expert decisions written as recommendations and presented in a flow diagram format. The USTH Chest Pain Pathway provides guidance based on current guidelines and recommendations on assessing and evaluating acute chest pain, tailored to local needs and institution-specific facilities. We recommend its use to ensure quality patient care in the hospital.

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INTRODUCTION

Acute chest pain is one of the most common presenting symptoms in the emergency department (ED) which accounts for 6% of ED attendances and 27.4% of medical admissions [1-2]. In the Philippines, there is a paucity of data on the incidence and causes of chest pain. However, studies have shown that among patients admitted for acute coronary syndrome, typical angina was the predominant complaint in 79% of Filipino patients [3-4].

Acute coronary syndrome (ACS) is a primary concern in patients presenting with chest pain. Only 22% of them are eventually confirmed to have ACS [5]. About 50% to 76% are diagnosed with non-cardiac causes such as gastroesophageal diseases, pleurisy, pneumonia, chest-wall syndromes, or pulmonary embolism [2, 5-6]. Although most patients do not have a life-threatening condition, assessing patients presenting with chest pain in the ED remains a challenge among physicians. Hence, it is vital to efficiently recognize and accurately diagnose patients at high risk for ACS who require emergent treatment and low-risk patients who do not need admission. Such a strategy is essential in reducing the burden of coronary artery disease, limiting unnecessary diagnostic work-up, and preventing inadvertent hospital discharge of patients with ACS.

Chest pain pathways are crafted primarily to improve the management of patients with acute chest pain. They provide guidance on rapid and efficient evaluation, early identification of ACS, high-quality care, and cost-effectiveness. Chest pain pathways emphasize protocol-based, systematic management to promote the optimal application of current recommendations and standards of care [7,8].

This institutional pathway aims to develop an evidence-based guide for the diagnosis, risk stratification, and management of patients presenting with acute chest pain; and to provide current information on the appropriate application of the recommendations, hence, providing an improved, organized, and efficient strategy for patients with and without ACS. The authors recognize existing gaps and specific unanswered issues in the management of ACS as the science continues to evolve. The physician’s best judgment and decision are still crucial in this emergency.

METHODOLOGY

The recommendations listed in this pathway are based on literature from research involving human subjects, published in English, and indexed in the MEDLINE (through PubMed) database. Key search terms were: angina, chest pain syndromes, myocardial injury, myocardial ischemia, myocardial infarction, stable angina, unstable angina, coronary heart disease, coronary artery disease, acute coronary syndrome, risk stratification, diagnostic pathway, clinical decision pathway, algorithm, emergency department, and emergency care. Twenty-seven records were identified through PubMed database searching. Nineteen papers formed the basis for this clinical pathway after duplicates, and those that did not meet the target population, interventions, or outcomes criteria were excluded. This pathway is representative of all the selected references.

A writing committee was convened and met face to face and virtually. The committee met twelve times to formulate, revise and finalize the pathway and to provide expert choices and recommendations based on a review of scientific evidence, current clinical practice, and available resources in the hospital. The acute chest pain algorithm is written and presented in a flow diagram format. Each additional table includes a recommendation-specific supportive text in the diagnosis, risk stratification, and management of this common ED chief complaint.

DEFINITION OF ACUTE CHEST PAIN

This section defines the terms used to ensure uniformity of understanding and application of the different algorithms. Acute chest pain shall refer to new onset or a change in pattern, intensity, or duration of chest pain compared to prior chest pain episodes. In contrast, stable chest pain is chronic and associated with consistent precipitants such as exertion or emotional stress. Chest pain may be described as pressure, tightness, squeezing, heaviness, or burning in character. For this reason, “chest discomfort” may be an acceptable alternative term [9].
ACS typically presents as acute retrosternal chest discomfort, pressure, squeezing, gripping, heaviness, and tightness. Chest pain equivalents could be dyspnea, epigastric pain, and pain in the left arm [9-10]. Chest pain descriptors that may suggest a low likelihood of ischemia are sharp, fleeting, pleuritic, or positional [9].

**EMERGENCY CARE: INITIAL EVALUATION AND MANAGEMENT**

The History and Physical examination

This article refers to chest pain, chest discomfort, or chest pain equivalents as “chest pain.” In patients presenting to the ED with acute chest pain, the initial assessment should aim to rapidly identify patients with life-threatening conditions to facilitate the initiation of appropriate interventions. The ED physician must obtain a focused history and physical examination. Anginal chest pain is retrosternal chest discomfort that increases in intensity over several minutes and is usually precipitated by stress (physical or emotional) or occurring at rest (as in the case of ACS) with characteristic radiation to the left arm, neck, or jaw. Shortness of breath, nausea or vomiting, lightheadedness, confusion, presyncope or syncope may also accompany the chest pain. Vague abdominal symptoms are common among people with diabetes, women, and the elderly [9]. A thorough evaluation of cardiovascular risk factors, review of systems, past medical history, and family and social history should complement the assessment of presenting symptoms. Furthermore, integration of a comprehensive history and physical examination with ancillary findings can aid in the delineation of life-threatening non-ischemic cardiac causes, such as acute aortic syndromes, pulmonary embolism, and myopericarditis, from non-cardiac causes. Specific clues may help arrive at a diagnosis in a patient with acute chest pain (Table 1).

The 12-lead Electrocardiogram

An initial 12-lead electrocardiogram (ECG) should be obtained and interpreted within 10 minutes of arrival (figure 1). This step is essential because of its capacity to recognize and triage patients with ST-elevation myocardial infarction (STEMI) and thus implement and ensure timely reperfusion therapy, thus improving outcomes in these patients [11]. However, if the initial ECG is nondiagnostic, serial ECGs to detect potential ischemic changes should be performed, especially when clinical suspicion of ACS is high. The ECG should be repeated after a 10-minute interval, especially if chest pain recurs or persists.

On the other hand, in patients with intermediate-to-high clinical suspicion for ACS in whom initial ECG is nondiagnostic, supplemental ECG leads V7 to V9 are reasonable to rule out posterior myocardial infarction (MI). Lastly, if the 12-lead ECG shows an acute inferior MI, then recording of additional right precordial leads (V3R and V4R) should be considered to identify concomitant right ventricular infarction [9-10].

**Emergency pharmacological treatment**

Admit patients with ACS to the chest pain unit (CPU). Initiate optimal management. Administer dual antiplatelet therapy such as aspirin, a P2Y12 inhibitor, and an anticoagulant. Give sublingual nitroglycerine and morphine to alleviate the chest pain. Start high-intensity statin therapy (Table 2). These drugs are easy to administer, do not require complex dosing schemes or laboratory tests, cause minimal to no undesirable complications, and do not interfere with the diagnostic strategy planned for the patient.

Establish intravenous access and institute continuous electrocardiographic (ECG) monitoring. Provide supplemental oxygen (O2) for oxygen saturation of <90% or partial arterial oxygen (PaO2) pressure of <60mmHg. Request high-sensitivity troponin I (hsTrop-I) at 0-hour [9].

**Evaluation of Acute Chest Pain With Nonischemic Cardiac Causes**

In patients with acute chest pain wherein other potentially life-threatening non-ischemic cardiac conditions are expected (i.e. aortic pathology, pulmonary embolism, valvular heart diseases, myopericarditis), further diagnostic work-up is recommended to provide an accurate approach to management.

**Acute aortic syndrome**

Patients with acute aortic syndrome (e.g., aortic dissection) present with acute, sudden, severe chest
pain radiating to the back in 80 to 90% of cases [9]. The diagnostic modality of choice in stable patients is computed tomography (CT) aortogram (Class 1, C). If CT aortogram is contraindicated or unavailable, a transesophageal echocardiogram (TEE) or cardiac magnetic resonance (CMR) should be performed to make the diagnosis (Class 1, C) [9].

**Pulmonary embolism**
Diagnosis of pulmonary embolism can be challenging since clinical signs and symptoms may be nonspecific. Dyspnea followed by chest pain, typically pleuritic, are the most common presenting symptoms. CT angiography (CTA) using pulmonary embolism (PE) protocol is the diagnostic modality of choice in stable patients (Class I, B), while ventilation-perfusion scanning is a second-line alternative in the acute setting [9].

**Myocarditis and Pericarditis**
Acute chest pain due to pericarditis and myocarditis, classically presents with chest pain that is sharp and pleuritic which improves on sitting up or leaning forward. On physical examination, pericardial friction rub may be audible. Cardiac magnetic resonance (CMR) with gadolinium contrast is a Class 1B recommendation to distinguish myopericarditis from other causes. A transthoracic echocardiogram (TTE) is useful in demonstrating the presence of

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**Table 1. Clinical Features of the different etiologies of acute chest pain.**

<table>
<thead>
<tr>
<th>Clinical Syndrome</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emergency</strong></td>
<td></td>
</tr>
<tr>
<td>Acute Coronary Syndrome</td>
<td>Diaphoresis, tachypnea, tachycardia, hypotension, crackles, S3, mitral regurgitation murmur; examination may be normal in uncomplicated cases</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>Tachycardia and dyspnea; pain with inspiration</td>
</tr>
<tr>
<td>Aortic dissection</td>
<td>Connective tissue disorders (e.g., Marfan syndrome), extremity pulse differential; Severe and abrupt onset chest pain, pulse differential, and widened mediastinum on chest x-ray; Syncope, aortic regurgitation</td>
</tr>
<tr>
<td>Esophageal rupture</td>
<td>Emesis, subcutaneous emphysema, pneumothorax, unilateral decreased or absent breath sounds</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
</tr>
<tr>
<td>Non-coronary cardiac: aortic stenosis (AS), aortic regurgitation (AR), hypertrophic cardiomyopathy (HCM)</td>
<td>AS: Characteristic systolic murmur, tardus or parvus carotid pulse AR: Diastolic murmur at the right of the sternum, rapid carotid upstroke HCM: increased or displaced left ventricular impulse, prominent a wave in jugular venous pressure, systolic murmur</td>
</tr>
<tr>
<td>Pericarditis</td>
<td>Fever, pleuritic chest pain, increased in a supine position, friction rub</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>Fever, chest pain, heart failure, S3</td>
</tr>
<tr>
<td>Esophagitis, peptic ulcer disease, gall bladder disease</td>
<td>Epigastric tenderness Right upper quadrant tenderness, Murphy sign</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Fever, localized chest pain, may be pleuritic, friction rub may be present, regional dullness to percussion, egophony</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>Dyspnea and pain on inspiration, unilateral absence of breath sounds</td>
</tr>
<tr>
<td>Costochondritis, Tietze syndrome</td>
<td>Tenderness of costochondral joints</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>Pain in a dermatomal distribution, triggered by touch; characteristic rash (a unilateral and dermatomal distribution)</td>
</tr>
</tbody>
</table>

ventricular wall motion abnormality, pericardial effusion, or restrictive pathology (Class 1C) [9].

Other clinically important causes of chest pain

Lastly, chest pain may also occur in the presence of valvular heart disease particularly aortic valve and mitral valve stenosis with secondary pulmonary hypertension. It may also occur after papillary muscle rupture secondary to myocardial infarction or in acute degenerative mitral valve pathology. In terms of diagnostics, transthoracic echocardiogram (TTE) is useful in assessing valvular anatomy because of its availability and is therefore considered the first-line test in these patients (Class 1C) [9]. In cases wherein TTE is inadequate, TEE is useful in determining the severity and cause of VHD. Alternatively, CMR imaging may be considered over TTE or if TEE is nondiagnostic (Class 2a) (figure 1) [9].

Chest pain unit

Chest pain units are areas of emergency medical care dedicated to improving the management of patients with acute chest pain or any other symptom suggestive of ACS. It can be located adjacent to the ED, in an actual physical area, or just as a working process within the ED. A group of trained staff act synchronously to achieve a rapid and efficient evaluation, prompt recognition of ACS, and cost-effectiveness [12].

Screening for COVID-19

The Infection Prevention And Control Committee (IPCC) of the University of Santo Tomas Hospital (USTH) established a Pathway for Emerging and Re-emerging Infections (PERI) for Coronavirus Disease 2019 (COVID-19). It aims to triage patients in the emergency room to designated units (chest pain
### Table 2. Dose regimen of pharmacologic therapies in acute coronary syndrome patients.

<table>
<thead>
<tr>
<th><strong>Antiplatelet drugs</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Initial oral LD of 150 to 300 mg (or 75 to 250 mg IV), and an MD of 75 to 100 mg OD for long-term treatment</td>
</tr>
<tr>
<td>P2Y12 receptor inhibitors</td>
<td></td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>LD of 300 to 600 mg orally, followed by an MD of 75 mg OD, with no specific dose adjustment in CKD patients.</td>
</tr>
<tr>
<td>Ticagrelor</td>
<td>LD of 180 mg orally, followed by an MD of 90 mg BID, no specific dose adjustment in CKD patients.</td>
</tr>
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<table>
<thead>
<tr>
<th><strong>Anticoagulant drugs</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Unfractionated heparin (UFH)</td>
<td>Dose in primary PCI: 70 – 100 IU/kg IV bolus when no GP IIb/IIIa inhibitor is planned; 50-70 IU/kg IV bolus with GP IIb/IIIa inhibitors; Dose in patients receiving fibrinolytic therapy or in patients not receiving reperfusion therapy: 60 IU/kg IV bolus with a maximum of 4000 IU followed by an IV infusion of 12 IU/kg with a maximum of 1000 IU/hour for 24 to 48 hours. Target aPTT: 50 – 70 seconds or 1.5 to 2.0 times that of control to be monitored at 3, 6, 12, and 24 hours.</td>
</tr>
<tr>
<td>Low molecular weight heparin (LMWH) (Enoxaparin)</td>
<td>In patients <strong>&lt;75 years of age</strong>, give 30 mg IV bolus followed 15 minutes later by 1 mg/kg SC every 12 hours until revascularization or hospital discharge for a maximum of 8 days; <strong>In patients &gt;75 years of age</strong>, No IV bolus; start with first SC dose of 0.5 mg/kg with a maximum of 75 mg per injection for the first two SC doses;</td>
</tr>
<tr>
<td>Fondaparinux</td>
<td>Dose in patients receiving fibrinolytic therapy or in patients not receiving reperfusion therapy: 2.5 mg IV bolus followed by an SC dose of 2.5 mg OD up to 8 days or hospital discharge; <strong>Not recommended for primary PCI</strong></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>Anti-ischemic Therapy</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrates</td>
<td>Initial administration of rapidly acting nitroglycerin SL or buccal, 0.4 mg at 5-minute intervals times 3 doses; IV nitroglycerine: 5 to 10 μg/min, titrated to a maximum of 200 μg/min as needed until relief of pain; maintain SBP of at least 90 to 100 mmHg</td>
</tr>
<tr>
<td>Beta - Blockers</td>
<td>Metoprolol tartrate 25 to 50 mg every 6 hours for 2 to 3 days as tolerated then switch to 100 mg BID; Carvedilol initially 6.25 – 50 mg BID; Bisoprolol 5 – 10 mg OD; Esmolol at 50 to 250 ug/kg/min may be used in patients with relative contraindications to the administration of a beta blocker and in whom HR slowing is considered highly desirable.</td>
</tr>
<tr>
<td>Morphine</td>
<td>An initial dose of 4 to 8 mg IV, followed by doses of 2 to 8 mg IV repeated at 5 to 15 minutes intervals until the pain is relieved or side effects emerge—hypotension, depression of respiration, or vomiting.</td>
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<table>
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<tr>
<th><strong>Lipid - Lowering agents</strong></th>
<th></th>
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<tbody>
<tr>
<td>Statins</td>
<td>Atorvastatin 80mg/tab upon admission then OD; Rosuvastatin 20mg/tab upon admission then OD</td>
</tr>
<tr>
<td>Fibrinolytic agents</td>
<td></td>
</tr>
<tr>
<td>Streptokinase</td>
<td>1.5 million units over 30 to 60 minutes IV;</td>
</tr>
</tbody>
</table>
The University of Santo Tomas Hospital (USTH) 2022 Institutional Chest Pain Pathway

### Table 2. Dose regimen of pharmacologic therapies in acute coronary syndrome patients (continued)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alteplase (tPA)</strong></td>
<td>15 mg IV bolus 0.75 mg/kg IV over 30 minutes (up to 50 mg) then 0.5 mg/kg IV over 60 minutes (up to 35 mg)</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>Oxygen is indicated in patients with hypoxemia (SaO2 &lt; 90% or PaO2 &lt; 60 mmHg) Routine oxygen is not recommended in patients with SaO2 &gt; 90%</td>
</tr>
</tbody>
</table>

Legend: LD = Loading dose; MD = Maintenance dose; OD = Once daily; BID = twice daily; CKD = Chronic Kidney disease; SC = subcutaneous; IV = intravenous; SL = sublingual

Sources: (1) 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation; (2) 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation.

### Figure 2. Diagnosis and Risk Stratification of patients with suspected acute coronary syndrome.

1. All patients in the ER with fever (i.e. temperature ≥ 37.6°C) or any respiratory symptoms or influenza-like-illness (e.g. cough of <14 days duration, colds/nasal congestion, sore throat, headache, myalgia, arthralgia, malaise, easy fatigability, nausea, vomiting, diarrhea of <7 days duration, impaired sense of smell or taste) shall be advised to wear procedural or surgical masks if not yet done. A yellow trash bin shall be readily available for proper disposal of used masks [13].

2. If the patient has fulfilled the criteria for suspect/probable/confirmed COVID-19 case or is a close Contact, he/she shall be placed immediately in the ER isolation room or red zone. AIRBORNE and CONTACT precautions shall be implemented [13].

### Risk stratification and Management of Patients with Suspected Acute Coronary Syndrome

 Patients with acute chest pain and suspected ACS entail a spectrum of differential diagnoses (ischemic or non-ischemic or noncardiac causes)
and stratification into low, intermediate, or high-risk groups once ST-elevation myocardial infarction (STEMI) has been excluded. This stratification guides physicians in their subsequent management.

Clinical pathways which include troponin results, structured and/or validated scoring of clinical variables, and ECG interpretation, can provide significant points for patient risk stratification and alternative diagnoses. Moreover, it provides clinicians with faster diagnostic decisions thereby rapidly "ruling in" or "ruling out" acute myocardial injury; and aiding in accelerating progress to the next step in clinical management.

First major decision: Is immediate PCI warranted?

The priority is to identify the patients who need urgent transfer to the catheterization and intervention unit for percutaneous coronary intervention (PCI) (figure 2). The following are the key recommendations:

- For patients with ST-segment elevation myocardial infarction (STEMI), primary PCI, is the preferred reperfusion strategy, recommended within 12 hours of symptom onset, provided it can be performed within 120 minutes from STEMI diagnosis by an experienced team. If timely primary PCI cannot be performed after STEMI diagnosis, administer fibrinolytic therapy within 12 hours of symptom onset in patients without contraindications. The maximum target delay time is 10 minutes. For patients with symptoms of >12 hours, do primary PCI strategy if the following are present: (1) ECG evidence of ongoing ischemia; (2) ongoing or recurrent pain and dynamic ECG changes; (3) ongoing or recurrent pain, symptoms, and signs of heart failure, shock, or malignant arrhythmias [14].
- For patients with non-ST elevation ACS (NSTE-ACS), do immediate invasive strategy (i.e., coronary angiogram) with the intent to do revascularization in under 2 hours from first medical contact in patients with at least one of the very-high-risk criteria: (1) hemodynamic instability, (2) cardiogenic shock, (3) recurrent or refractory chest pain despite medical treatment, (4) life-threatening arrhythmias, (5) mechanical complications of myocardial infarction, (6) acute heart failure related to NSTE-ACS, and (7) ST-segment depression >1 mm in 6 leads plus ST-segment elevation in leads aVR and or V1. Depending on the coronary anatomy, do either PCI, coronary artery bypass graft (CABG), or continuing medical therapy [10, 15].

Management of patients presenting with hemodynamic instability (i.e. resuscitated cardiac arrest) and concomitant NSTE–ACS, warrants individualized decisions according to their neurologic status and level of critical state [10]. Hence, the option of performing delayed intervention may be considered in these instances. This is supported by the randomized Coronary Angiography after Cardiac Arrest (COACT) trial, which stated that an unselected immediate invasive strategy is not superior to a delayed invasive strategy in patients who had an out-of-hospital cardiac arrest and had no signs of STEMI [16]. Therefore, it is reasonable to delay the performance of invasive coronary angiography (ICA) among NSTE-ACS patients who will need immediate hemodynamic stabilization first such as cardiogenic shock management and mechanical ventilation support [17].

Decision Pathway for Non-ST Elevation Acute Coronary Syndrome

Once STEMI has been excluded, patients may be triaged according to their ECG findings and cardiac biomarkers result. The preferred biomarker is cardiac troponin (cTn) I or T because of its high sensitivity and specificity for myocardial tissue damage. The diagnostic accuracy of cardiac troponins for the detection of myocardial infarction shortens the time interval to the second cardiac troponin determination. This means a reduction in the delay to diagnosis, shorter stays in the emergency room, and lower hospitalization costs [15].

The latest European Society of Cardiology (ESC) Non-ST-segment elevation ACS guidelines give a IA recommendation for the use of high-sensitivity cardiac troponin (hs-cTn) as the standard biomarker for clinical practice and a class IB recommendation for the application of two main novel algorithms with cardiac biomarkers for the management of patients with acute chest pain [10]. In patients presenting with suspected non-ST-segment elevation ACS, it is recommended to use the 0/1 hour algorithm (best option, blood draw at 0 and 1 hour) or the 0/2 hour algorithm (second-best option, blood draw at 0 and 2 hours). These algorithms have been derived,
developed, and well-validated in large multicenter cohorts [17-21]. In a study by Badertscher P, et al, they reported that the 0/1 hour ESC algorithm is as effective as the 0/3 hour in ruling in or ruling out acute myocardial infarction (AMI) with a very high negative predictive value [23]. Moreover, clinicians should be familiar with the analytical performance and the 99th percentile upper reference limit that defines myocardial injury for the cTn assay used at their institution. The high-sensitivity Troponin-I (hsTrop-I) Abbott assay is currently being used in our institution. Therefore, cut-off concentrations of such assay are used. The availability of cTn has rendered creatine kinase myocardial (CK-MB) isoenzyme and myoglobin not useful for the diagnosis of acute myocardial injury [9-10]. It is noteworthy that the algorithms should always be integrated with a detailed clinical assessment and 12-lead ECG, and repeat blood sampling is mandatory in case of ongoing or recurrent chest pain [10].

If both the 0- and 1-hour troponin levels of the patient are inconclusive and the clinical presentation is highly suggestive of ACS, then a third measurement of cardiac troponin at the third hour (3 h) is warranted [10]. The cut-off levels for hsTrop-I at 3 h are still in development [10]. However, in a retrospective study by Kim et al, a rise and/or a fall in hs-Troponin I of >0.0162 ng/mL at 3 h was found to be useful in identifying patients with acute myocardial infarction [24]. This finding was the basis of our cut-off for hsTrop-I at 3 h.

Once a diagnosis of NSTE-ACS has been established, patients must be risk stratified to either very high-risk, high-risk, or low-risk NSTE-ACS to guide clinicians in the treatment strategy and timing of invasive strategy (i.e. revascularization through PCI or CABG depending on the lesion morphology and patient’s risk profile) (figure 3) [10].

As mentioned above, very high-risk NSTE-ACS patients need an immediate invasive strategy followed by revascularization (either PCI or CABG) if the anatomy is suitable, preferably within 2 hours from first medical contact. If the NSTE-ACS patient belongs to the high-risk stratification [established NSTEMI diagnosis, dynamic new or presumably new contiguous ST/T-segment changes (symptomatic or silent), resuscitated cardiac arrest without ST-segment elevation or cardiogenic shock and Global Registry of Acute Coronary Events (GRACE) score of >140], the invasive strategy may be scheduled within 24 hours. However, if the patient lacks very high or high-risk stratification features, a selective invasive strategy may be scheduled before discharge.

Once the diagnosis of an acute NSTE-ACS is made, early management of the patient involves the concurrent attainment of several goals, including relief of ischemic chest pain, evaluation of the hemodynamic state, correction of abnormalities that are present, prevention of early sequelae of ACS (i.e., recurrent myocardial infarction, heart failure, arrhythmias, and death), determination of the optimal timing of cardiac catheterization and potential percutaneous coronary intervention, and initiation of antithrombotic therapy. These early diagnostic and therapeutic interventions are followed by the initiation of short- and long-term interventions aimed at improving in-hospital and long-term outcomes. A summary of the benefits of the pharmacologic and non-pharmacologic interventions is shown (Table 3).

### Decision Pathway for Patients with Normal ECG and Normal Troponin

In patients with normal or no ischemic changes on 12-lead ECGs, normal hs-cTn, and chest pain-free for several hours, stress imaging can be performed during the hospitalization or shortly after discharge. Stress imaging is preferred over exercise ECG due to its high diagnostic accuracy [28]. It has been shown in studies that normal stress testing has a high negative predictive value for ischemia and is associated with excellent patient outcomes [29-30]. Furthermore, if the patient still has ongoing or recurrent chest pain, but the hsTrop-I is inconclusive at 0/1 h, cardiac troponin at the third hour is usually required to identify appropriate patients for early discharge and outpatient management [10].

### Key Messages

- Immediate recognition of patients with acute chest pain and suspected ACS is warranted in the ED. Clinicians must efficiently distinguish these patients from those with non-critical syndromes to prevent unwarranted, ineffective, and uneconomical hospitalization and extensive diagnostic work-up.
- A focused history and physical examination and 12-lead ECG should be obtained and interpreted within 10 minutes of the patient’s arrival at the
The University of Santo Tomas Hospital (USTH) 2022 Institutional Chest Pain Pathway

**NSSTE-ACS (UNSTABLE ANGINA OR NON-ST ELEVATION MYOCARDIAL INFARCTION)**

Administer the following (see Table 2 for the dosages):
- Aspirin
- P2Y12 receptor inhibitors (prasugrel or ticagrelor or clopidogrel)
- Anticoagulants
- Beta-blockers
- Nitrates
- Analgesics
- High-dose statins
- Angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs)
- Oxygen supplementation for oxygen saturation of <90% or PaO2 <60mmHg

**Very High Risk**
- Activate catheterization laboratory (within 30 minutes)
- Immediate revascularization: PCI (within 2 hours) or CABG

**High-risk**
- Medical management
- Schedule for early invasive PCI (within 24 hours)

**Low risk**
- Medical management
- Selective invasive PCI prior to discharge

**ADMIT TO CCU/CVU**

**POST ACS CARE**

**Figure 3.** Risk stratification and management of Non-ST elevation Acute Coronary Syndrome.

- Cardiac biomarker hsTrop I should be obtained immediately.
- Patients suspected of acute coronary syndrome should be admitted to the chest pain unit, a physical area, or a working process within the emergency room.
- Standard medical therapies should be initiated in patients suspected to have ACS which include antithrombotic therapy (aspirin, P2Y12 inhibitor, anticoagulant), nitrates, morphine, beta-blockers, high-intensity statins, and oxygen if O2 saturation is <90%.
- Primary PCI is indicated in STEMI patients with symptoms of ischemia of <12 hours duration. It must be performed within 120 minutes of STEMI diagnosis. Fibrinolysis is indicated if primary PCI is not feasible.
- Patients with NSTE-ACS should be risk stratified for an invasive approach to either very high risk, high risk, or low-risk NSTE-ACS. An immediate invasive approach within 2 hours from medical contact is recommended in patients with very high-risk features. In other clinical presentations, a selective invasive approach may be performed according to non-invasive testing or clinical risk assessment.
- The hsTrop I 0/1 hour algorithm in conjunction with clinical and ECG findings is recommended in patients with suspected NSTE-ACS to rapidly “rule in” or “rule out” ACS and identify patients safe for early discharge and outpatient management.

**Limitations**

This pathway is specifically directed toward the diagnosis and management of acute chest pain. It excludes patients with chronic coronary syndromes. This guideline is evidence-based. However, some recommendations are influenced by the opinions and clinical experience of the writing committee, and available resources of the institution.

**Gaps in knowledge**

- Clinical risk stratification and decision tools will likely continue to grow in popularity because of their ease of application. However, large randomized controlled trials (RCTs) to determine improvement of outcomes are needed prior to wide-
spread implementation. There is a paucity of local setting RCTs that support and validate the use of risk stratification scoring systems of different hospital institutional pathways.

• Additional testing on the 3rd hour is recommended if the first two cardiac troponin measurements of the 0 h/1 h algorithm are not conclusive and the clinical condition is still suggestive of ACS.

However, there are no updated recommendations on what constitutes an abnormal 3rd-hour hs-cTn value. Hence, future researches should be directed towards this objective.

• The present institutional pathway is intended to standardize and improve the quality of care for chest pain patients. However pre-discharge evaluation and follow-up care are not included and

### Table 3. Benefits of Pharmacologic and Non-Pharmacologic Interventions

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must be considered as an important future improvement of the pathway.

- A registry with specific quality performance indicators is recommended to evaluate the delivery of health services.

- The decision on the timing of ICA in NSTE-ACS patients with hemodynamic instability was explained and supported by the COACT trial. However, the safety and effectiveness of routine vs. selective invasive assessment of frail patients (i.e. elderly, critically ill, immunocompromised) presenting with NSTE-ACS lacks supporting literature, hence the need for further evaluation.

Conflict of Interest

The contributing authors declare no conflict of interest related to this clinical pathway.

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The Development of Physical Diagnosis: Historical Perspectives

Isaias A. Lanzona, MD

ABSTRACT

The history of physical diagnosis started with Hippocrates. History taking, inspection, palpation, and examination of the urine were then the fundamental diagnostic tools. The Hippocratic Corpus and Galen’s authoritative theoretical writings dominated medical thinking for over 1,000 years. Clinical examination advanced through Vesalius’s and Morgagni’s discoveries on human dissection (1543) and pathologic anatomy (1761) respectively. The actual beginnings of physical diagnosis occurred with the discovery of percussion by Auenbrugger in 1760, by Corvisart who popularized percussion in 1808, and by Laennec who invented the stethoscope in 1816. These achievements commenced the development of physical diagnosis.

HIPPOCRATIC SCHOOL

The development of physical diagnosis starts with what our five senses teach. The organs of the senses are “the body’s gateways to the mind” according to St. Augustine. For him, sight is the principal sense by which knowledge is acquired; sound is something to be enthralled by; and smell, taste, and touch are created by God and thereby to be cherished. As medicine is a practical science, one relies on the five senses in performing the four methods of physical diagnosis: looking (inspection), feeling (palpation), tapping (percussion) and listening (auscultation). As observers, doctors seek to understand how the senses work. As students, they are taught how to use their senses to interpret the clues they have picked up. [1] As an evolving science, medicine is portrayed in a variety of ways through the subjects ranging from empirical reasoning, anatomical dissections, and treatises to scenes of triumph effected by the “fathers” of medicine. [1] The history of physical diagnosis recounts a rich history of achievements with the use of the senses.

Medical history generally looked at Hippocrates (460-370 BCE) as the Father of Modern Medicine. [2] Through his precepts, medicine became an art, a science, and a profession [3] An enduring contribution of the Hippocratic school was the conviction that disease was a natural process and not by magical causes, superstitions, and the supernatural. As a result, the doctor would no longer be an intermediary with the gods but the bedside friend of the sick. [4] This change was considered to be a major conceptual leap. [3,5] Because if the disease is natural, it could be studied, and its course predicted. This provided significant importance for medical epistemology (What do we know about the disease? What is the basis of knowledge? What are its sources?). [6] This concept was a necessary prerequisite to the development of physical diagnosis. [3]

From such a concept (that diseases are natural), medicine became patient-centered with direct observations at the bedside rather than disease-centered. This was referred to as the first incarnation of scientific medicine as bedside medicine. [6] This Hippocratic tradition provided an observation model for medicine invoked as a living force in early
nineteenth-century Paris when the French capital was the Mecca of the medical world. [7]

The collection of medical writings known as the Hippocratic Corpus consists of about 60 treatises and 42 case histories. The case histories contained in Books I and III of Epidemics are by far the most celebrated remarkable records of observations. (8) This is an example of a passage worth mentioning in Epidemics I chapter 23. [8] After saying that one should take into account “the nature of man in general and of each individual and the characteristics of each disease”, the writer proceeds:

Then we must consider what food is given to him and who gives it..., the conditions of climate and locality both in general and in particular, the patient's customs, mode of life, pursuits and age. Then we must consider his speech, his mannerisms, his silence, his thoughts, his habit of sleep or wakefulness and his dreams, their nature and time. Next, we must note whether he plucks his hair, scratches or weeps. We must observe his paroxysms, his stools, urine, sputum and vomit. We look for any change in the state of the malady, how often such changes occur and their nature, and the particular changes which induce death or a crisis. Observe, too, sweating, shivering, chill, cough, sneezing, hiccoughs, the kind of breathing, belching, wind, whether silent or noisy, haemorrhages and hemorrhoids. We must determine the significance of all these signs.

The cardinal concept of the Hippocratic corpus was that health was equilibrium and illness an upset. [4] Accordingly, humans were believed to be made up of the same fundamental elements that comprise all of the cosmos – fire, water, air, and earth. Furthermore, these elements could have qualities of being hot, cold, dry and/or moist. [9] In the course of digestion, food and drinks are converted into body juices or humors namely blood, phlegm, yellow bile, and black bile respectively. In the Hippocratic Corpus, notably, On the Nature of Man, the body was viewed as stable until illness subverted it. An imbalance would produce illness or disease if it resulted in an undue concentration of fluid in a particular body zone. In a sense, the Hippocratic school can be considered the originator of the notion of “homeostasis”. [9] The chief role of the physician at that time was to aid the natural resistance of the body in order to maintain equilibrium and to overcome metabolic imbalance through surgery, bloodletting, purges and enemas, baths, ointments, diet, and exercise.

Despite the greatness of the Greek system, the Hippocratic school developed little anatomy and pathology: the sine-qua-non of physical diagnosis. [5] For one, human dissection was a controversial issue during the Hippocratic period. The belief was that human dissection will disrespect the human body or an intact body is needed in life after death. [3] Secondly, there was no incentive for physicians to search for localized signs of a disease as treatment can only be achieved by restoring the previous balance in the body fluids as a whole consistent with the humoral philosophy. [5] Despite this shortcoming, their case studies demonstrated a high level of medicine that included a careful history, inspection, palpation, direct auscultation, and examination of the sputum and urine. [5] Furthermore, one is impressed by the clinical acumen of the Hippocratic school in the face of a nearly complete ignorance of the relation of disease to the localized organ and function of the human body. [9] Thus, the Hippocratic writings support the conclusion of Korn that ‘the golden age of physical diagnosis started with Hippocrates.” [10]

The Hippocratic school dominated Western medicine for the next 500 years until another Greek came into the scene, Claudius Galen (CE 130-201). He was born in Pergamum (now Turkey) but spent most of his adult life and rose to medical fame in Rome. [9] While Hippocrates was content with careful observation, Galen went further offering anatomical (dissected on pigs and monkeys but not on humans) and physiological accounts of what happened in health and disease. [11] Building on the works of the Hippocratic School, he wrote more than 400 volumes containing over 8 million works on all aspects of medicine: diagnosis, therapy, regimen, and philosophy of medicine. He is a model for conceptual thinking in making diagnoses through the good use of his five senses (smell, taste, hearing, touch, and sight). [12] To cite, with the sense of touch, he introduced sphygmoology (the scientific study of the pulse) following the observations and findings of a Greek physician, Praxagoras, (who first established a link between pulsation and disease) and Herophilus (who invented a water-clock to measure pulsation). This was perhaps Galen’s single most important diagnostic aid in his repertoire
and the technique to his theoretical expositions of medical practice. [12] Through his whole series of sixteen books on the pulse, he instructs doctors to observe the following: strength, frequency, speed, and rhythm.

Although more than 500 years separated Galen from Hippocrates, Galen acknowledged the achievements of Hippocrates and developed extensive tracts on humoral pathology, which included *On the Black Bile and On the Elements according to Hippocrates*. [13] Aside from Greece and Rome, humoral pathology made its way into Islamic medicine, was adopted by medieval practitioners, and also featured in Ayurvedic medicine in India. Indeed, Greek humoral medicine became the most powerful explanatory framework of health and disease available to doctors and laymen for some 1,500 years until scientific medicine gradually replaced it in the late 19th century. [11]

The power of the Western Roman Empire ended in the year 476 CE. The orderly regime of hygiene, literacy, and medical practice also faded. [13] Ideas and practices of medicine came to be dictated by the church. Autopsy and dissection were still banned. In Europe in the 5th to the 10th century (described as the medieval period), progress in medicine and science virtually grounded to a halt with no organized medicine. The medical practice still followed the precepts of Hippocrates and Galen on humoral pathology. The physical diagnosis could make little real progress. [5] However, Europe in the 13th century (towards the end of the early medieval period) witnessed a revival of medical learning from ancient Rome with renewed interest in human dissection. [13] Several events set the stage for lifting the taboo against dissecting the human body (legislative changes, decline of religious teaching, reactions to criminal violence). [14] One of them was an imperial decree by Emperor Frederic II (a former Holy Roman Emperor) in 1238 authorizing the performance of public demonstrations on the bodies of executed criminals for teaching purposes. [3] This paved the way in 1315 for the first recorded public dissection performed by Mondino de’ Liuzzi (CE 1270-1326) in Bologna, Italy. The following year, he wrote the first book exclusively on anatomy, *Anatomia Corporis Humani* (Anatomy of the Human Body). [14] The pace quickened with more dissections and more work devoted to human anatomy. Renaissance art [13] contributed to knowledge of anatomy as exemplified by Leonardo da Vinci. [14] However, the influence of Galen and Hippocrates was so great and influential that most medical authorities saw no need to follow the new anatomical findings as well as to think of localized disease and strictly adhered to the principles of humoral pathology. [14]

**PADUAN SCHOOL**

The Paduan School in Venezia, Italy was quoted by a prominent was quoted by a prominent historian in Medicine, Henry Sigerist, as “the cradle of modern medicine” as it played an extraordinary role in the development of medical knowledge between the 15th and 16th centuries. [15] The year 1543 represents a turning point in the modern history of medicine. Andreas Vesalius (1514-1564), born in Belgium but a professor of anatomy and surgery in Padua, brought human anatomy to the next level of science with the publication of *De Humani Corporis Fabrica* (On the Structure of the Human Body) barely two centuries after the public dissection of Mondino de’ Liuzzi and 50 years after Leonardo’s drawings. [3,4,13-14] His book was based on his meticulous observation and accurate description in the form of exquisitely detailed anatomic plates. [3,16] He was familiar with the precepts of Galen which dominated the practice of medicine for over 1,000 years and was aware that his precise anatomic observations in *De Fabrica* contradicted many of Galen’s zoological cherished tenets. *This publication was pivotal in jolting medicine out of the stagnation of the medieval period (CE 476CE-1485) in Europe.* [3,5,13,16] “Vesalius provided the accurate anatomic base upon which physical diagnosis could be built.” [17] William Osler called the *Fabrica* the “greatest book ever written from which modern medicine dates.” [5]

Despite Vesalius’s anatomic dissection, it had only little effect on the advancement of bedside medicine. It was physiology, rather than medicine, that benefited from Vesalius’s work. [9,13] There was a revival in physiology with William Harvey’s (1578-1657) work on the circulation of blood in 1628. This young Englishman arrived in Padua to further his studies and received a doctorate degree in medicine in 1602. The outstanding discovery of William Harvey is recognized as directly connected with his Paduan education because here he
learned of the existence of the valves of the veins, a unidirectional structure, and a connection between mathematics and research. [9,13] Harvey’s classic work was *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* (Anatomical Essay on the Motion of the Heart and Blood in Animals) commonly referred to as *De Motu Cordis*. He compiled many concepts on the circulatory system some dating back to Greece and Rome and integrated them with some of his theories and evidence. In particular, he understood that there were 2 circulations: from the heart via the lungs and back (pulmonary) and from the heart through the body and back (systemic). [13] This eradicated an existing dogma from Galen that the blood in the left ventricle came directly from the right ventricle through pores in the interventricular septum. [9] Because of his work, William Harvey is considered “the father of modern physiology.” [9]

**17TH-18TH CENTURY**

Gradually in the 17th century, doctors began to distinguish disease on the basis of symptoms. As examples, Hippocrates and Galen had described fever with or without rash and fevers with diurnal variations. [16] Pointing out what makes one disease different from the other based on careful observation and description can be seen as a kind of turning point in clinical thinking. What therefore constitutes a disease? Such a question was raised by an English physician, Thomas Sydenham (1624-1689). The definition of disease by Sydenham established nosology (derived from the Greek words for “disease” and “theory about”). Nosology is the branch of medicine that deals with the concept, definition, classification, and nomenclature of disease. [3]

Oxford educated, Thomas Sydenham was politically a radical (a Puritan, left-wing protestant who rebelled against the Crown in Civil war in England) as well as in his medical ideas. [6] Acclaimed as the English Hippocrates, he called for a rigorous return to observation of the patient using the senses and abandoning theory and pre-established medical systems. [4,6,11,13-14,18] He “first gave clinical observation its place of honor as a scientific method – one which for those who cultivate it effectively is still today a basic asset of the complete physician”. [3,19] His prescription for medical practice was simple: medicine is a craft that would progress through the observation of patients and monitoring of therapies. [4] Drawing from his experience in treating intermittent fevers (malaria), his goal was to discover specific therapies. He discovered that quinine (Peruvian or Jesuit’s bark) was effective against malaria. Traditionally, conventional remedies were meant to purge the body of the humors, but the bark seemed to cure the disease. This was an example of a first effective specific drug therapy (quinine) for a specific disease (malaria). Such discovery reinforced Sydenham’s conviction that diseases were specific entities and a disease has a specific treatment. [4,11] His reflection can be seen as a turning point in clinical thinking. [11,13] Eventually, this encouraged doctors to classify diseases, find out the difference between the disease and the person suffering from the disease, and identify the specific therapy. [11] Although he did not totally reject humoral medicine as his practice was still influenced by Hippocrates, he believed that physicians should trust his own independent reasoning based on experience. This historic development of nosology was fundamental to the evolution of diagnosis. [14]

Alongside descriptive anatomy described by Vesalius was the start of pathologic anatomy. The great anatomists of the time were now interested in pathologic or morbid anatomy. There was a positive public reaction to autopsies in order to determine the cause of death especially in cases where the cause was undetermined or in criminal cases. Herman Boerhaave (1668-1738) of Leiden was largely responsible for correlating autopsy results with what was found at the bedside. He was a great clinician and a brilliant teacher in the 18th century. Although bedside teaching began in Padua and later brought to Leiden, Boerhaave’s made bedside teaching an art form. [3,11] He made daily rounds with his students reviewing the history, inspecting the patient, and examining the urine. The students attended the autopsy of each patient who died to determine the cause of death. His postmortem examinations gave an accurate picture of his observations when his patients were still living. Such observations can be used for early diagnosis and treatment of similar cases in the future.

The next advance was the development of the discipline of pathologic anatomy by Giovanni Battista Morgagni (1682-1771). He received his doctor’s degree in Bologna, Italy in 1701. In
1715, he was appointed as the first chair in Padua, Venezia thus following the footsteps of illustrious predecessors such as Vesalius. [4,11,14,20] In Padua, he completed a monumental work on pathologic anatomy and published the important work of his life, De Sedibus et Causis Morborum per Anatomien Indagatis Libri Quinque (The Seats and Causes of Disease Investigated by Anatomy in Five Books), in 1761 at the age of 79 years. The work was a compilation of his pathologic observations from about 700 autopsy dissections. [20] Most of the patients described in his texts had been treated and ultimately dissected by himself. His pathologic anatomy stands apart from that of his predecessors in the precision of reasoning he applied to the subject.

He introduced the anatomo-clinical method, the correlation of clinical and specific organic lesions identified in the living patient by physical diagnosis and confirmed by postmortem examinations. [21] From these efforts, Morgagni reached a monumental conclusion: disease had its “seat” in an organ (localized) and that postmortem study should confirm previous clinical observation when the patient was still living. As a corollary, it elaborated a new concept: that it was the anatomical lesion in an organ (pathology) that leads to dysfunction of the anatomical mechanical device (human body), thus resulting in the expression of the disease (clinical symptoms). [20] His anatomo-clinical correlation served as a major development in the history of medicine as it helped clinicians to diagnose a disease based on history and physical examinations, analyze the prognosis of the disease, and decide the management of the disease. As Rudolf Virchow (known for Virchow’s triad) [22] stated, “He introduced the anatomical concept into medicine. His work profoundly influenced the next century of medicine”. [4]

The idea of a localized or a specific disease in an organ would not likely catch or impress practicing physicians unless improved tools of physical diagnosis can be discovered. For one reason, the vital organs, those in which disease produced significant morbidity and mortality, are...
not accessible to the physician’s senses. The heart, lungs, liver, and spleen were encased in bony boxes generally beyond the reach of inspection or palpation. Therefore, new methods are needed at the bedside to provide objective evidence, and methods that would bring the vital but inaccessible organs to contact with the physician’s senses. [5]. Percussion and auscultation will provide the needed answer to this lack of clinical methods.
REFERENCES AND NOTES


Improving Systems to Promote Research Integrity

Leilani B. Mercado-Asis, MD, PhD, MPH, MEd (DE), Ma. Lourdes P. Domingo-Maglinao, MD, MHPEd

ABSTRACT

Research integrity is manifested thru the use of honest and verifiable research methods with adherence to accepted professional codes. Recently, trustworthiness in research has been challenged by various forms of research misconduct, such as analytical flexibility, data dredging, HARKing (hypothesis after research knowledge), plagiarism, and selective and distorted reporting. Drivers of research misconduct have been identified as institutional—publication incentives to pursue a career, researcher—metric of success is publication volume, and the journal—more likely to accept papers with positive. The open access mode propelling the proliferation of predatory journals is causing a dilemma to sound research reporting. Measures were established to curtail research integrity challenges, such as study registration, open data, common reporting standards, a team of rivals, and blind analysis. This report will elaborate and provide insight into what influenced research misconduct, how it can be mitigated, and how to maintain a credible research environment.

Key words: research integrity, research misconduct, predatory journals, published protocol and data, Journal of Medicine UST

INTRODUCTION

The integrity of research is fundamental to the advancement of knowledge, the public’s support for research, and the autonomy of the academic profession [1]. Research integrity is based on the adherence to core values of objectivity, honesty, openness, fairness, accountability, and stewardship [2]. The multidimensional aspect of ethical scientific conduct involves researchers who rely on reliable results and public support. Further, the public relies on scientific progress, which could be perilous and harmful to unethical scientific activities [1].

Smith defines research misconduct as the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research or reporting results [3]. In 1981, Dr. John R. Darsee, a cardiology research fellow, admitted to falsifying data in most of his research. Prof. Eugene Braunwald, a world-renowned mentor, had ordered to withdraw all of Dr. Darsee’s work from various scientific meetings and peer-reviewed publications and had to notify the funding agency, the National Institutes of Health (NIH), of such dishonest work [4]. Because of the rampant research misconduct in the ‘70s and ‘80s, the US Congress passed the Health Research Extension Act in 1985, which was transformed and is currently known as the Office of Research Integrity (ORI) in 1992. Its primary role is to prevent research fraud, promote research integrity through oversight and education, and review institutional findings and recommendations [5]. ORI’s misconduct case summaries are published on their official website with specific administrative actions imposed on dishonest research findings [6]. Of note is the case of Dr. Ylbin Lin, a postdoctoral fellow found guilty of falsifying, fabricating, and plagiarizing six

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papers and eight manuscripts. He falsely assembled random paragraphs of text, tables, and figures from previous publications and manuscripts to improve his citation metrics. Dr. Lin agreed to exclude himself voluntarily for ten years from contracting with US government agencies [7]. Similarly, in the survey by Bouter and colleagues, the major research fraud problems in modern research have been identified, such as selective reporting, selective citing, and flaws in quality assurance and mentoring [8]. Such research dishonesty has been demonstrated even among faculty staff and scholars across all science disciplines [9,10].

Two significant contributors that influence researchers to engage in research fraud are the competitiveness and pressure to acquire grants and publication acceptance in top-tier journals [8,9]. Peer review, a gauge of journal integrity, has recently been challenged [3]. Smith contested that flaws and abuses have been described in peer-reviewing, such as the “power” of a name, bias over negative results, and objectivity [3].

Overall, preventive measures have been formulated and implemented to address this research misbehavior. Professional, legal, and peer sanctions have been applied and supported [10]. Notably, various forms of system approaches are gaining interest, from protocol registration to open data and blind review [11,12].

This report elaborates further on the researchers’ risk factors for engaging in unethical research practices and tackles published preventive measures beneficial to all concerned stakeholders.

**CHALLENGES, DRIVERS, AND ADVERSE OUTCOME OF UNETHICAL RESEARCH PRACTICES**

The performance of research activities is often placed on a specific pedestal of professional needs. The honesty and integrity of scientists are widely believed to be threatened by pressures to publish, unsupportive research environments, and other structural, sociological, and psychological factors, such as academic advancement, job security, promotion to a higher level of training, and securing of research funds [13-15].

Although monetary prizes were initially introduced as metaphors of prestige [16], recently, they are being utilized as an incentive to attract young research aspirants to sustain research interest and work or as a cash reward for exemplary research performance.
Quan and colleagues described the landscape cash-per-publication reward policy in China. The amount has been increasing for cash rewards ranging from USD30 to USD165,000 for a single publication. The majority are given to the first author, and there is no regard for author requirement, primarily when papers are published in prestigious journals (e.g., Nature, Science) [17]. The negative impact of the monetary reward policy was apparent in the bias to recognize exemplary research output published in unpopular journals, disregard of authorship rule, abuse of bibliometric indicators, and displaced academic goals [17,18]. Furthermore, Hvisendahl reported rampant academic fraud, such as plagiarism, academic dishonesty, ghostwritten papers, and fake peer review scandal, in many Chinese publications [19].

Another critical stumbling block and a significant research misconduct driver is the challenge of publishing negative results [20-24]. With the pressure of acquiring grants and publication in a high-impact journal, researchers fall prey to fabricating, falsifying, or distorting data to land in top-tier journals [20,22,24]. Fanelli reported a 22% increase from 1990 to 2007 in the frequency of publication of papers with positive results in most high-yield countries [21]. In their analysis of unpublished and published papers in social sciences, Franco and colleagues reported that those with solid results are likely to be written up, submitted, and accepted for publication. The misconception of less publication potential for studies yielding null data has led to shelving off and abandoning interesting research work [24]. The adverse outcome of this predicament could lead to situations that limit the replicability assumption of science, as replication cannot be meaningful without the potential acknowledgment of failed replications. Moreover, blocking the publication and interpretation of null results may further extinguish questionable researcher practices [22].

Recently, heightened publications of papers with positive results have created conspicuous paranoia in the research community [11,25-28]. Researchers engage in unethical research practices with the culture of publish-or-perish and similar drivers mentioned above to propel professional growth. HARKing (Hypothesizing After the Results are Known), analytic flexibility, and data dredging are interrelated where post hoc design and data are manipulated to achieve significance and hypotheses fitting with selective writing and reporting. [11,25-28]. Such approaches dramatically increase and understate the risk of false positives, most severe in studies with small samples and imprecise variables [29].

MEASURES TO PROMOTE MEDICAL RESEARCH INTEGRITY

Research reproducibility refers to the ability of a researcher to duplicate the results of a prior study using the same materials used by the original investigator to yield the same results [30-32]. As per the discussion of Ioannidis and Goodman and colleagues, several ill research practices of data manipulation can be checked and addressed by towing somebody else’s work (meta-research), such as the complexity of design and measurement tools, statistical criteria, heterogeneity of experimental results, incentives, reporting, and claim for probable false conclusion [30,31]. Fallacious research practice has also affected the validity of related concepts like Bayesian statistics. Johnson reported in Bayesian hypothesis testing that the root cause of non-reproducibility has been traced to the conduct of significance tests at inappropriately high levels of significance. Modifications of common standards of evidence are proposed to reduce the rate of non-reproducibility of scientific research by a factor of 5 or greater [23,32].

The tripartite (administration-researcher-journal) drivers of research misconduct rest heavily on the role of the journal itself. Recently, there is the mushrooming of journal publishing companies brought about by the ease of publication platform and has become attractive because of expanded worldwide exposure using the Open Access mode [33-35]. Such phenomenon spiraled, and Jeffrey Beall made a list and implicated the predatory nature of some journals and publishers, apparently victimizing eager researchers to propel their stagnant professional and academic careers [33]. These journals attract submission through aggressive emailing and advertising with high acceptance rates at the expense of proper peer-review, and therefore, the quality of submitted papers is questionable [33,34]. Recently, Krawczyk and Kulczycki have questioned Beall’s list, generally equating open access to being predatory [35]. Their study has shown that the major themes by which Beall has characterized predatory journals are also widely present in non-Beall publications.
The overgeneralization of the flaws of some open access journals to the entire open access movement has led to unjustified prejudices among the academic community toward open access [35]. Nonetheless, Richtig and his group have proposed an algorithm that can be utilized to discriminate between open-access journals that are potentially suitable for article submission versus predatory journals, as shown in Figure 1 [34].

The ultimate concern of unethical research is putting public health in danger. A systematic approach to research integrity must be observed and strictly followed [11,12,36,37]. Optimal interventions need to understand and harness the motives of various stakeholders who operate in scientific research and who differ on the extent to which they are interested in promoting publishable, fundable, translatable, or profitable results. These approaches are summarized in Figure 2. The specific interventions address specific issues of research misconduct, such as vague protocol, copious data collection, flexible data analysis, and distorted reporting. Proposed solutions are study registration, published protocol, open data, the team of rivals, registered reports, and blind analysis [11,37].

Whether regarded as the driver or victim, the researcher is amid research misconduct pandemonium [38-40]. Command of the English language seems to be a significant factor in committing plagiarism. In two reports involving Chinese researchers, plagiarism dominated the results of the interview as a determinant for unethical research practice [38,39]. Interestingly, cultural traits have also been implicated in intertwining the perception of research dishonesty [39]. Satalkar and Shaw delved into factors and circumstances that shape researchers’ understanding of research integrity. Their study results have shown that among researchers, early education, moral values inculcated by the family, and participation in team sports were the earliest influences on notions of honesty, integrity, and fairness [40]. Notably, researchers’ personality traits, including the degree of ambition and internal moral compass, were perceived as critical in determining the importance they attributed to conducting research with high ethical standards [40]. Nonetheless, respondents were agreeable that education and training on research integrity and more precise working definitions and guidelines are critical to prevent ill and unacceptable research practices [38,39].
Lastly, the researchers’ active participation in promoting research integrity has been perceived to be equally important as their work impacting the issue [12]. During the 6th World Conference on Research Integrity (WCRI), researchers’ who commit to robust, rigorous, and transparent practices were recognized and depicted through the Hong Kong Principles (HKPs) (Figure 3). Five principles were introduced, such as responsible research practices, transparent reporting, open science (open research), valuing a diversity of types of research, and recognizing all contributions to research and scholarly activity. The principles target exploratory and confirmatory research and analysis, focusing on rewarding behaviors that strengthen research integrity and avoidance of harmful research practices. If implemented, the HKPs could play a critical role in researchers’ evidence-based assessments, put research rigor at the heart of assessment, and open up research to the broader benefit of society [12].

CONCLUSION AND INSIGHTS

Players in the research community—the institution, mentors, researchers, and the journal—have ruffled the integrity of the research practice influenced by pressure to reach and sustain a certain level of prestige, recognition, and promotion. Data manipulation from design to publication significantly threatened the end recipient of research—the public. Researchers’ cultural backgrounds and personal traits have also been shown to influence unethical research practices. System approaches to mitigate research malpractice and promote research integrity have been evolving to target directly the core of the problem—the researchers!
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Challenges and Experiences of Young Medical Specialists in Establishing Private Clinical Practice

Flordeluna Z. Mesina, MD,¹ Ma. Theresa M. Collante, MD²

ABSTRACT

Background: The field of medicine is constantly changing. Notable changes occur in the patterns of clinical practice, business of medicine, shift in demographics/generation of the health care workforce, emergence of sub-specialization; and advances in research and technology. These changes can affect the way young physicians establish their practice and this is an area not addressed by the medical education and training.

Purpose: There is little data in the literature regarding the experience of young physicians in establishing clinical practice. This study was undertaken to answer the central question: Among physicians in the field of Internal Medicine with or without subspecialty who graduated from training in 2013 to 2018, what were the issues and challenges that they faced as they established their clinical practice in the urban or mixed setting?

Methodology: Qualitative research-case study; Key informant interview was conducted among junior Internal Medicine consultants who satisfied the inclusion criteria. Data analysis used thematic analysis consisting of reading, writing notes, describing, and classifying transcripts according to categories and themes.

Results: After a comprehensive analysis of narratives, five emergent themes surfaced: “Tough Days” (Period of figuring out the system; Need for Self-introduction; Few patients and Feelings of frustration and depression); “Torn and Divided” (Unpredictable work schedule and workload; Lack of time for issues outside career); “Temporary Debt” (Large start-up cost; Expensive maintenance); “Difficult but Tolerable” (Family support; Call-a-colleague; Debt of gratitude to mentors) and lastly “Dreams and To-do’s”.

Conclusions: Our respondents have experienced substantial challenges in starting clinical practice. Learning the ways of the healthcare business, effectively promoting oneself to the community, dealing with the emotional turmoil of having few patients, coming up with a strategic schedule and area of practice, and looking for funds and paying it back, were the challenges and experiences of these young medical specialists as they establish their careers in the urban and/or rural setting.

Key words: clinical practice, challenges, start-up, establishing practice

INTRODUCTION

Rapid development in the medical field and the health care system at present pose unique challenges to young physicians starting their medical careers. The patterns of practice are different from the olden days
where doctors treat all types of patients. In the urban setting, there is also scarcity of the old-fashioned doctor who will sit and chat leisurely with patients, get to know their whole family, and make house calls. Health care in the 21st century is strongly influenced by technology, social media, sub-specialization, and evidence-based medicine.[1]

In the present health care setting, change is notable in the following areas: a) patterns of practice; b) business of medicine; c) shift in demographics and generation of the health care workforce; d) emergence of sub-specialization; and e) advances in research and technology.[1] With regards to patterns of practice, in the past, physicians were largely self-employed or part of small practice, however, today’s physicians are employed by large health care organizations, as well as integrated delivery systems.[2]

A newly graduate physician needs to choose from the different models of practice. The traditional medical practice, also known as a solo practice, is a practice without partners or employment affiliations with other practice organizations. Group practice is typically divided into single-specialty or multispecialty practice where doctors have legal partnership in managing patients, income, and expenses. And lastly, employed physician practice is where one is hired by a health system, government agency, or other business without the opportunity to become a partner. [2]. Aside from the type of practice, deciding on the location and setting of practice is another challenge. Previous studies stated the following factors considered by physicians in choosing between rural and urban settings: a) family, especially spousal support, b) access to continuing professional education opportunities; and c) ability to connect with other specialists and modern facilities. [3] In our setting, a study by Carandang and colleagues showed that experiential and non-experiential factors such as personal preference for certain status, lifestyles, geographical areas, and work and leisure characteristics seemed to have the most influence on the choice of medical practice.[4]

The business of medicine has changed how physicians are paid. As there is continuous shift in the demographics and generation of the health care workforce, more and more will seek adequate professional fees or salaried positions with benefits and working conditions that permit a work-life balance. The present is also the age of sub-sub-specialization, wherein there is a specialist in just about any body part. Barondness et al. have raised concern about the splintering effects of advanced sub-specialization and its potential to increase the cost of health care delivery.[5] There is little doubt that the trend in medical education and training is towards refinement of subspeciality and will be the mainstay of medicine and surgery practice. The fuel to the above changes, is the tremendous advancement in research and technology in the 21st century. Despite all these changes, the goals of establishing a clinical practice remain the same. Joson pointed out two goals of establishing a private practice in the Philippines—to earn a living in the Philippines, and to contribute to the health development of a community in the Philippines. Furthermore, the medical practitioner should be satisfied, happy, and healthy, earning enough to be a healthy person and to enjoy and sustain a comfortable living with a frugal lifestyle in the Philippines. He should be earning enough and contributing to the health development in a community in the Philippines and is healthy in terms of sustaining physical, mental, and social well-being as long as possible or at least up to the average lifespan of a Filipino living in the Philippines.[6] Achieving the above-mentioned goals may prove to be difficult and may require tremendous resources, including effort, time, and capital, especially for a physician starting a private practice because the resources come solely from the physician himself.

Internal medicine is a broad field with several subspecialties to choose from, a young physician who graduates with more than ten years of study and training would be eager to go out of the real world. Unfortunately, during formal medical education or training, physicians receive little to no instructions on how to set up and manage a medical practice, making the process of starting a medical practice a daunting task. There are also very few publications that discuss the challenges dealt with by physicians starting their practice and there are no guidelines as to how to go about it. At present, this area of study is very dynamic in terms of knowledge and discoveries, and is exponentially growing. The young internist then is faced with this unique dynamism and the aforementioned changes in health care. These interactions with his working environment, his support system, and the practice logistics, in turn affects the way he establishes his
clinical practice, and therefore, the challenges and issues he encounters along the way.

This study aims to determine the challenges and experiences of young physicians who graduated from Internal medicine training from 2013-2018 with regards to establishing their private clinical practice in the urban or mixed setting. It also aims to determine the capital and recurrent costs of establishing private practice.

**CONCEPTUAL FRAMEWORK**

A physician’s medical practice is influenced by three overlapping main factors such as:

1. Support system, composed of:
   a. Family
   b. Friends
   c. Peers
   d. Mentors

2. Working environment, composed of:
   a. Specialization
   b. Nature of practice (private/government/mixed)
   c. Availability of HMOs/healthcare insurance
   d. Place of practice (urban/suburban)

3. Logistics of setting up a medical practice, composed of:
   a. Distance of residence to work
   b. Capital availability (space, finances, equipment, manpower) with the ultimate goal of a satisfying career and a comfortable lifestyle.

**METHODOLOGY**

**Study Design**

This is a qualitative research, a case study type. The participants were junior internal medicine consultants with or without subspecialty and the setting was the University and Training Hospital.

**Sample/Case Selection**

Participants were selected by convenience sampling from the junior consultants who graduated from 2013-2018 from the Department of Medicine of a university training hospital. After initial invitation to 15 medical doctors (MD), only 10 junior internal medicine subspecialty consultants gave consent and participated in our study. Data saturation was achieved with 10 MD interviews hence further recruitment was not done.

**Data Collection**

Two sources of information were utilized. The primary data collection method was participant interview. We conducted an individual, semi-structured, recorded, and transcribed interview with each participant. All interviews were arranged to accommodate the participants’ schedules and were conducted in locations conducive and convenient for the participant. The researchers used a digital phone recorder with adequate memory and clear reception. Each interview was saved in a digital folder in two locations providing duplicate sources of original material in case a back-up was needed.

The second source of information was an interview protocol or interview guide which was designed and created by the researchers in accordance with the objectives of the study. This form was preliminarily distributed to the participants which they answered prior to the interview. Its purpose was to give an itemized question on their experience in setting up a medical practice and also to give them a background
on the study and basic flow of the interview. It also includes demographic data in the first part of the questionnaire.

Data Analysis
Transcripts from the recorded in-depth semi-structured interviews were employed as the main focus of the data analysis. The interview centered on twelve questions about establishing their clinical practice.

The participants were given ample time to recall the details of their experiences in establishing their clinical practice by providing the preliminary questionnaire weeks ahead of their actual interview. They brought the questionnaire to the interview and used their preliminary answers as their guide. This established the trustworthiness and credibility of the data gathered.

Participant’s names for this qualitative case study were coded and replaced. Data for this study were analyzed manually through categorical aggregation. The audio-recorded interviews were transcribed by the researchers. The transcriptions were read and re-read several times. Notes were written and important phrases were highlighted. The researchers then started the process of coding by aggregating text with the same thought process and then classifying them into categories and themes.

Ethical Considerations
This study was reviewed and approved by the institution’s Research Ethics Committee (REC) prior to its commencement. The name and identity of subjects were kept confidential. Informed consent forms were signed by each participant prior to the conduct of the study. The researchers financed the study.

RESULTS
The physicians were 35 to 40 years old; 6 (60%) females and 4 (40%) males, who recently started private practice, seeing both general Internal Medicine cases and their subspecialty cases, with at least two clinics for two to five years at the time of interview. Three (3) were rheumatologists; 3 cardiologists; 2 Hematologists/Oncologists; 1 endocrinologist, and 1 nephrologist (Table 1). The first year of practice was generally described as the most difficult because it was a time of adjustment in schedule and responsibilities from a trainee who works in a team to a private practitioner.

The meta-themes identified during the interviews were 1) Tough Days; 2) Torn and Divided; 3) Tremendous Debt; 4) Difficult but Tolerable and 5) Dreams and To-dos.

TOUGH DAYS

Period of figuring out the system
The subjects’ application to hospitals was not as easy as they expected it to be. The long list of requirements was one difficulty, in which tax papers were included. One subject specifically mentioned that he had to look for a “good accountant” because he did not have enough knowledge of the country’s

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Legend: IM, Internal Medicine; Rheuma, Rheumatology; Cardio, Cardiology; HO, Hematologist/Oncologist; Gov’t, government; NCR, National Capital Region
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Challenges and Experiences of Young Medical Specialists

Some of them had an immediate relative who is a physician who served as their guide. Majority of the participants did not have a family member who had first-hand experience of establishing a clinical practice, hence they needed to figure out everything on their own.

Self-introduction

By establishing their medical career in hospitals or areas where there were subspecialist internists practicing already, particularly in highly urbanized areas, the subjects felt that they were perceived as “competitors.” It was a challenge for them to practice in an area where they had to “share the hospital with those who came before them.” Most of the subjects had to seek the approval of senior consultants before they were allowed to hold clinic in a hospital.

In areas where there were no or less subspecialist, promoting one’s self and the subspecialty is an important issue. “Selling your practice” to people who are not aware of what you are “selling” is awkward and embarrassing.

Few subspecialty patients/cases

The participants handled more Internal Medicine cases than their subspecialty cases, particularly in the first one to two years of their medical practice. It was estimated by the subjects as 75 to 90% Internal Medicine cases and 10% to 25% subspecialty cases. While seeing Internal Medicine cases is mandatory and inevitable in the provinces, being decked or given Internal Medicine cases in the city is considered a “blessing.” The subspecialty cases come as occasional referrals from friends and mentors practicing in the same and nearby hospitals, which gradually increased in number during the second and third year of practice.

Feelings of frustration and depression

The participants stated that they were eager to work but there were none or very few patients seeking consult. Sitting in their clinics with nothing to do but wait for patients was “frustrating.” There was a point in their work week when they thought of not reporting at the clinic for that day because they were not expecting patients to come anyway. Sometimes, friends or relatives visit their clinic for check-ups, however, they will not charge a professional fee for it and go home at the end of the day knowing that they “spent more than what they earned,” and that their secretaries and drivers earned more than they did, was depressing.

TORN AND DIVIDED

Unpredictable work schedule and workload

The participants took on several clinics during their first one to two years of practice, as well as several hospitals to visit, to cover as much area of practice as possible and to generate as much income as they can. This led to occasions when there were too many patients to take care of in a week, but there were mostly none in the other weeks. The Schedule was difficult to manage for the participants whose clinics are situated far away from each other, especially if one clinic is in the nearby province/s and the rest are in the city. And even if the clinics are all in the city, getting to and from one clinic to another takes so much time because traffic is often slow. One participant said, “Pag nag-overtime ako sa isang clinic, sigurado late ako sa kasunod.” (“When I work overtime at a clinic, I am sure I am late for the next one.”—P2)

Lack of time for issues outside career

Holding a clinic in some hospitals may require the physician to be involved in administrative and teaching tasks. This additional work further increases the time spent on clinical practice which will then decrease the time that can be spent being with family, taking care of children and parents, being with friends or colleagues, running the home, monitoring and improving the family business if not starting one, teaching in a university, or taking another degree.

TREMENDOUS DEBT

Large startup cost

It was not enough to comply with the hospital requirements for the participants to be able to start their medical practice. They were required to pay
stocks and/or “right to practice” in at least one of the hospitals they applied to, in the range of Php 500,000 to Php 1.2 Million, either as a one-time payment or in installments after a 20 to 30% down payment. They also had to contribute to the construction expenses for the clinic, and paid around P50,000 prior to using the clinic (Table 2). Their savings at that time was minimal because they had minimal salaries during the residency and/or fellowship training that they just completed. There are hospitals that do not need stocks to start practice but usually they would require 1 to 5 years visiting status prior to approval of clinic.

From another perspective, let us not forget the capital cost which includes the medical school expenses as well. All of our respondents were graduates of private medical schools, where tuition fees range from P100,000 to P200,000 per annum.

**Expensive maintenance**

Monthly bills were composed of monthly rent, salaries of secretaries and/or drivers, meals for drivers, transportation cost which includes fuel and fees, or commute fare, plus installments for the stocks and “right to practice.” Monthly expenses ranged from Php 20,000 to Php 50,000 (Table 2). The subjects also mentioned that the registration fees of conferences they are required to attend are “additional burden.”

**DIFFICULT BUT TOLERABLE**

The participants’ decisions regarding their clinical practice were made mostly by themselves, without consultation, but in careful consideration of their responsibilities to their respective families, particularly those who have children. Making these decisions was a challenge in itself, but was tolerable because of the support from friends and colleagues, mentors, and family.

**Going home to a family**

The support of a spouse and/or parents were fundamental in “surviving” the early years of their practice. Their family and goals for the family were major factors on their decision where to establish their clinics. Some of them emphasized that their schedule worked around their children’s schedules since they have toddlers and pre-school children. One went on saying, “Nakakawala ng pagod yung makita ko yung mga anak ko, kaya madalas nagmamadali akong umuwi para maabutan ko na gising pa sila.” (“There is a feeling of relief to see my children, so I often hurry home to catch them awake.”-P3) Aside

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**Table 2: Capital and Recurrent Costs (mean) of starting and maintaining Clinical Practice**

<table>
<thead>
<tr>
<th>CAPITAL COST</th>
<th>Item/Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic 1 (private hospital with stocks)</td>
<td>Shares of Stocks</td>
<td>Php 500,000 to 1M</td>
</tr>
<tr>
<td>Clinic 1 interiors</td>
<td>Furnitures and fixtures</td>
<td>Php 250,000 to 750,000</td>
</tr>
<tr>
<td>Clinic 1</td>
<td>Lease for 25 years</td>
<td>Php 250,000</td>
</tr>
<tr>
<td>Clinic 2 (No stocks required)</td>
<td>Registration fee</td>
<td>Php 10,000</td>
</tr>
<tr>
<td>BIR</td>
<td>Registration fee</td>
<td>Php 5,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>Php 1 to 2 Million</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RECURRENT COST</th>
<th>Item/Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic 1</td>
<td>Monthly rental</td>
<td>Php 2,500 to 5,000</td>
</tr>
<tr>
<td>Clinic 2</td>
<td>Monthly rental</td>
<td>Php 2,500 to 5,000</td>
</tr>
<tr>
<td>Secretaries (2)</td>
<td>Monthly utilities</td>
<td>Php 3,000</td>
</tr>
<tr>
<td>Clinic operations (2 clinics)</td>
<td>Monthly</td>
<td>Php 10,000</td>
</tr>
<tr>
<td>Transportation allowance</td>
<td>Monthly</td>
<td>Php 2,000 to 5,000</td>
</tr>
<tr>
<td>Accountant</td>
<td>Monthly/quarterly</td>
<td>Php 25,000 to 30,000 per month</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Challenges and Experiences of Young Medical Specialists

from moral and emotional support, additionally, the majority of the subjects were provided their start-up funds by their parents.

Call-a-colleague
Friends and colleagues were sources of patient referrals. Most of the time their residency batchmates became their network of referrals. They were also the go-to persons with regards to questions on how to go about the application process in hospitals, taxation, and other requirements. In times of difficult cases, at least one colleague is ready to help. Active networking and ease of referral to other subspecialties are advantages of working in subspecialty-focused institutions.

Debt of gratitude to mentors
According to all the participants, they had at least one mentor who was instrumental in paving the way for them to start in a reputable institution. Their recommendations were valuable and vital. Most of them also got their first patients from referrals of mentors. To be associated with a mentor is a blessing for them, because they would often “cover” and see their patients in their mentors’ absence. This would help them to be introduced in the circle of referral. It should be noted that most of our respondents are not a daughter or son of a doctor, so their mentor served as their second parent in guiding them in their medical careers. Mentors also served as role models to emulate their career path.

DREAMS AND “TO-DO’S”
After surviving the arduous first few years of clinical practice as a young medical specialist, the participants did not forget to bring up their aspirations. One would like to open one or two more clinics. Some would like to venture on non-medical business. While the other one would like to close one of her clinics with the prospect of taking graduate studies. Postgraduate or master’s studies were consistently mentioned in their future plans. Majority of them plan to start teaching in the medical school soon.

DISCUSSION
In this qualitative study, we have shown the experiences and challenges of starting a private practice in an urban setting. Clinical practice as defined by the Physician’s Act of 2020 can be divided into general medical practice and specialty medical practice.[7] Medical practice is also of different types namely: solo private practice, group practice, or being a part of a health maintenance organization (HMO) practice, and government practice. In the Philippines, a specialist can choose to combine these types as long as his or her time permits. Mixed practice was perceived to offer more opportunities in terms of patient care, both in quantity and quality, but entails more medical responsibility, more time spent in travel, and higher operating costs. Mixed practice may also broaden the geographic coverage of the subspecialty with limited manpower.

Most of our participants described their experiences in establishing a solo private practice, which means the responsibility and full control of operation is theirs alone. There are certain advantages of solo private practice such as 1) being in control of everything; 2) decision-making is straightforward and fast; 3) lower start-up cost. While the drawbacks are as follows: 1) no work, no pay; 2) higher chances of exhaustion; 3) less control of work-life balance. [8-9] This is still the predominant type of medical practice in the country. Our participants’ main challenge in establishing solo private practice comes from the unfamiliarity of the sheltered-newly graduated medical specialist in the business of medicine. And this is not surprising, since their training was focused on the art and science of their specialty or subspecialty while lacking on the business aspect of medicine. A study was conducted with senior medical students regarding their interest and knowledge on business and financial literacy, and a pre-test and post-test questionnaire after completing an elective 20-hour business course was done. Results showed that students have a substantial interest in the course but very limited initial knowledge and competence. At course conclusion, there was a significant improvement in competence in financial management and fundamental knowledge of business aspect of medicine.[10] Most of our
participants’ knowledge in business were informally passed down from their senior consultants and/or mentors. Admittedly, they had difficulty in figuring out the system and the process, especially taxation. This is not only seen in the medical profession but also in the other allied health programs including veterinary medicine and dentistry. [11-12] Whether or not it should be incorporated into the medical curriculum as a regular subject or elective rotation is something the medical educators should look into the future.

Majority of our participants are subspecialists and practices in the National Capital Region, they described their experiences and challenges in practicing in a highly urbanized and subspecialty focused centers. Since most subspecialty training programs are located in the urban areas, a newly graduate subspecialists tend to start their practice in the city and/or in the nearby areas. According to the Philippine Statistics Authority, as of 2015, the local government in the country consists of 145 cities, of which 33 are highly urbanized cities, and five are independent component cities. These are where specialty training hospitals and medical centers are concentrated.[13] The scope of medical practice in rural areas is diverse. Family physicians in the US, and most likely subspecialists, may have more opportunities to treat patients beyond their specialty, have broader hospital privileges, and make house calls. They may also have more clinical independence in their practice. On the other hand, physicians practicing in urban areas may have more access to colleagues with different subspecialties, as well as sophisticated medical facilities.[14] Most cities have large conglomerate hospital systems with sites around the catchment area, which adds flexibility in terms of traveling from one area to another. The downside is possible compartmentalization of practice and tight competition as more subspecialists tend to cluster in urban areas.

LIMITATIONS

This case study is limited only to one specialty (Internal Medicine) and its subspecialties. There is a limited application to the rural setting since we did not include physicians with exclusive rural practice.

CONCLUSION

Learning the ways of the healthcare business, effectively promoting oneself to the community, dealing with the emotional turmoil of having few patients, coming up with a strategic schedule and area of practice, looking for funds and paying it back, and working on dreams outside of their clinical practice were the challenges and issues faced by young physicians as they establish their careers as specialists in the urban and/or rural setting.

Conflict of Interest

The authors declare no conflict of interest.
REFERENCES


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APPENDIX 1

<table>
<thead>
<tr>
<th>Themes</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOUGH DAYS</td>
<td>“Noong una hindi ko alam kung saan mag-umpisa. Pagkatapos kong mag-graduate sa fellowship, officially unemployed. Nagtaonan-taon ako sa mga seniors at mga kaibigan kasi wala naman akong kamag-anak na doctor.” (&quot;At first I didn't know where to start. After I graduated fellowship, I am officially unemployed. I kept asking seniors and doctor friends for advise because I don't have a relative who is a doctor.&quot;) (P3)</td>
</tr>
<tr>
<td></td>
<td>“Since 3 of my hospitals did not have an established residency or fellowship training program, it took a while to adjust to a different system like answering calls from GPs or in-house physicians, answering in-patient referrals and communicating through the nurses, and ordering insulin drip/therapy which some nurses didn’t fully understand how to do it.” (P5)</td>
</tr>
<tr>
<td>Self-introduction</td>
<td>“Sa isang hospital na inapplayan ko nahirapan ako magpakilala kasi very close knit ang mga doctors na doon nag-training. It's awkward to start conversations and introduce myself every time.” (&quot;In a hospital where I applied, it was difficult for me to introduce myself because the doctors who trained there were very close. It's awkward to start conversations and introduce myself every time.&quot;) (P6)</td>
</tr>
<tr>
<td></td>
<td>“It was a challenge at the start to make myself known to other doctors practicing in the same hospital in order to gain referrals. It took time to establish relationships, nag-aattend ako lagi ng meetings/conferences for them to know me.” (&quot;It was a challenge at the start to make myself known to other doctors practicing in the same hospital in order to gain referrals. It took time to establish relationships, I always attend meetings/conferences for them to know me.&quot;) (P9)</td>
</tr>
<tr>
<td></td>
<td>“Ok din na natanggap ako kung saan ako nagresidency/fellowship, at least kilala na pero nakaka-ilang kapag nirereferan ka ng mga senior consultants. Nakakatuwang at nakaka-kaba,” (&quot;It's also ok that I was accepted where I did residency/fellowship, at least I'm known but I get anxious and excited when senior consultants refer to me.&quot;) (P8)</td>
</tr>
<tr>
<td>Few subspecialty patients/cases</td>
<td>“I started investing on a private hospital, shortly after it opened in April of the same year. As a newly opened hospital, there were few patients going to the outpatient clinics and being admitted or referred, tiyaga lang sa paghihintay.” (&quot;I started investing on a private hospital, shortly after it opened in April of the same year. As a newly opened hospital, there were few patients going to the clinics or being admitted or referred, I just patiently waited.&quot;) (P5)</td>
</tr>
<tr>
<td></td>
<td>“Kahit may subspecialty ako, nag sign-up din ako na tumingin ng IM cases kasi confident naman ako mag-manage, buti na lang kasi yun ang pinaka-source of income ko sa simula.” (&quot;Even though I have a subspecialty, I also signed up to look at IM cases because I'm confident to manage them, it's a good decision because that's my main source of income in the beginning.&quot;) (P7)</td>
</tr>
<tr>
<td>Feelings of Frustration and depression</td>
<td>“Minsan nakakalungkot kasi ang layo ng byahe at traffic tapos wala palang dadating na pasyente. Nagdadala ako ng ibang gagawin para malibang ako.” (&quot;Sometimes it's sad because the travel distance is far and there are no patients coming. I bring other things to do to use my time wisely.&quot;) (P3)</td>
</tr>
<tr>
<td></td>
<td>“Kaya ako nagdesisyon magmasterals kasi nasasayang ako sa oras na mag-hintay lang ng pasyente, kesa malungkot ako, inilaan ko na lang ang panahon ko sa ibang bagay. Ginawa ko munang by appointment or napapamessage ako sa secretary pag may pasyente.” (&quot;So I decided to become masters so as not to waste my time just waiting for patients...I just devoted my time to other things. What I did first was by appointment or my secretary can message me when there is a patient.&quot;) (P1)</td>
</tr>
</tbody>
</table>
Table 1. Participants’ Selected Interview Quotes (continued)

**TORN AND DIVIDED**

Unpredictable work schedule and work load

“Marami akong inapplyan, I printed so many CVs and distributed them. Natanggap nman, kaya may days na busy talaga, meron nman walang pasyente!” (“I applied in a lot of hospitals/clinics/HMOs, I printed so many CVs and distributed them. I was accepted in most, so there are days that are really busy. There are days with none.”) (P4)

“Syempre kapag bago ka, tanggap lang ng tanggap. Hindi pa ako marunong humindi noon. Minsan na-ooverwhelm na ako.” (“Of course when you’re new, it’s just accept everything they assigned to me. I didn’t know how to say no before...sometimes Im overwhelmed.”) (P4)

Lack of time for issues outside of career

“Akala ko kapag consultant na marami ng time sa family, pero pag nagsisimula, di ka pa pwede masyado magbakasyon. Iniisip ko pag lagi ka nandyan, ikaw lagi ang tatawagin.” (“I thought when you become a consultant you will have a lot of time with your family, but when I started, I can’t take much vacation. I think if you are always there, you will always be called for referrals.”) (P10)

**TREMENDOUS DEBT**

Large start-up cost

“I had to pay an expensive fee corresponding to the privilege to practice in two of my private hospitals.” (“I had to pay an expensive fee corresponding to the privilege to practice in two of my private hospitals.”) (P2)

“My parents lent me the money to pay the so-called stocks which would give me the privilege to practice in the hospitals. They also helped me to renovate my clinic and until now they are still partially helping me as I establish my practice.” (P5)

**DIFFICULT BUT TOLERABLE**

Going home to a family

“One colleague of mine encouraged me to apply to a hospital where she was currently practicing because the said hospital still needed my expertise.” (P5)

“Because I am single, I still stay with my family and my siblings with nephews. It is important to have solid emotional support especially when there is a toxic patient or the patient dies... they keep my sanity.” (P7)

Call-a-colleague

Debt of gratitude to mentors

“Sobrang laking tulong ng mga mentors ko, they constantly supported me especially during the start of practice.” Malaking bagay yung magpaparelieve sila. Kung may tanong ka lagi silang nandyan. (“My mentors were very helpful, they constantly supported me especially during the start of practice. It’s a big thing that they will relieve. If you have a question they are always there.”) (P1)

“They recruited me at medical school. Sila ang ultimate role model ko.” (“They recruited me at medical school. They are my ultimate role model.”) (P8)
The Impact of Online Learning In The Internal Medicine Rotation Among Medical Clerks During The Covid 19 Pandemic and Lockdown

Melvin Remulla Marcial, MD, MHPEd

ABSTRACT

Background: The impact of online learning during internal medicine rotation among graduating medical students was evaluated during COVID-19 pandemic.

Objectives: The study aimed to gauge acceptability of a self-directed learning, recognize frustrations, identify coping mechanisms, assess rate of learning, evaluate study habits and appraise level of readiness in handling actual patients later in practice among graduating medical clerks.

Methodology: An ambispective cohort design study involving both retrospective and prospective follow-up of respondents belonging to the medical clerkship program of the University of Santo Tomas, Faculty of Medicine and Surgery (UST-FMS). The retrospective component involved blended learners with clinical experience (Group 1). The prospective component included online learner with clinical experience (Group 2) and online learner without clinical experience.

Results: Group 1 showed that they favor pure traditional learning over pure online learning in contrast to the other 2 groups which rated acceptability of online learning high. All groups had high levels of frustration with their inability to experience actual patient exposure, had moderate to high level of coping mechanisms, and rated high the traditional learning and blended learning methodologies. In contrary, all groups rated low to moderate contributions of online learning to their learning. Group 3 had a significantly higher mean overall readiness score compared to the two other groups.

Conclusion: The study showed the different levels of impact of online learning to the different population of medical clerks in terms of its acceptability as an alternative way of learning. Actual patient exposure is of main concern while different coping mechanisms maximize knowledge acquisition.

Key words: Online learning, self-directed, COVID-19 pandemic, Medical clerks

INTRODUCTION

The rotation in Internal Medicine for graduating medical clerks is the most anticipated part of their learning journey prior to their graduation. This rite of passage draws ambivalent feelings as they foresee the hardship yet rewarding clinical experience. Learning and teaching activities consist of actual patient exposure in the ambulatory care services, various specialty wards, in intensive care and emergency units of the University of Santo Tomas Hospital (USTH). They have the mandatory 24 hour duty every 3 days as they rotate to the
different subspecialties for at least a week. They are under the direct supervision of the Consultants of the Department of Medicine both from UST-FMS and UST Hospital assisted by the Medical Residents and Fellow-in-Training of different subspecialties. For more face to face patient encounters, the medical clerks are likewise deployed to two government hospitals, namely San Lazaro Hospital and Jose Reyes Memorial Hospital. In between their numerous ward works and patient care, they are required to have case presentations of actual patients seen and attend conferences in between schedules with consultants as moderator/facilitators.

Unfortunately, the coronavirus disease (COVID-19) pandemic unfolded that generated havoc worldwide leading to the closure of schools and universities.\cite{1-3} The Philippines, not being spared by this tragedy, an enhanced community quarantine (ECQ) or lockdown was enforced by the government closing all the schools and universities as well. Thus, the medical clerks were not allowed to report to the hospital for their ward duties and activities for safety reasons. Instead, the traditional learning methods of actual patient encounters in the hospital and face to face learning/teaching activities were put into a halt. This situation lead to a 360 degree turn in the manner by which teaching and learning activities were delivered to the medical clerks, from face to face instruction to online learning. Under time constraint, realignment of the course plan, rethinking teaching and learning activities, and review of assessment methods were done immediately and realigned to suit online learning. The UST-FMS is blessed with the infrastructure (the e learning platform Blackboard) that was secured by the University of Santo Tomas years prior to the COVID pandemic though the UST Educational Technology Center (UST EdTech) that tirelessly provides technical support whenever needed, to which the entire faculty and students are grateful of. The maximal use of the said virtual platform was encouraged and prioritized by the UST-FMS’s Dean, Assistant Dean and Clinical Program Head.

However, the anxiety of both the medical clerks and the consultants were evident from the very start with different possible sources. Internet connectivity created major problems in the actualization of online learning during the lockdown. For the facilitators, it is more of digital literacy and the familiarity with the features of the virtual platform that worried them. For the medical clerks, their frustration of not having actual patient encounters prevailed as well as the manner by which their final oral examination exercise (oral revalida) will be carried out, that is, via online. The impact of this online learning to these graduating medical clerks would be difficult to determine unless a formal investigation is carried out.

**REVIEW OF LITERATURE**

“Electronic (e) or online learning can be defined as the use of electronic technology and media to deliver, support and enhance both learning and teaching and involves communication between learners and teachers utilizing online content”. \cite{4}

There has never been a greater opportune time to reinforce and realize the important position of online learning in medical education in this trying times. Learning delivery through greater accessibility during the lockdown was seen by all sectors as a palpable advantage of online learning over traditional methods. Accessibility refers to the user’s ability to find what is needed, when it is needed. \cite{5} The availability of digital learning objects at all times is crucial to one’s learning. Digital learning objects pertains to any learning materials compiled together in a meaningful way geared towards a specific learning outcome.\cite{6,7} Case-based learning, simulations, modules, or complete courses are examples of these digital learning objects that are organized to meet the requisites of a specified curriculum. The manner in which the educational content is delivered can either be synchronous or asynchronous. Synchronous delivery is real-time and facilitator-led wherein all students collaborate at the same time in a virtual platform. These includes webinars, internet chat forums, and instant messaging. Asynchronous delivery is not in real time wherein the instructor and students communicate thru emails, blogs and discussion boards. Thus, in this case, the content, sequence and pacing of one’s learning are all self-directed.\cite{5}

In online learning, unlike a plenary lecture given to different classes, has an advantage of standardization of content. Since on line learning is student-centered, it is flexible and addresses the different learning style idiosyncrasies of every students, thus it is personalized. This is in contrast to a traditional style of learning where all students, regardless of their different learning capacity and
learning style, is subjected to a one size fit all system of teaching. Medical students engaged in online learning have been assessed to have better retention rates and content utilization resulting to better knowledge, skills, and attitudes as an outcome.[8]

However, the success of online line learning in creating an impact to the medical students will be realized only upon properly addressing the key barriers to its implementation. These includes time constraints, poor digital literacy, inadequate infrastructure, weak institutional strategies and support and negative attitudes of all stakeholders.[9]

Digital literacy has been defined as the ability to use digital technology, communication tools or networks to locate, evaluate, use and create information.[10] The digital literacy of all the stakeholders must be taken into account since this key factor determines the success in the deployment of online learning materials, learning and teaching activities, assessment, and updating.

Understanding the elemental attributes of the current generation of medical trainees as well as that of the generations involved in its planning, implementation, and assessment is of utmost importance. Medical students with different learning styles will only be benefited by learning and teaching methods when it conforms to their own study habits, ideas, and preferences. [11,12]

The present generation of medical students belongs to Generation Y/Millennial or “Civic” generation (age 20s; born 1982–2002). Their parents usually are hovering, protective and fostering. This generation has a variety of learning styles: such as visual, auditory, and kinesthetic. Adapted to learn in small groups in contrast to studying alone nor belong to large groups to study such as in lecture halls.[13] They are usually optimistic, aggressive, quick learners as a result of mistakes from playing video games (video game effect), attentive if the format is on their own terms, and comfortable with multitasking.[14–16] This Generation Y is surrounded by technology and their digital literacy is superior. Online textbooks and journals are virtually omnipresent for this generation. They use chatting and blogging as well as other forms of self-directed, self-paced, online learning due to its convenience and efficiency.[17–19]

Silent or “adaptive/veteran” generation (age 70–80s; born 1922–42) are the Deans, Chairman, Presidents, senior professors. They prefer to learn using textbooks and printed materials. The adapt a formal teaching style with authority emphasized and formal attire expected. They use lectures, handouts, written tests. They have strong emphasis on physical exam and face-to-face interactions.[13] Their digital literacy is often times limited to the most basic and usually requires shadowing from Generation X to survive.

Baby Boomers or “Idealist” generation (age 50–60s; born 1943–60) are the present Professor, Associate professors, Curriculum committee heads, Chairs and Supervisors of medical schools. Their learning styles are very much different from the Generation Y medical students of today. They do more self-study, use reference books and prefer face-to-face interactions with medical students by having bedside teachings and interactive lectures. [13] Their digital literacy is somewhat borderline but usually are required to undergo formal training or workshops to keep abreast with the medical students and colleagues.

Generation X or “Reactive” generation (age 30–40s; born 1961–81) comprises the post graduate trainees such as fellows and residents or early mid-career faculty. They participate in study groups and review courses; and make use of interactive didactic strategies and web-based resources for independent learning.[13] Their digital literacy is proficient and willing to explore possibilities by having updated gadgets and applications.

Thus, aiming on Generation Y is important because the future depends on providing them the right education. Although intra- and intergenerational teaching occurs in both directions in medical education, the majority of intergenerational teaching comes from the more senior generations, Silent Generation (Veterans), Baby Boomers (Idealist), and Generation X (Realist) teaching Generation Y.[13]

Likewise, inadequate infrastructure, weak institutional strategies and support were seen to be the major problems that affected the adoption of online learning in majority of medical schools. Obvious reason is lack of budget allocated for establishing an effective and efficient virtual platform. This problem must be given an utmost priority by the institution. Another aspect is addressing internet connectivity problems. This can be lessened by utilizing low bandwidth-requiring activities such as asynchronous activities like email exchanges, discussion boards and blogs. High bandwidth-
requiring activities should be reserved for prioritized learning and teaching activities which requires real-time interactions between the facilitator and the students at the same time (synchronous). Examples of which are teleconferences, webinars, case-based discussions or facilitation of evaluation exercises.

Thus, the impact of online learning in this generation of medical students with regards to their readiness to be a physician in the future depends on many factors mentioned above considering also the effect of the worldwide CORONA virus pandemic in its success. Whether the pandemic has pushed the adoption of online learning to the forefront of medical education as the only choice and be able concretize the claims of the effectiveness of online learning in terms of achieving all the expected outcomes for a future physician remains to be seen.

Intensive search for same studies in the local setting was done but there was none. Likewise, recent international publications reviewed did not address the objectives that this study wants to know among the graduating medical students such as acceptability of a self-directed learning to them and the frustrations as they use it, the coping mechanisms they adopted during the pandemic time, their rate of learning retention and utilization as well as their quality of study time/study habits and most importantly their level of readiness in handling actual patients later in practice. [1–3]. Thus, this study would aim to address and document the impact of the COVID 19 pandemic and lockdown on their learning experience and the future it holds on them.

RESEARCH QUESTION

This study is interested to know the impact of online learning as an alternative method of learning from the point of view of the end user, the 4th year medical clerks during COVID 19 pandemic and lockdown.

Having experienced online learning instead of the traditional face to face learning, an assessment of the following outcomes would show the impact of this virtual learning method to these graduating medical student with regards to their better assessment of oneself in terms of knowledge, skills and attitude as a future physician, their capacity to utilize self-directed learning to their own advantage, demonstration of the maturity level amidst the current situation, seeing oneself not only as a user but an advocate, and their ability to adapt to present situation as well as generate ideas creating solutions to the barriers of learning.

RESEARCH OBJECTIVES

GENERAL OBJECTIVE:

1. Understand the impact of online learning as an alternative method of learning from the point of view of the end user, the 4th year medical clerks

SPECIFIC OBJECTIVES:

Using the online learning

1. Gauge acceptability of a self-directed learning
2. Recognize frustrations on its use
3. Identify coping mechanisms employed
4. Assess the rate of learning retention and utilization
5. Evaluate the quality of study time/study habits
6. Appraise oneself in terms of level of readiness in handling actual patients later in practice

THEORETICAL FRAMEWORK

There are many adult learning theories that can be used as a foundation for this research study. One of this is self-directed learning (SDL) that is rooted in Malcolm Knowles’ theory of adult learning. In 1997, D.R. Garrison added elements of self-management to the model. SDL is a process where students take the initiative to determine their own learning needs, formulate learning outcomes, ascertain resources, pace content, volume, implementation of learning, and have self-assessments in which online learning or electronic learning belongs. SDL would still need the help of mentors, viable infrastructure, and peers to be effective. It requires the learner select learnings seems appropriate for them and thus exercises control over all learning decisions. [20]

Wedemeyer’s Theory of Independent Study is another theory applicable in online learning. Charles Wedemeyer in 1981 rooted his theory in the ideal of learner autonomy. It is characterized by the capacity of the student to have independent study wherein the teacher is not present on his side, the student is situated conveniently in his own place, the teaching and learning processes are done asynchronously.
such as through writings or other medium, learnings are generated directly by the students from their own activities, manner of learning is self-paced and student are directly responsible for their own progress and evaluation [21]

The experiential learning theory by David Kolb in the 1970s rooted from the studies of John Dewey, Kurt Lewin, and Jean Piaget may not directly support online learning in its pure form. Experiential learning needs a hands-on engagement that places the students at the center of the learning experience. Though active participation is important, but learning can only be realized once the student will reflect upon what was actively experienced. In medical education, online learning can address such experiential learnings by simulation activities especially development of skills needed prior to handling actual patients in the future. Simulation activities are the preferred way of teaching critical and sensitive cases that can compromise the patients' lives if ever done in actual setting. Like what pilots and astronauts do prior to deployment. Through online learning simulation videos or virtual interactive workshop, these activities fulfill the four elements needed for Kolb's experiential learning theory, that is, concrete experience, reflective observation, abstract conceptualization of the experience, and the use of knowledge gained from experience once actual patient is seen in the future (active experimentation).[22–24]

The medical student who uses this self-directed learning tool will undergo a certain process of identifying its strength and weaknesses compared to traditional face to face learning method. After which, these factors will be subjected to an amelioration/remediation process to overcome its weaknesses and maximize its strength resulting to as adaptation. There will be eventual assimilation of such to his own system leading to an empowered self-directed learner who will ultimately become a competent and confident physician in the future.

**RESEARCH SETTING**

The study is limited to evaluating the impact of online learning as an alternative method of learning from the graduating 4th year medical clerks having their 2 month rotation in the Department of Medicine, UST-FMS specifically during the COVID 19 pandemic and lockdown period.

Even with an already established virtual infrastructure provided by the University, the e-learning platform Blackboard, one of the possible impediments in this study is the different level of digital literacy of both the facilitators and the students that will definitely affect the impact of this self-directed learning method. The teaching culture, attitude of both parties and other barriers to its implementation such as internet connectivity and time element will somewhat affect the outcome of this study.

In order to reduce the effect of such factors, shadowing with the facilitators who are not yet well oriented with the Blackboard virtual platform was done by colleagues whose digital literacy is proficient until such a time that the former can access,
create sessions and conduct classes on their own. Commendable efforts of digital-proficient colleagues were exhibited by creating step by step mini-video tutorials on this matter.

Researchers’ relationship to the setting
The author of this research is an Associate Professor of the UST-FMS. The author recognizes the anxiety of the graduating medical clerks in terms of not having actual patient exposure since they were not allowed to report to the hospital for safety purposes. Moreover, they have been used to the traditional face to face teaching and learning methods. The exclusive use of online method of learning during this inevitable global situation has brought apprehension to both the medical clerks and the facilitators themselves.

Collaborative processes and consents
Permission for the study was secured from the Institutional Research Ethics Board, UST-FMS and the students through consent forms.

RESEARCH APPROACH

Study Design
This study employed an observational, ambispective cohort design. According to Rothman, Greenland, \& Lash (2008), [25, 26] an ambispective cohort design is a type of analytic, observational study which involves both retrospective and prospective follow-up of respondent, from the point of exposure until the development or change in an outcome or outcomes. The retrospective component of the study will involve the follow-up of fourth year medical clerks who were affected by the community quarantine or lockdown from March 15, 2020 to April 15, 2020, thus had a at least a month exposure to direct patient care during internal medicine rotation (graduating Groups 9 and 10 Batch 2020), until the development of specific learning outcomes. In contrast, the prospective component will entail the observation and follow-up of fourth year medical clerks who will be affected by the quarantine with no exposure to direct patient care during internal medicine rotation (graduating Groups 11 and 12 Batch 2020) and those groups who will just start their Internal Medicine rotation (incoming Groups 1 and 2 Batch 2021) until the assessment of learning outcomes after two months.

Study Population
The study population by convenience sampling involved graduating 4th year medical students (medical clerks) of UST-FMS, graduating Groups 9, 10, 11, and 12 of Batch 2020 and incoming Groups 1 and 2 of Batch 2021 rotating in the Department of Medicine. This population was chosen because these are the rotating groups directly affected by the lockdown due to the COVID 19 pandemic that prevented them to report to the hospital. Of the 2 months required rotation in Internal Medicine, Groups 9 and 10 of Batch 2020 were able to experience patient encounters in their hospital exposures for a month prior to the lockdown and the last month spent on online learning. Graduating Groups 11 and 12 of Batch 2020, and incoming Groups 1 and 2 of Batch 2021 who spent their Internal Medicine rotation on pure online learning. However, the graduating four groups of medical clerks (9,10,11, and 12) were able to have actual patient encounters and hospital exposure prior to the lockdown during their rotation in other specialties. The incoming Groups 1 and 2 of Batch 2020-2021 were included because of the fact that they were most affected by the lockdown. Groups 1 and 2 had last 2 months of their 3rd year academic activities via online learning and promoted to 4th year level thereafter. After which, Group 1 and 2 started their clerkship program in Internal Medicine without any prior significant hospital exposure yet compared to the graduating four groups of medical clerks belong to Batch 2019-2020.

Each group of clerks is composed of at least 60 students. Thus, a total of 180 respondents were included and grouped into 3 according to the number of months of actual hospital exposure and duration of on line learning exposure during the lockdown. Sample size computation for Analysis of Covariance (ANCOVA) was conducted using GPower version 3.1.9.4. The study of Pei & Wu (2019) was used to estimate a partial \( \eta^2 \) of 0.119 which can be converted as effect size \( f \) of 0.368. [27] With a computed partial \( \eta^2 \) of 0.368, a power of at least 80%, a significance level of 5% (two-tailed), a total of three independent groups, and at least 1 covariate, a sample size of 75 respondents is
necessary. This sample size is evenly divided into the number of groups; hence, at least 25 respondents are necessary in each group.

Research Instrument
A structured survey form using a Likert scale was used. This survey form is comprised of 76 items divided into 6 main sections. Each section addresses the specific objectives of the research study. Ten items for section 1, 12 items for section 2, 11 items for section 3, 10 items for section 4, 14 items section 5 and 19 items for section 6. This has to be accomplished by the medical clerks after their 2 months rotation in Internal Medicine. The point system in the Likert scale is assigned as follows: 1.0 point if entirely (not agree/helpful/acceptable); 2 points if somewhat (not agree/helpful/acceptable); 3 points if neutral ; 4 points if somewhat (agree/helpful/acceptable); and 5 points if entirely (agree/helpful/acceptable). This survey has been evaluated and validated by distinguished faculties of the UST-FMS (2) and UST Graduate School (1).

METHODOLOGY
There were 3 groups in the study. Depending on the methods of learning the groups were exposed to during the lockdown while on Internal Medicine rotation. Group 1 included Groups 9 and 10 of Batch 2020 who had one-month traditional learning method and one month on line learning as well as additional clinical exposure of at least 10 months from previous specialty rotations and will be labeled blended learning with clinical experience. Group 2 included Groups 11 and 12 of Batch 2020 with 2 months of online learning method as well as additional clinical exposure of at least 10 months from previous specialty rotations and will be labeled online learning with clinical experience. Group 3 included Groups 1 and 2 of Batch 2021 with pure online learning method but no significant hospital exposure before and will be labeled online learning without clinical experience. All the groups, upon completion of their Internal Medicine rotation, were asked to accomplish an exit survey form assessing the impact of online learning on them with regards to the different objectives of this research paper during the lockdown while on Internal medicine rotation. See Figure 2.

STATISTICAL ANALYSIS
Statistical analyses used STATA Statistical Software, Version 13, College Station, TX: StataCorp LP. A p-value of 0.05 was considered statistically significant. Descriptive statistics included mean and standard deviation for continuous variables; median and interquartile range for ordinal data; and, frequency and percentage for nominal variables. Inferential statistics will focus Multivariate Analysis of Covariance (MANCOVA). MANCOVA is a multivariate analytic technique which compares multiple, continuous-level dependent variables between 2 or more groups while controlling for a quantitative confounder or covariate.[28] Cognizant that the study involved six (6) learning outcomes and compare three (3) independent groups, MANCOVA is the best statistical approach to avoid inflating Type I error (false positive results) while controlling for statistically significant confounders such as age and gender. [28]

RESULTS
Table 1 illustrates the demographic profile and the internet stability of the respondents according to the type of learning modality. Results showed that in all group, more than half of the respondents were between 20 – 25 years old and were female. For their internet stability, majority of the blended learning with clinical experience group (53.33%) and online learning with clinical experience group (44.78%) reported very good internet connection, while 52.56% of the online learning without clinical experience group had good internet connection. The descriptive statistics for the comfort in using computer-based technology activities among the respondents according to the type of learning modality is illustrated in Table 2. Descriptively, all groups rated their comfort in computer-based technology activities as moderate to very high. Comparative analysis also indicated that the online learning without clinical experience had a statistically higher mean comfort scores in using email, keyboarding, accessing the web, electronically sending and receiving documents, downloading, uploading, listening to audio, and viewing videos compared to the two other groups (p<0.001).

The descriptive statistics for the acceptability of online learning among the respondents according to
The Impact of Online Learning In The Internal Medicine Rotation Among Medical Clerks

FIGURE 2: Survey methodology regarding the impact of online learning among medical clerks of UST-FMS.

Table 1. Demographic Profile and Internet Stability according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Blended Learning with Clinical Experience (n=60)</th>
<th>Online Learning with Clinical Experience (n=67)</th>
<th>Online Learning without Clinical Experience (n=78)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 20 – 25 Years Old</td>
<td>47 (78.33%)</td>
<td>40 (59.70%)</td>
<td>70 (89.74%)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Between 25 – 30 Years Old</td>
<td>13 (21.67%)</td>
<td>27 (40.30%)</td>
<td>8 (10.26%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td>0.275</td>
</tr>
<tr>
<td>Female</td>
<td>34 (56.67%)</td>
<td>38 (56.72%)</td>
<td>53 (67.95%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>26 (43.33%)</td>
<td>29 (43.28%)</td>
<td>25 (32.05%)</td>
<td></td>
</tr>
<tr>
<td>Internet Stability</td>
<td></td>
<td></td>
<td></td>
<td>0.001*</td>
</tr>
<tr>
<td>Excellent</td>
<td>9 (15.00%)</td>
<td>5 (7.46%)</td>
<td>4 (5.13%)</td>
<td></td>
</tr>
<tr>
<td>Very Good</td>
<td>32 (53.33%)</td>
<td>30 (44.78%)</td>
<td>17 (21.79%)</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>14 (23.33%)</td>
<td>29 (43.28%)</td>
<td>41 (52.56%)</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>4 (6.67%)</td>
<td>3 (4.48%)</td>
<td>14 (17.95%)</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>1 (1.67%)</td>
<td>0 (0.00%)</td>
<td>2 (2.56%)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Descriptive Statistics on the Comfort with Computer-Based Technology Activities according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Computer-Based Technology Activities</th>
<th>Mean (Standard Deviation)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blended Learning with Clinical Experience (n=60)</td>
<td>Online Learning with Clinical Experience (n=67)</td>
</tr>
<tr>
<td>Using email</td>
<td>3.42 (1.12)</td>
<td>3.60 (1.14)</td>
</tr>
<tr>
<td>Keyboarding</td>
<td>3.35 (1.02)</td>
<td>3.76 (1.13)</td>
</tr>
<tr>
<td>Accessing the Web</td>
<td>3.47 (1.13)</td>
<td>3.73 (1.07)</td>
</tr>
<tr>
<td>Electronically sending documents</td>
<td>3.38 (1.04)</td>
<td>3.67 (1.11)</td>
</tr>
<tr>
<td>Electronically receiving documents</td>
<td>3.20 (1.02)</td>
<td>3.66 (1.08)</td>
</tr>
<tr>
<td>Downloading documents or multimedia materials</td>
<td>3.15 (1.13)</td>
<td>3.60 (1.13)</td>
</tr>
<tr>
<td>Uploading documents or multimedia materials</td>
<td>3.08 (1.12)</td>
<td>3.27 (1.15)</td>
</tr>
<tr>
<td>Listening to audio on the computer</td>
<td>2.95 (1.23)</td>
<td>3.22 (1.19)</td>
</tr>
<tr>
<td>Viewing videos on the computer</td>
<td>2.90 (1.27)</td>
<td>3.24 (1.22)</td>
</tr>
<tr>
<td>Overall Comfort</td>
<td><strong>3.21 (0.92)</strong></td>
<td><strong>3.53 (0.93)</strong></td>
</tr>
</tbody>
</table>

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19 Very High = 4.20 – 5.00

MANOVA Results: Pillai’s Trace=0.24, F=2.91, p=0.0001

the type of learning modality is illustrated in Table 3. Results showed that the mean acceptability score was lowest in the blended learning with clinical experience group (\( \bar{x} = 2.02, SD = 0.98 \)) and highest in the online learning group without clinical experience (\( \bar{x} = 2.59, SD = 1.23 \)), which was statistically different among the three groups (\( p = 0.011 \)). Interestingly, the blended learning with clinical experience group had a higher mean score for pure traditional learning (\( \bar{x} = 4.07, SD = 0.95 \)) while both groups with online learning had higher mean scores in pure online learning for the quality of learning.

It is also interesting to note that in the blended learning with clinical experience group, all reasons for preferring online learning were rated as low; the online learning with clinical experience rated these as moderate; while, the online learning without clinical experience rated these as high. Comparative analyses showed that the online learning without clinical experience group had a significantly higher mean score in all reasons for preferring online learning except for the reason of “less need to go to the campus” (\( p = 0.241 \)).

The descriptive statistics for the frustrations with online learning among the respondents according to the type of learning modality is illustrated in Table 4. Results indicate that all groups had high to very high levels of frustration with the following: inability to have actual patient exposure; inability to go to the hospital; missing 24-hour duty experience; inability to hone skills; missing actual interaction with consultants, residents, and classmates; poor internet connectivity, inability to apply learning physically; and, having too much conference. However, all groups had low levels of frustration with regards to the little number of conferences with online learning. Comparative analyses showed that the online learning without clinical experience group had a significantly higher mean frustration level with missing 24-hour duty experience (\( p = 0.010 \)); missing interaction with consultants (\( p = 0.004 \)), residents (\( p = 0.012 \)), and classmates (\( p = 0.039 \)); and, the little number of conferences (\( p = 0.001 \)). Results also showed that the online learning without clinical experience group had a significantly lower mean frustration levels (\( \bar{x} = 3.46, SD = 1.07 \)) with regards to the too much number of conferences with online learning.

The descriptive statistics for the different coping mechanisms among the respondents according to
The Impact of Online Learning in The Internal Medicine Rotation Among Medical Clerks

The type of learning modality is illustrated in Table 5. Results indicate that all groups had moderate to high level of coping mechanisms, ranging from 2.68 (SD=1.21) to 4.17 (SD=0.93). Comparative analysis showed that three coping mechanisms were statistically different among the groups, while the remaining seven (7) coping mechanisms were not statistically different. Specifically, the coping mechanisms of “catching up with my readings (medical)” (x̄=3.65, SD=0.89, p=0.029), “joining virtual study groups” (x̄=3.41, SD=1.21, p=0.001), and “listening to music while online” (x̄=4.01, SD=1.00, p=0.001) were significantly higher in the online learning without clinical experience group.

Table 6 presents the descriptive statistics for the contributions to learning among the respondents according to their type of learning modality. Results showed that all respondents, regardless of learning modality, rated a high to very high contributions to learning when using traditional learning and blended learning methodologies. In contrary, all groups rates low to moderate contributions of online learning to their learning. Comparative analyses also showed that the online learning without clinical experience had a significantly higher (p<0.05) mean scores for all parameters contributing to learning and all factors facilitated by online learning compared to the two other groups.

Table 7 presents the descriptive statistics for the readiness to handle actual patients through online learning among the respondents according to their type of learning modality. Descriptive statistics indicate that the respondents in all groups had varying readiness levels, ranging from moderate to very high depending on the different readiness parameters. Overall, the online learning with clinical experience group had moderate readiness (x̄=3.39, SD=0.70), while both blended learning with clinical experience (x̄=3.43, SD=0.77) and online learning without clinical experience (x̄=3.69, SD=0.61) had high levels of readiness. Comparative analysis showed that the online learning without clinical experience had a significantly higher (p=0.019) mean overall readiness score compared to the two other groups.

Table 3. Descriptive Statistics on the Acceptability of Online Learning according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Mean (Standard Deviation)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptability of Online Learning</td>
<td>Blended Learning with Clinical Experience (n=60)</td>
<td>2.02 (0.98)</td>
</tr>
<tr>
<td></td>
<td>Online Learning with Clinical Experience (n=67)</td>
<td>2.42 (1.06)</td>
</tr>
<tr>
<td></td>
<td>Online Learning without Clinical Experience (n=78)</td>
<td>2.59 (1.23)</td>
</tr>
<tr>
<td>Higher Quality Standard of Learning</td>
<td>Pure Online Learning</td>
<td>1.43 (0.67)</td>
</tr>
<tr>
<td></td>
<td>Hybrid or Blended Learning</td>
<td>3.45 (1.08)</td>
</tr>
<tr>
<td></td>
<td>Pure Traditional Learning</td>
<td>4.07 (0.95)</td>
</tr>
<tr>
<td>Reasons for the Preference of Online Learning over Traditional Learning</td>
<td>Self-directed</td>
<td>2.40 (1.25)</td>
</tr>
<tr>
<td></td>
<td>Self-paced</td>
<td>2.75 (1.26)</td>
</tr>
<tr>
<td></td>
<td>Flexible study time</td>
<td>2.98 (1.32)</td>
</tr>
<tr>
<td></td>
<td>Flexible study location</td>
<td>2.72 (1.30)</td>
</tr>
<tr>
<td></td>
<td>Available anytime with Internet</td>
<td>2.13 (1.20)</td>
</tr>
<tr>
<td></td>
<td>Available anywhere with Internet</td>
<td>2.13 (1.24)</td>
</tr>
<tr>
<td></td>
<td>Less need to go to the campus</td>
<td>3.02 (1.31)</td>
</tr>
<tr>
<td></td>
<td>Much topic coverage</td>
<td>2.33 (1.23)</td>
</tr>
</tbody>
</table>

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19 Very High = 4.20 – 5.00
DISCUSSION

A good internet connection is the key to an effective online learning. Surprisingly, contrary to expected result, all 3 groups reported a good to very good internet connection. This is despite the fact that during synchronous activities, so many problems are encountered especially during peak hours such as no internet connection at all, recurrent internet connection dropping, slow connections, inability to connect due to high bandwidth requirements of videos or presentations, interferences causing choppy communications, and so many other internet glitches that cause so much frustrations both in the part of the medical clerks and facilitators.

Those who were in far provinces experienced limited access to stable internet connection. This was also reported by Ateneo de Manila University School of Medicine and Public Health in their experience on online learning during the pandemic. [29]

In a study of the internet connections with medical students from Universiti Sains Malaysia (USM) Health Campus in Malaysia during the COVID 19 pandemic and lockdown, to resolve the internet connectivity needs, participants had to obtain additional Internet subscriptions, some upgraded the current plan to a higher data plan or have changed to a different internet provider. [30] These same strategies were employed by the UST medical students during this time.

With these connectivity problems in mind, it would be prudent to maximize the use activities that would only need low bandwidths such as emails, or using cross-platform voice over IP (VoIP) and instant messaging (IM) software application during peak hours allowing users to post photos, notes, links, blog, and chat. Likewise, synchronous activities must be scheduled not on peak hours if possible. There has been an effort on the part of the UST-FMS to identify medical clerks who have internet connectivity problems and provided them adequate resources to resolve such issues.

Since the present generation of medical students belongs to Generation Y/Millennial or “Civic” generation, all groups rated their comfort in computer-based technology activities as moderate.

Table 4. Descriptive Statistics on the Frustrations with E-Learning according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Frustrations</th>
<th>Blended Learning with Clinical Experience (n=60)</th>
<th>Online Learning with Clinical Experience (n=67)</th>
<th>Online Learning without Clinical Experience (n=78)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to have actual patient exposure</td>
<td>4.85 (0.44)</td>
<td>4.85 (0.50)</td>
<td>4.82 (0.45)</td>
<td>0.905</td>
</tr>
<tr>
<td>Unable to go to the hospital</td>
<td>4.53 (0.70)</td>
<td>4.54 (0.77)</td>
<td>4.72 (0.66)</td>
<td>0.204</td>
</tr>
<tr>
<td>Missed 24-hour duty experience</td>
<td>4.05 (1.06)</td>
<td>3.85 (1.16)</td>
<td>4.37 (0.87)</td>
<td>0.010*</td>
</tr>
<tr>
<td>No means of honing skills</td>
<td>4.8 (0.48)</td>
<td>4.67 (0.75)</td>
<td>4.72 (0.64)</td>
<td>0.522</td>
</tr>
<tr>
<td>Miss actual interaction with consultants</td>
<td>4.52 (0.77)</td>
<td>4.13 (1.06)</td>
<td>4.58 (0.66)</td>
<td>0.004*</td>
</tr>
<tr>
<td>Miss actual interaction with residents</td>
<td>4.58 (0.67)</td>
<td>4.24 (1.07)</td>
<td>4.62 (0.63)</td>
<td>0.012*</td>
</tr>
<tr>
<td>Miss actual interaction with classmates</td>
<td>4.65 (0.58)</td>
<td>4.45 (0.93)</td>
<td>4.75 (0.55)</td>
<td>0.039*</td>
</tr>
<tr>
<td>Poor internet connectivity</td>
<td>4.40 (0.98)</td>
<td>4.49 (0.75)</td>
<td>4.18 (0.95)</td>
<td>0.098</td>
</tr>
<tr>
<td>Unable to apply what we have learned physically</td>
<td>4.90 (0.30)</td>
<td>4.73 (0.62)</td>
<td>4.82 (0.45)</td>
<td>0.140</td>
</tr>
<tr>
<td>Too much number of conferences</td>
<td>3.97 (1.02)</td>
<td>3.99 (1.02)</td>
<td>3.46 (1.07)</td>
<td>0.003*</td>
</tr>
<tr>
<td>Too little number of conferences</td>
<td>2.57 (1.09)</td>
<td>2.18 (1.01)</td>
<td>2.88 (1.03)</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Mean Score Categories: Very Low = 1.00 – 1.79  Low = 1.80 – 2.59  Moderate = 2.60 – 3.39  High = 3.40 – 4.19  Very High = 4.20 – 5.00

MANOVA Results: Pillai's Trace=0.25, F=2.45, p=0.0001
The Impact of Online Learning on Internal Medicine Rotation Among Medical Clerks

The group of online learning without clinical experience had a statistically higher mean comfort scores in using email, keyboarding, accessing the web, electronically sending and receiving documents, downloading, uploading, listening to audio, and viewing videos compared to the two other groups. This could be explained that this group is much younger than the other two groups and has been on online learning mode on the latter part of their 3rd year as medical students, 3 months before their medical clerkship, thus, they are used to already to the use to the virtual learning platform.

In this case, it was observed that the facilitators had more difficulty than the medical clerks in using the learning platform, in such a way that the medical clerks somewhat guide the facilitators at times in using the technology. The poor technical skills of the facilitators is one of the major barrier to online learning that has been identified by all the medical schools during the lockdown. [29,31]

In the United States, results from national survey of all medical schools with regards to the internal medicine exposure during Covid 19 pandemic showed that bedside teaching and physical examination activities were “let go” during this period and students were not allowed from direct patient care.[32] This was also adapted by the UST-FMS for the medical clerks in the emergency room settings, ambulatory care, endoscopy, pulmonary and dialysis units./

The online learning without clinical experience rated almost reasons for preferring online learning high. On line factors such as being self-directed, self-paced, having flexible study time and location, anytime and anywhere availability by just having an internet connection, and can cover much topic scored the highest. The advantages of online learning were

to very high. The group of online learning without clinical experience had a statistically higher mean comfort scores in using email, keyboarding, accessing the web, electronically sending and receiving documents, downloading, uploading, listening to audio, and viewing videos compared to the two other groups. This could be explained that this group is much younger than the other two groups and has been on online learning mode on the latter part of their 3rd year as medical students, 3 months before their medical clerkship, thus, they are used to already to the use to the virtual learning platform.

In this case, it was observed that the facilitators had more difficulty than the medical clerks in using the learning platform, in such a way that the medical clerks somewhat guide the facilitators at times in using the technology. The poor technical skills of the facilitators is one of the major barrier to online learning that has been identified by all the medical schools during the lockdown. [29,31]

The medical clerks belonging to the blended learning with clinical experience group showed that they favor pure traditional learning over pure online learning. This result would be understandable due to the fact that their mindset was geared towards a traditional learning from the very start of their clerkship but was disrupted by the sudden lockdown due to the COVID 19 pandemic. Their frustrations and anxiety of not having face to face patient encounters are evident in the exit reflections they submitted after the medicine rotation.

In the United States, results from national survey of all medical schools with regards to the internal medicine exposure during Covid 19 pandemic showed that bedside teaching and physical examination activities were “let go” during this period and students were not allowed from direct patient care.[32] This was also adapted by the UST-FMS for the medical clerks in the emergency room settings, ambulatory care, endoscopy, pulmonary and dialysis units./

The online learning without clinical experience rated almost reasons for preferring online learning high. On line factors such as being self-directed, self-paced, having flexible study time and location, anytime and anywhere availability by just having an internet connection, and can cover much topic scored the highest. The advantages of online learning were

Table 5. Descriptive Statistics on the Coping Mechanisms employed to Maximize Knowledge Acquisition during the Quarantine according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Coping Mechanisms</th>
<th>Mean (Standard Deviation)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blended Learning</td>
<td>Online Learning</td>
</tr>
<tr>
<td></td>
<td>with Clinical</td>
<td>with Clinical</td>
</tr>
<tr>
<td></td>
<td>Experience (n=60)</td>
<td>Experience (n=67)</td>
</tr>
<tr>
<td>Catching up with my readings (medical)</td>
<td>3.18 (1.30)</td>
<td>3.32 (1.02)</td>
</tr>
<tr>
<td>Catching up with my readings (non-medical) to relax</td>
<td>3.18 (1.28)</td>
<td>3.03 (1.29)</td>
</tr>
<tr>
<td>Joined virtual study groups</td>
<td>2.68 (1.21)</td>
<td>2.70 (1.21)</td>
</tr>
<tr>
<td>Chat online with friends or relatives</td>
<td>3.73 (1.15)</td>
<td>3.72 (1.08)</td>
</tr>
<tr>
<td>Bonding with family</td>
<td>3.83 (1.06)</td>
<td>3.79 (1.11)</td>
</tr>
<tr>
<td>Listened to music while online</td>
<td>3.95 (0.98)</td>
<td>3.49 (1.21)</td>
</tr>
<tr>
<td>Rewarded self with watching a movie after</td>
<td>3.82 (1.21)</td>
<td>3.49 (1.28)</td>
</tr>
<tr>
<td>Binge eating</td>
<td>3.65 (1.27)</td>
<td>3.43 (1.21)</td>
</tr>
<tr>
<td>Sleeping a lot</td>
<td>3.83 (1.25)</td>
<td>3.73 (1.18)</td>
</tr>
<tr>
<td>Exercise</td>
<td>3.50 (1.35)</td>
<td>3.33 (1.30)</td>
</tr>
</tbody>
</table>

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19 Very High = 4.20 – 5.00
MANOVA Results: Pillai’s Trace=0.25, F=2.45, p=0.0001
The Impact of Online Learning in the Internal Medicine Rotation Among Medical Clerks

favored by the said group maybe because these respondents had not experience yet direct patient care. The high mean scores may have been affected by several factors such as the convenience of online learning. Another would be, their responses may be affected by the word-of-mouth from other students who had Internal Medicine clinical experience prior to the lockdown, which may bring fear among the respondents.

Understandably, the results indicated that all groups had high to very high levels of frustration with their inability to experience what it is like to be a medical clerk rotating in Internal Medicine which is anticipated by everybody to be the acid test of their being a medical student. They never have imagined that this COVID 19 pandemic will shutter their chance to have actual patient exposure, not being able to go to the hospital as front liners, miss what does it feel to be “from duty” status, their inability to have actual application of skills in patients, and a virtual encounter instead of having a face to face interaction with consultants, residents, and as well as their classmates.

In the same USA national survey, most students agreed that the pandemic had definitely disrupted their internal medicine direct patient exposure, and even stated that they should continued with normal clinical exposures during this pandemic even to accept the risk of infection with COVID-19 if they returned to the clinical setting [32].

On the part of the UST medical clerks, though they accepted the fact that what happened to them was somewhat unavoidable, online learning for them at the very start of the rotation was a disappointment, but was replaced with satisfaction and gratefulness when a retooled curricular program was adapted.

### Table 6. Descriptive Statistics on the Contributions to Learning according to Type of Learning Modality among the medical clerks from UST-FMS (N = 205)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Mean (Standard Deviation)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blended Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with Clinical Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n=60)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Online Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with Clinical Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n=67)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Online Learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>without Clinical Experience(n=78)</td>
<td></td>
</tr>
<tr>
<td>Learning Method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional Learning</td>
<td>4.22 (0.90)</td>
<td>0.505</td>
</tr>
<tr>
<td>Blended Learning</td>
<td>3.78 (0.99)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Online Learning</td>
<td>1.75 (0.77)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Parameters Contributing to Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackboard Virtual Platform</td>
<td>2.73 (1.04)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Digital Literacy</td>
<td>3.38 (1.01)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Overall Clerkship Program</td>
<td>3.43 (1.00)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Faculty or Consultant Staff</td>
<td>4.17 (0.76)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Learning and Teaching Activities</td>
<td>3.45 (1.05)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Absence of 24-Hour Duty</td>
<td>2.73 (1.23)</td>
<td>0.014*</td>
</tr>
<tr>
<td>Factors facilitated by Online Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquiring your expected learning outcome</td>
<td>2.43 (1.05)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Improving the quality of your study habits</td>
<td>2.05 (0.85)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Managing your study time</td>
<td>2.40 (1.04)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Increasing retention rate</td>
<td>1.93 (0.86)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Better utilization of content</td>
<td>2.42 (1.08)</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Mean Score Categories: Very Low = 1.00 – 1.79  Low = 1.80 – 2.59  Moderate = 2.60 – 3.39  High = 3.40 – 4.19  Very High = 4.20 – 5.00
### Table 7. Descriptive Statistics on the Enhancement of Readiness to Handle Actual Patients through Online Learning according to Type of Learning Modality among the medical clerks of UST-FMS \( N = 205 \)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean (Standard Deviation)</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blended Learning</td>
<td>Online Learning</td>
</tr>
<tr>
<td></td>
<td>with Clinical Experience</td>
<td>with Clinical Experience</td>
</tr>
<tr>
<td></td>
<td>( n=60 )</td>
<td>( n=67 )</td>
</tr>
<tr>
<td>I can recognize life threatening cases when I encounter them.</td>
<td>3.48 (1.03)</td>
<td>3.60 (0.89)</td>
</tr>
<tr>
<td>I can make a focus history in the emergency room setting.</td>
<td>3.48 (0.97)</td>
<td>3.55 (0.94)</td>
</tr>
<tr>
<td>I can perform a focus physical examination in an emergency room setting.</td>
<td>3.50 (0.95)</td>
<td>3.30 (0.97)</td>
</tr>
<tr>
<td>I can formulate an essential diagnostic plan in an emergency room setting.</td>
<td>3.30 (1.05)</td>
<td>3.22 (1.01)</td>
</tr>
<tr>
<td>I can create and carry out a crucial therapeutic plan in an emergency room setting.</td>
<td>3.17 (0.99)</td>
<td>2.91 (1.10)</td>
</tr>
<tr>
<td>I can write an admitting order.</td>
<td>2.97 (1.04)</td>
<td>2.76 (1.07)</td>
</tr>
<tr>
<td>I am capable of doing handoffs and sign outs for patient safety.</td>
<td>3.40 (1.03)</td>
<td>2.74 (1.08)</td>
</tr>
<tr>
<td>I know what the parameters are to monitor in patients while admitted in ICU or ward.</td>
<td>3.52 (1.00)</td>
<td>3.16 (1.02)</td>
</tr>
<tr>
<td>I can formulate a master problem list of a patient.</td>
<td>3.55 (0.81)</td>
<td>3.42 (0.91)</td>
</tr>
<tr>
<td>I can formulate an illness script.</td>
<td>3.12 (0.99)</td>
<td>3.36 (0.95)</td>
</tr>
<tr>
<td>I can write a concise medical history.</td>
<td>3.77 (0.98)</td>
<td>3.79 (0.81)</td>
</tr>
<tr>
<td>I can discuss a case with my colleague.</td>
<td>3.75 (0.97)</td>
<td>3.87 (0.85)</td>
</tr>
<tr>
<td>I can discuss a case with my seniors and consultants.</td>
<td>3.43 (0.95)</td>
<td>3.45 (0.88)</td>
</tr>
<tr>
<td>I can discuss case with my patients.</td>
<td>3.37 (1.10)</td>
<td>3.64 (0.98)</td>
</tr>
<tr>
<td>I can write a prescription for my patient.</td>
<td>3.58 (1.01)</td>
<td>3.66 (0.93)</td>
</tr>
<tr>
<td>I can decide what medication to give to my patients based on ESSC knowledge.</td>
<td>3.30 (0.98)</td>
<td>3.31 (1.00)</td>
</tr>
<tr>
<td>I can follow orders from my seniors after knowing its purpose.</td>
<td>3.60 (1.17)</td>
<td>3.85 (0.87)</td>
</tr>
<tr>
<td>I can collaborate with my colleague in patient care and management.</td>
<td>3.63 (1.07)</td>
<td>3.72 (0.83)</td>
</tr>
<tr>
<td>In OPD setting, I can assess patient, create a diagnostic and therapeutic plan.</td>
<td>3.53 (0.93)</td>
<td>3.36 (1.00)</td>
</tr>
<tr>
<td>I can discuss case and give instructions to patients in 30 minutes at most.</td>
<td>3.05 (1.10)</td>
<td>3.15 (1.09)</td>
</tr>
</tbody>
</table>

Overall Readiness: 3.43 (0.77)  3.39 (0.70)  3.69 (0.61)  0.019*

Mean Score Categories: Very Low = 1.00 – 1.79  Low = 1.80 – 2.59  Moderate = 2.60 – 3.39  High = 3.40 – 4.19

Very High = 4.20 – 5.00

MANOVA Results: Pillai’s Trace=0.57, \( F=3.68, \ p=0.0001 \)
They have realized the greater risk against their health if they insist on being exposed to COVID-19 patients. Interestingly though, both groups with online learning had higher mean scores in pure online learning for the quality of learning.

A multicenter quantitative analysis investigating the psychological effects of the pandemic on US medical students and their reactions to the Association of American Medical Colleges (AAMC) national recommendation to pause all student clinical rotations with in-person patient care showed majority of the medical students to be anxious of what lies ahead of their medical education.[33]. Though obviously experiencing anxiety, all groups had moderate to high level of coping mechanisms to maximize knowledge acquisition during the quarantine. However, the coping mechanisms of “catching up with my readings (medical), joining virtual study groups and listening to music while online were significantly higher in the online learning without clinical experience group. The results mirrored the characteristic of the present generation of medical students belonging to Generation Y/ Millennial or “Civic” generation. As expected, they are adapted to learn in small groups in contrast to studying alone, and comfortable with multitasking, i.e., listening to music while studying.

It is expected that all respondents, regardless of learning modality, rated a high to very high contributions to learning when using traditional learning and blended learning methodologies. Direct patient exposure is no doubt what all medical clerks are expecting to encounter during this period of their medical training. Since patient is the best teacher in terms of gaining clinical experience, they all yearn for face to face encounters with actual patients. Together with blended learning, actual patient encounters have somewhat been addressed by conducting “Patient as Teachers” (PAT) sessions wherein an actual patient is invited to a virtual conference with the medical clerks. The medical clerks are given opportunities to directly take history from the patient with the guidance of the facilitator. Likewise, modified physical examination feasible by virtual means was maximized. The medical clerks, especially Group 3, were really grateful to the opportunities given to them to have a virtual patient encounter. Interesting to note that all parameters contributing to learning as well as factor facilitated by online learning were all rated high by group 3, respondents from the online learning without clinical experience. Since this group had not experienced direct patient care, their high mean scores may be affected by several factors. One of which is the convenience of online learning. Second, their responses may be affected by the word-of-mouth from other students who had Internal Medicine clinical experience, which may bring fear among the respondents.

The respondents in all groups had varying readiness levels to handle actual patients through online learning, ranging from moderate to very high depending on the different readiness parameters. Overall, the online learning with clinical experience group had moderate readiness while both blended learning with clinical experience and online learning without clinical experience had high levels of readiness. Comparative analysis showed that the online learning without clinical experience had a significantly higher mean overall readiness score compared to the two other groups. Very ironic that the comparative analysis showed that the online learning without clinical experience had a significantly higher mean overall readiness score compared to the two other groups. This can be explained most likely that this particular group was able to study well for their engagements and asynchronous self-directed learning manifested by excellent presentations as they were able to adjust to the online learning system during the latter part of them being a third year medical students. Likewise, since it has been about 4 months from lockdown after which this group started to have their medical clerkship, the medical clerkship program was well structured compared to the clerkship program of the 2 other groups which started their medical rotation on the start of the lockdown. This particular group had also the benefit of having a well curated repository of resource materials containing must know topics and video procedures from the nine subspecialties of internal medicine. This said repository unfortunately was not yet provided to the other 2 groups due to the sudden shift in the clerkship curriculum brought about by the lockdown. Also, this group might have been psychologically prepared for the online learning since they started their medicine clerkship four months after the lockdown. Actually, many in this group thought of not enrolling for clerkship because they know that their clerkship will be fully online and naturally as expected, should have wanted to have a face to face or traditional medical clerkship.
The perceived readiness of these medical clerks can only be assessed once they will be having their post graduate internship and one they start to have their specialty residency program. As the UST-FMS anticipates, Rose stated in 2020 that providing authentic patient experiences to medical students in this “new normal” environment will remain a big challenge for all medical schools. [34]

CONCLUSION

The study showed the different levels of impact of online learning to the different population of medical clerks in terms of its acceptability as an alternative way of learning. Online learning as the “new normal” in the pandemic time has proven its worth as the best alternative learning method and has asserted its important role in the present training of the medical clerks. Actual patient exposure is of main concern while different coping mechanisms maximize knowledge acquisition.

SUGGESTION

Being self-directed and self-paced, Online learning is favored by the study participants who have not yet experienced direct patient care in their overall readiness. There is hope, over time, that the medical clerks soon becoming physicians, adapt Online learning as part of blended education even if the pandemic shall have resolved. Thus, it is safe to say that online learning will now be an integral part of medical education.

LIMITATIONS

This paper has the following limitations:

We are cognizant that the Online group without clinical experience did not experience direct patient care, their responses may have been under- or over-estimated and the self-reported responses to the questionnaire may have been under- or over-estimated.
REFERENCES


32. Alexandraki I, Walsh KJ, Ratcliffe T, Onumah C, Szauter K, Curren C, et al. Innovation and missed opportunities in
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The Virtual Cardiology Rotation: Situated Cognition and the Signature Pedagogy in Medicine

Clarissa M. Mendoza, MD, MBA

ABSTRACT

Background: Corona Virus 2019 (COVID-19) challenged the delivery of medical education and training, especially to the 4th year medical students. Medicine’s signature pedagogy, the ward rounds in the hospital, was put on hold in compliance with safety precautions during this pandemic and the Commission on Higher Education’s (CHED) suspension of face-to-face classes in all levels. How the University of Santo Tomas Faculty of Medicine & Surgery (UST-FMS) Cardiology Rotation was delivered despite these restrictions is described.

Using Google Classroom, Blackboard Collaborate, and Zoom, a 7-day online Cardiology Clerkship rotation was delivered to UST-FMS 4th year students (clerks) using the synchronous and asynchronous mode of delivery. It consisted of the following: 1) Cardiovascular (CV) Ward Rotation with 3 cases using Google Classroom’s adaptive release to create a vicarious experience of taking care of a patient and doing all the tasks that a clerk is supposed to do; 2) Virtual Ward Rounds by a consultant; 3) Outpatient Department (OPD) / Ambulatory Care Services (ACS) case discussions with a consultant and a 4) Heart Station Rotation for training in electrocardiogram (ECG) interpretation.

Conclusion: The advances in technology and software provided just-in-time resources that made possible the creative delivery of Medicine’s signature pedagogy.

Key words: virtual cardiology rotation, clerkship, signature pedagogy

INTRODUCTION

Signature pedagogy was defined by Shulman (2005) as “the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions,” where students are taught the “fundamental dimension of professional work - to think, to perform and to act with integrity.” For medical schools, bedside teaching and clinical rounds in the hospital are the signature pedagogy [1].

In March 2020, when the World Health Organization declared the COVID-19 pandemic, a cascade of events ensued that challenged the delivery of the signature pedagogy, especially to the 4th year medical students the clerks. The COVID-19 pandemic, with all its face-to-face restrictions by the Commission on Higher Education (CHED) and the mandated social distancing by the Department of Health, challenged Medicine’s clerkship training program in all its three dimensions as defined by Shulman, the surface structure, the deep structure, and the implicit structure. The surface structure of Medicine’s pedagogy is the hospital which makes learning possible with its clinical triad - the patient, the physician-teacher (the interns, the residents, and the consultants), and the medical clerk. Its deep structure is the assumption that the patient is the best teacher that develops the clerk’s clinical...
The Virtual Cardiology Rotation: Situated Cognition

eye, his history-taking acumen, and the invaluable experience of witnessing the actual clinical course of a disease and how it is altered by the management. This learning is reinforced by the physician teachers’ ward rounds grounded on the principle of situated cognition. The implicit structure is the actual patient encounter that develops not only his clinical competence but also hones his professional attitudes and values, develops his compassion and empathy, and provides the practical application of ethical standards guided by the physicians in the team.

The literature described the myriad strategies medical schools worldwide employed to compensate for the restrictions imposed by COVID-19 [2, 3] and still deliver some semblance of the signature pedagogy [4, 5]. For clinical clerkship, the challenge was how to simulate the learnings the hospital, the patient, and the physician-teachers provide.

At the beginning of the Academic Year 2020-2021, the UST-FMS clinical clerkship programs, embarked on two basic types of rotations - virtual or online distance learning in the first half of the year and face-to-face hospital rotation in the second half of the year with the premise that the pandemic will be manageable if not put to an end in the last half of the school year. There were high hopes that the vaccines would work. A class of clerks consisting of about 120 students was given a 1-month Internal Medicine (IM) rotation, of which seven days were for the Cardio-Pulmo Module (Table 1). The section designed and implemented a Virtual Cardiology Rotation closely approximating a real clerkship hospital experience. This article aims 1) to describe the virtual Cardiology Ward Rotation grounded on the principles of situated cognition that simulates all the activities in a clinical cardiovascular clerkship rotation; 2) to demonstrate the use of google classroom in the delivery of a simulated daily patient encounter from initial presentation to discharge; 3) to show how bedside rounds can be conducted using anchored instruction from the simulated case scenarios; 4) to describe the OPD case exposures, and 5) to describe the simulated Heart Station rotation experience.

The Cardiology Rotation in a Nutshell

The virtual Cardiology rotation, in general, was divided into asynchronous and synchronous activities (Table 2). The asynchronous activities included the Cardiovascular Ward Activities, the Heart Station, and the skills videos. The synchronous activities were conducted initially via Blackboard Collaborate and then via Zoom when it became available. They were conducted by cardiologists who were loaded to teach Cardiology. These were the OPD case presentations and the Meet the Expert (Ward Rounds) of the consultants. General orientation on what to expect in the rotation and their group assignments were given on day one. The orientation introduced them to the Cardiovascular Rotation, the teaching-learning activities, and the contents and use of the google classroom, including instructions on how to write chart orders, progress notes, and discharge summaries.

The Cardiovascular Ward

The virtual cardiovascular ward was created to simulate an in-patient hospital exposure. Grounded on situated cognition, anchored instruction, cognitive apprenticeship, limited peripheral participation, and reciprocal teaching, it was designed to meet the UST-FMS Institutional Learning Outcome (ILO) of “Competent Professional with Ethical Practice, Critical Thinker and Life-long Learner.” Figure 1

<table>
<thead>
<tr>
<th>Rotation Schedule</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>CARDIO-PULMO</td>
<td>IT- RHEUMA</td>
<td>GI-HEMA-ONCO</td>
<td>ENDO-NEPHRO</td>
</tr>
<tr>
<td></td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
</tr>
<tr>
<td>Group 2</td>
<td>ENDO-NEPHRO</td>
<td>CARDIO-PULMO</td>
<td>IT- RHEUMA</td>
<td>GI-HEMA-ONCO</td>
</tr>
<tr>
<td></td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
</tr>
<tr>
<td>Group 3</td>
<td>GI-HEMA-ONCO</td>
<td>ENDO-NEPHRO</td>
<td>CARDIO-PULMO</td>
<td>IT- RHEUMA</td>
</tr>
<tr>
<td></td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
</tr>
<tr>
<td>Group 4</td>
<td>IT- RHEUMA</td>
<td>GI-HEMA-ONCO</td>
<td>ENDO-NEPHRO</td>
<td>CARDIO-PULMO</td>
</tr>
<tr>
<td></td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
<td>ER-ACS*</td>
</tr>
</tbody>
</table>

*ER-ACS: Emergency Room – Ambulatory Care Services
The Virtual Cardiology Rotation: Situated Cognition

Table 2. Teaching-Learning Activities in the CV Rotation among UST-FMS class of clerks.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asynchronous</strong></td>
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<tr>
<td>Cardiovascular Ward</td>
<td>Orientation</td>
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<tr>
<td>Heart Station</td>
<td>Watch video</td>
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<td>Skills Videos</td>
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<td><strong>Synchronous</strong></td>
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<td>Meet the Expert</td>
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<tr>
<td>OPD Conference</td>
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</tbody>
</table>

Schedule of synchronous activity may vary depending on the day of the week the consultant is loaded.

![Fig.1. Teaching Learning Process in the Cardiovacular Ward of the University of Santo Tomas Hospital (USTH).](image)

depicts the teaching-learning process model in the virtual Cardiovascular ward rotation.

A group of 30 students was divided into groups of 3 members each. This was to facilitate peer-group learning and collaborative work. Each group was given 3 cases to work on, but only one was assigned to upload the required written work daily, the case’s Clerk-In-Charge (CIC). All of them were a CIC of a case.

The Google Classroom's assignment tab with the adaptive release was used to deliver the case scenarios, forms, and the results of laboratory and ancillary procedures to the clerks in a timed release at 8 am every day. Table 3 shows a daily plan of tasks for the teacher and the CIC. It details the cases, disclosures, and attachments that the teacher must create and the required submissions from the students. As a section rotates in 4 batches, four sets of 3 different cases were prepared (Fig.2). Deployment on successive days was chosen to give time for the subgroups to discuss the case. Case 1 was deployed on day 2, case 2 on day 3, and case 3 on day 4. All the cases end on day 7, the last day of the rotation.

The activities that the CIC needed to accomplish for the first day of the cases were Subjective and Objective Salient Features (1st submission only), Problem List, Admitting Orders, and Day 1 Progress Notes, and for the successive days - updated Problem List, Physician Order Sheet, Daily Progress Notes and on the patient’s discharge - the Discharge Summary, Instructions, and Take-Home Medications and Prescription. Fig. 3 shows the different forms provided to them.

The accomplishment of different forms was designed to achieve specific learning objectives. Salient Features was training in determining important subjective and objective data to help generate the problem list and arrive at a rational working diagnosis. The Problem List aimed to develop critical thinking in determining the problems that must be addressed and, depending on the patient’s course, which was resolved or needed continuing management on discharge. The Order Sheet forced them to return to their books, read journals and treatment guidelines and finally write their chart orders. These are the things that they will do as physicians. The advantage of the virtual platform is the freedom to order without the fear of “having a license to lose.” This is a task that they cannot freely do in an actual patient’s chart. The daily Progress Notes (Subjective – Objective – Assessment – Plan: SOAP) reinforced the training afforded by the Order
The Virtual Cardiology Rotation: Situated Cognition

Table 3. Design of a Ward Case in Google Classroom

<table>
<thead>
<tr>
<th>DAY</th>
<th>TEACHER’S TASK: CREATE</th>
<th>TEACHER’S TASK: ATTACH</th>
<th>CIC’S TASK: SUBMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ER Scene (History and PE), Welcome Note and Instructions</td>
<td>Forms, Cardiac Monitor, ECG, All Forms</td>
<td>Salient Features, Problem List, Physician Order Sheet: ER and Admitting Orders, Laboratory and Ancillary Results</td>
</tr>
<tr>
<td>2</td>
<td>ICU Scene, Course, and Instructions</td>
<td>Filled Salient Features, Problem List, Physician Order Sheet: ER and Admitting Orders, Laboratory and Ancillary Results</td>
<td>Updated Problem List, Physician Order Sheet, Progress Notes</td>
</tr>
<tr>
<td>3</td>
<td>Ward Scene</td>
<td>Updated Problem List, Physician Order Sheet, Laboratory and Ancillary Results</td>
<td>Updated Problem List, Physician Order Sheet, Progress Notes</td>
</tr>
<tr>
<td>4</td>
<td>Ward Scene</td>
<td>Updated Problem List, Physician Order Sheet, Laboratory and Ancillary Results</td>
<td>Updated Problem List, Physician Order Sheet, Progress Notes</td>
</tr>
<tr>
<td>5</td>
<td>Ward Scene</td>
<td>Updated Problem List, Physician Order Sheet, Laboratory and Ancillary Results</td>
<td>Updated Problem List, Physician Order Sheet, Progress Notes</td>
</tr>
<tr>
<td>6</td>
<td>Ward Scene</td>
<td>Updated Problem List, Physician Order Sheets</td>
<td>Updated Problem List, Physician Order Sheet, Progress Notes</td>
</tr>
<tr>
<td>7</td>
<td>DISCHARGE</td>
<td>Physician Order Sheet</td>
<td>Discharge Summary and Instructions, Take Home Medications List and Prescriptions</td>
</tr>
</tbody>
</table>

Fig. 2. The CV Cases for adaptive release in Google Classroom.

Fig. 3. The forms to be accomplished.

Sheet as they learned to think like a physician. The S (subjective) is a lesson in listening to patient’s complaints as they make the virtual rounds with the consultant. These were described in the daily disclosure and placed as side notes in the physician’s order sheet. The O (objective) forced them to identify
the critical daily physical examination data and interpret the attached laboratory and ancillary procedures. The A (assessment) taught them to discern whether, based on the objective data, the patient is improving, in status quo, or deteriorating. The P (plan) was training in choosing the diagnostic procedures appropriate for their differentials or the day’s clinical presentation. This was a practice of the mental ESSC considerations (efficacy, safety, suitability, and cost) they learned in Pharmacology. Whatever they write in their plan must be reflected in their orders.

Daily adaptive-release feedback was provided after they had uploaded their work. These were the filled salient features, problem list, and orders written by the consultant or resident. This simulated the experience of being able to read the patient’s actual chart. They were instructed to correct their work using red fonts, but the initial work must not be deleted. The daily orders and progress notes were added each day successively. (See Fig. 3)

The Daily Ward Rounds

To simulate the ward rounds, a consultant teacher conducted Zoom meetings anchored on the deployed cases. In these meetings, the teacher and the students exchanged viewpoints regarding the case and its management. This was also the venue where the consultant gave feedback on the submitted works, from the salient features to the progress notes.

Table 4. The Heart Station tasks in USTH

<table>
<thead>
<tr>
<th>DAY</th>
<th>TEACHER’S TASK: CREATE</th>
<th>TEACHER’S TASK: UPLOAD</th>
<th>CIC’S TASK: SUBMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set 1 ECG tracings (5)</td>
<td>Upload review files and videos on ECG interpretation, learn and play ECG rhythms and Introducing the Heart Station</td>
<td>Review the learning materials</td>
</tr>
<tr>
<td>2</td>
<td>Set 2 ECG tracings (5)</td>
<td>Upload Set 1 tracings</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Set 3 ECG tracings (5)</td>
<td>Upload Set 2 tracings, Upload Set 1 tracings with interpretation</td>
<td>Submit set 1 tracings</td>
</tr>
<tr>
<td>4</td>
<td>Set 4 ECG tracings (5)</td>
<td>Upload Set 3 tracings, Upload Set 2 tracings with interpretation</td>
<td>Submit corrected set 1 tracings and set 2 tracings</td>
</tr>
<tr>
<td>5</td>
<td>Set 5 ECG tracings (5)</td>
<td>Upload Set 4 tracings, Upload Set 3 tracings with interpretation</td>
<td>Submit corrected set 2 tracings and set 4 tracings</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Upload Set 5 tracings, Upload Set 4 tracings with interpretation</td>
<td>Submit corrected set 3 tracings and set 4 tracings</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Upload Set 5 tracings with interpretation</td>
<td>Submit corrected set 4 tracings and set 5 tracings</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Submit corrected set 5 tracings</td>
</tr>
</tbody>
</table>

The Heart Station

The clerks’ skill in electrocardiogram (ECG) interpretation was honed here. Pre-pandemic, clerks went to the Heart Station every afternoon to read the ECGs. They were mentored by the resident and the rotating cardiovascular fellow. To simulate this, the virtual Heart Station was created. To prepare them for this rotation, day 1 reviewed ECG and rhythm interpretation in a game format available on the internet.

Five ECGs were sent to them for five days in a timed-release manner every 8 am. They had to identify the rhythm, measure the rate, PR interval, QRS duration, and QT actual, and interpret the ECG. The tracings with interpretation were sent to them the following day, along with new tracings for interpretation. To facilitate learning, they had to correct and score their work. Their corrected ECGs were submitted the following day, along with the ECG interpretations due for submission for the day (Table 4). The tracings with interpretation simulated the experience of seeing the consultant’s ECG interpretation the following Heart Station Day. Making them correct their work reinforced learning as they saw their mistakes and learned from them. As they went through this daily task, they commented that there was ease in the interpretation, and their scores improved each day. Any difficulty in the interpretations was discussed in the Zoom ward rounds. Questions on the interpretation were also sent to the Google classroom, where feedback
was given by the consultants. Fig. 4 summarizes the teaching-learning process in the Heart Station.

**The Outpatient (OPD) Case Presentations**

To provide holistic exposure, OPD case conferences were included in the rotation. Instead of the pre-pandemic rotation in the Cardiovascular Ambulatory Care Services rotation (ACS), they were exposed to patients with cardiovascular complaints or having their follow-ups following discharge via two Zoom meetings dedicated to the OPD cases sent to them earlier. The common OPD presentations discussed were chest pain, palpitation, dyspnea, other heart failure symptoms, and hypertension. Discussions centered on differentials, diagnosis, work-up, and treatment.

**The Skills Video**

A Skills Video Station was provided in the Google Classroom for asynchronous viewing. It contained videos on heart sounds and murmurs, cardioversion, radial artery cannulation, coronary angiography and stenting, transthoracic Echo, and how to place the venous catheter.

**Students Formative and Summative Assessment**

The People tab in Google Classroom provided a centralized depository of the assigned submissions. Professors could see all their submitted work, with notations on whether they were submitted on time or not. The chronological format allowed tracking of their progress as they went through their daily activities. It also provided a section where teachers could comment on their work. At the end of the rotation, they were asked to do a self-evaluation, using the rubrics provided on how they will be graded in the rotation: 50% ward performance, 30% Heart Station, 10% Conference Performance, and 10% Peer Evaluation. The rubrics were available in Google Classroom. They were also asked to write a reflection on their experience in the Cardiology Rotation. Here are some of the touching comments: “The module was very high yield”; “… the activities we were assigned seemed at first overwhelming but were very insightful and taught me so much about data interpretation and patient management”; “… Nobody will disagree with me that CV rotation is one big rollercoaster ride. From the very start, this rotation knows no chill at all. We are simply bombarded with loads and loads of tasks. Despite all these, CV rotation is my favorite IM rotation. This is the only rotation that made me feel what it is like to be a clerk!” “CV Rotation successfully imparted knowledge, discipline, and, more importantly, good camaraderie.” “Kudos to the CV rotation for imparting such a wonderful program.” “I was pushed beyond my limits as I was able to encounter a lot of new journals.” “This rotation has made me so excited and really looking forward to the actual rotation.”

**The COVID-19 Challenge**

This simulated Cardiology Rotation was a lesson in resilience. The pandemic did not hinder us from making the clerks learn the way we did, the way the clerks and interns before them learned how to become a physician imbued with the Thomasian attributes of a servant leader, an effective communicator, and a collaborator, an analytical and creative thinker, and a lifelong learner. They learned to go back to their notes and books and to search the internet for Guidelines to write that one order that will make a difference in their patient’s life. More importantly,
they experienced a collaborative peer-learning environment. As one clerk said, “I never realized how working in a group made a lot of things easier.”

Implications for Future Research
Analysis of the submitted works provides a rich source of information and data for future medical education research, either qualitative or quantitative. The reflections they wrote could be qualitative research on lived experience, while the graded ECG interpretations could provide objective data on how to teach such technical skills. Their chart orders at the end of the rotation provide a picture of their progress in this skill, which can also be a subject of future research in pedagogy. Insights on improving the delivery of clerkship training, even post-pandemic, can also be gleaned.

Acknowledgment
Special thanks to Dr. Manuel Zacarias, who invited me to join the Clerkship Committee, Dr. Lerrie Gutierrez, who made the daily ward rounds, Dr. Wilson Tan de Guzman, who willingly accepted the task of uploading OPD cases and conducting the OPD online presentations, Dr. Alena Bantolo for helping me program the adaptive release dates, Dr. Maria Minerva Calimag for encouraging me to write this innovative curriculum and for suggesting the title, Dr. Melvin Marcial who encouraged me to implement my ideas, even though “it is difficult,” Dr. Remedios Chan who invited me to present this at the Online Teaching-Learning for Medical Schools and Internship Hospitals sponsored by APMC-PAASCU and to Dean Maria Lourdes Maglinao for recognizing these efforts in her Apertura.

Conflict of Interest. The author declares no conflict of interest.
REFERENCES


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Healthcare: Is it a Business or a Profession?

Maria Graciela Garayblas-Gonzaga, MD, MSc

One hundred fifty years ago, the Faculty of Medicine and Surgery was established. As envisioned by our forefathers, she continues to mould and rear physicians imbued with the Thomasian spirit of love of God and country, academic excellence and service to humanity. Through the years, the Faculty of Medicine and Surgery stood the test of time and has maintained her role of developing astute clinicians, renowned researchers, social mobilizers, administrators and managers and model mentors. In short, compleat physicians!

As Dean (2006-2013), we recognized and identified various challenges. We reviewed and analyzed our students’ performance in the physicians licensure examination, relevance of the medical curriculum according to the needs of the time, faculty development, introduced student empowerment through participation in decision making, social accountability and gave emphasis to Catholic medical education. In so doing, we prepared our graduates to be true professionals, understanding that to be a doctor of medicine he or she has great responsibility and accountability, lifetime devotion to learning and training when serving others while adding value to the quality of work with integrity of character, sound knowledge and excellent skills.

Our profession is one of the more trusted professions and the top best profession in a survey conducted abroad. Yet, the practice of our profession continues to evolve with recent developments in technology, new discoveries in treating diseases and adaptability to changes in time.

The purpose of health care in medical education and in actual clinical practice is to promote health and well-being, prevent disease, heal and provide treatment, pharmacologic and non-pharmacologic, and improve the quality of life of individuals being served and cared for. As much as possible, we want to provide care that is accessible, affordable and available. As physicians, most of us chose to pursue a career to help humanity, selflessly and devoid of vested interests. Our priority is the patient’s best interest. The diagnosis and management of ill individuals are based on knowledge supported by evidences from sound researches and moral and ethical principles in the provision of standard of care.

Focusing on the present situation, health care has developed to a complex system until it has grown to be an industry with numerous stakeholders which contribute to how eventually the industry developed, grew and sustained. About half a century ago, or a little more perhaps, a physician managed simply a clinic of his or her own. A nurse or a secretary assisted him or her in the office. From a simple clinic in the community where he or she could be accessible to house calls, by the end of the 20th century, we witnessed more and more multispecialty clinics evolving in different places accessible to potential clients, patients, catering to their perceived needs. Eventually, we saw the birth of health maintenance organizations and private health insurances that apparently support the health needs of its members. Health clinics that catered to employees of government and private corporations are now being replaced by health maintenance organizations. The introduction
Healthcare: Is it a Business or a Profession?

of health maintenance organization in the Philippines was apparently patterned from the Sri Lankan model, to help sustain and assist the health needs of our countrymen especially the marginalized members of our society [1, 2]. However, in my opinion, it is still far from reality due to the high premium cost which may not be affordable to an ordinary Filipino laborer. Though many companies or corporations are generous enough to enroll their employees, some are not as fortunate. Organizations need to move forward with transparency and accountability to work, in order to build equality among its members and their enrolled dependents. Actuarial scientists, researchers, clinical economists, physicians, administrators, managers and stakeholders need to work harmoniously together to achieve the shared goals, business or not, and achieve the purpose of the health care industry. There are various ways to encourage physicians to enhance and improve the quality of care, good patient outcomes and eventually make the system grow. And consequently make the “business” grow. Newer hospitals or big specialty clinics hire physicians even offering different incentives. Residents or hospitalists are contracted to see patients which minimize the burden on the cost of running and maintaining the establishment. Some offer training programs so there is continuity in making specialists. Somehow, this adds to “market power”. There used to be about thirty two health maintenance organizations but with the current situation, there are only twenty listed licensed HMO’s in the country.

Looking at the other side of the coin, the trend among doctors is to pull their resources together and build a 50-100 bed capacity hospital. The number of new and modern private hospitals begin to grow like mushrooms. Yet if we look at statistics, there are still a lot of fellowmen who have not been attended to by doctors.

Thus, the question of medicine being a profession or a business arises. If we look at the share of health expenditure in the GDP of the Philippines, it is 5.6%; while household final consumption expenditure on health in the country is a whooping six hundred twenty seven billion pesos (PhP 627B) [3]. Health spending of Filipino household has been increasing recently, mostly spent for drugs and other medical goods. Could this be one of the reasons why more businessmen engage in building and operating a hospital? And opening drug stores, as well? And some doctors turning to become health entrepreneurs too? Affordable medical care is still a main concern, a primary demand, among our growing population. As of December 31, 2021, private employees accounted for 28% of the total covered members of Philhealth. Half is paid by employees, the other half is shouldered by the employers. Now that the Universal Health Care law is in place, all Filipinos are automatically enrolled as Philhealth members. Hopefully, this will minimize the cost of health, focus on primary care and prevention of diseases and lessen the burden of hospitalization among our countrymen. Hopefully, more sick individuals could be attended to.

The face of medicine now begins to change as viewed by an “outsider”. To some, the profession has become a business enterprise. The usual respect and reverence to doctors are gradually slipping away; communication skills and direct working relationships are put on the sideline and more legal suits are filed.

Let us look back at the vision of our forefathers who founded the medical school, look forward to how we want the medical profession to be and look at the present and see where and how we stand. Let us keep the spirit of knowledge, generosity, altruism, and fidelity to the oath we took burning in our hearts. Whether medicine is seen as a profession or a business, to many of us, it is a vocation, our life. With faith in the Divine Providence, we know we shall survive. Let us not go with the current so we do not drown in the sea of the world. Drive upstream to find the Source of all good and happiness.
REFERENCES


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Combined Rapid Urease Test and Histology For The Diagnosis of Helicobacter Pylori Infection

Virgilio S. Lo Jr., MD, Carmelita D. Dado-Dalupang, MD

ABSTRACT

Significance: Accurate detection of Helicobacter pylori (HP) is essential for the diagnosis of HP infection. The use of antibiotics and proton pump inhibitors (PPI) may give a false-negative rapid urease test (RUT) result. It is, therefore, suggested that histologic examination be done in combination with RUT. We aimed to determine the sensitivity and specificity of RUT compared with histology and assess the detection rate of combined RUT and histology for HP infection.

Methodology: Retrospective data collection was performed on 192 patients who were tested for both RUT and histology at the time of esophagogastroduodenoscopy (EGD) from 2017 to 2018. At least two gastric biopsies, one from the corpus, one from the antrum, were taken for both RUT and histology. EGD was performed by a single gastroenterologist. A single pathologist was responsible for interpreting the histology with hematoxylin and eosin (H&E) and Giemsa stain. The gold standard test for the diagnosis of HP infection was histology. Demographic profile, RUT and histology results were reviewed. Tests for diagnostic accuracy were computed using SPSSv23.

Results: One hundred ninety two (192) patients were tested for RUT and histology. Fifty two (27.1%) were males and 140 (72.9%) were females, with a mean age of 54±17 years. Epigastric pain was the most common indication for EGD seen in 42.7% of patients. Twenty four (12.5%) patients tested positive for HP infection by histology. Among these, 16 (8.3%) tested positive for both RUT and histology (true-positive), while 8 (4.2%) tested negative for RUT but had positive histology (false-negative). Six out of 8 (75%) patients with false negative results had PPI use. The sensitivity and specificity of RUT for the diagnosis of HP infection were 66.7 and 98.2%, respectively. While the positive and negative likelihood ratio were 37.3 and 0.34, respectively, with a diagnostic odds ratio of 110.

Conclusion: The sensitivity and specificity of RUT for the diagnosis of HP infection were 66.7 and 98.2%, respectively. The addition of histologic examination to RUT increased the HP detection rate by 33% compared with RUT alone. Given its modest sensitivity, histology plays an important role in the diagnosis of HP infection, especially in patients taking PPIs. We recommend doing histology when RUT is negative to increase the HP detection rate.

Key words: retrospective, Helicobacter pylori, rapid urease test, histology, Giemsa stain

INTRODUCTION

Helicobacter pylori (HP) is a microaerophilic fastidious gram-negative bacterium involved in the pathogenesis of chronic gastritis, peptic ulcer disease, gastric adenocarcinoma, and mucosa-associated lymphoid tissue lymphoma [1,2]. The diagnostic methods available for detecting HP infection include H.pylori stool antigen test, histology, polymerase chain reaction, rapid
urease test (RUT), serology, and urea breath test [3]. Locally, RUT is one of the most common tests used for diagnosing HP infection. It is an invasive test that requires sampling of the gastric mucosa and provides indirect evidence of the infection by identifying the presence of the urease enzyme [4]. It is highly specific and requires a high density of bacteria. HP urease hydrolyzes urea, liberating ammonia, which produces an alkaline pH and a resultant color change of the phenolphthalein test medium. RUT is recommended initially because it is efficient, accurate and inexpensive [5]. Furthermore, RUT is extremely valuable because it gives a positive result for HP infection before the patient leaves the endoscopy unit. Its main disadvantage is that it is less accurate in patients taking proton pump inhibitors (PPI), antibiotics, or bismuth-containing compounds because these drugs reduce bacterial density and lead to false-negative results [3,5,6].

Histology remains to be the diagnostic gold standard to which other tests are compared. It has excellent sensitivity and specificity and provides additional information about the gastric mucosa [5,7]. It relies on the presence of the typical bacteria along with the inflammatory reaction for diagnosing HP infection. The routine hematoxylin and eosin (H&E) stain helps in the evaluation of the severity of inflammation along with detection of the bacteria [1]; while Giemsa stain seems to have advantage over other stains because of its simplicity and consistency in improving detection of HP [6]. Several limitations hinder routine use of histology in clinical practice including higher cost, longer turnaround time, dependence on the skills of the pathologist, and inter-observer variability. Additionally, the density of HP can vary at different sites, possibly leading to sampling error [3,6].

In a study by Yakoob et al, the sensitivity and specificity of RUT were reduced in patients taking PPI. The sensitivity and specificity of RUT with and without PPI were 43.3%, 86.4% vs 71.9% and 80%, respectively. They concluded that the exclusive use of the RUT for the diagnosis of HP cannot be recommended in patients with prior PPI use [3].

The objectives of this study were to determine the sensitivity and specificity of RUT compared with histology and to assess the detection rate of combined RUT and histology for HP infection.

MATERIALS AND METHODS

Using a retrospective design, the study was conducted in the endoscopy unit of a tertiary teaching hospital in Manila, Philippines. Purposive sampling of records was done. Preliminary screening of data was achieved by reviewing the electronic records of 3,424 in-patients and out-patients aged ≥18 years old from January 2017 to December 2018. Inclusion criteria were all patients who were tested for both RUT and histology at the time of the esophagogastroduodenoscopy (EGD). Baseline information such as age, gender, and symptoms were obtained as well as the corresponding endoscopic findings. Patients who underwent EGD with no determination of HP infection status by RUT and histology were excluded. The gold standard test for the diagnosis of HP infection was histology (Figure 1).

Esophagogastroduodenoscopy

An EGD was performed using Olympus® GIF HQ-190 with local xylocaine spray with or without sedation after an overnight fast of at least 6 hours. Endoscopic findings and diagnoses were made by a single gastroenterologist and at least one assisting gastroenterology fellow-in-training. At least two gastric mucosal biopsies, one from the corpus and one from the antrum, were taken both for RUT and histology.

Rapid Urease Test

Biopsy samples approximately 2–3 mm each were taken, one from the corpus and one from the antrum. These were placed on the RUT kit. The RUT kit (Lituo Biotech Company®) includes a test card that has a yellow, round indicator containing urea and a pH indicator. The production of the urease enzyme by HP results in the decomposition of urea into bicarbonate and ammonia which causes the pH to rise and the color of the indicator to change from yellow to red or pink. Positive results were read within 5 to 30 minutes. Samples that had no color change after one hour were regarded as negative [4].
Histology
Biopsy samples approximately 2–3 mm each were taken, one from the corpus and one from the antrum were placed on a formalin bottle. A single pathologist was responsible for interpreting the histology using routine H&E and Giemsa stain.

Statistical Analysis
All data retrieved from charts and endoscopic reports were reviewed, recorded, and encoded in an electronic spreadsheet (Microsoft Excel 2016). These data were imported into Confidence Interval Calculator (2011) provided by Rob Herbert (PSG Research Workshop 2018) and IBM® SPSS® Statistics version 23 for statistical analyses. Data were summarized as frequencies and proportions. With an alpha (level of confidence) of 0.05 and 5% margin of error, 169 subjects were needed in the study to meet minimum requirements (Figure 1).

RESULTS AND DISCUSSION
A total of 192 subjects were included in the study. The mean ages for patients tested for RUT and histology were 54±17 years. Among these, 52 (27.1%) were males and 140 (72.9%) were females. Epigastric pain was the most common indication for EGD in 42.7% of patients.

Endoscopic diagnoses of patients tested for RUT and histology were as follows: 120 (62.5%) patients had esophagitis, 44 (22.9%) had peptic ulcer disease (PUD), 120 (62.5%) had acute gastric mucosal erosions, 153 (79.9%) had chronic atrophic gastritis, and 2 (1%) had adenocarcinoma. None of the patients had normal EGD result (Table 1 and Figure 2).

Twenty-four patients (12.5%) tested positive for HP infection. Among these, 16 (8.3%) tested positive for both RUT and histology (true-positive), while 8 (4.2%) tested negative for RUT but had positive histology (false-negative). The sensitivity and specificity of RUT for the diagnosis of HP infection were 66.7 and 98.2%, respectively. While the positive and negative likelihood ratio were 37.3 and 0.34, respectively with a diagnostic odds ratio of 110 (Table 2). The addition of histologic examination to RUT increased the HP detection rate by 33% compared with RUT alone.

Moreover, 6 out of the 8 (75%) patients with false negative results had PPI use (Table 2). We failed to do a subgroup analysis of PPI use of all the patients included in this study due to incomplete data.

Currently, no local protocol exists in the country for the diagnosis of HP. RUT is the commonly used diagnostic test for HP because of its lower cost, and rapidity of the results and availability. However, histologic examination remains the gold standard, although this is not commonly used.

We follow the combined corpus and antrum biopsy approach when doing RUT as it is the most widely recognized worldwide [1,5]. Megraud and...
Lehours have recommended to take at least two biopsy specimens from the antrum and one each specimens from the anterior and posterior corpus. Because HP has a patchy distribution in the stomach, it is advisable to collect multiple biopsy specimens. More importantly, it has been observed that the corpus may be the only site which remains positive due to consumption of PPIs [1].

A common scenario in patients referred for EGD is that they have already taken PPIs, antibiotics, or bismuth-containing compounds within 2 weeks of the procedure. To improve RUT sensitivity in such patients, stopping the potentially test-altering medication and delaying EGD for at least 2 weeks may be done [5].

This study utilized RUT combined with histologic examination, which is considered the gold standard for identifying HP infection with reported sensitivity and specificity of 95% and 98%, respectively [5]. The prevalence of HP infection in this series using RUT alone was 8.3%. When combined with histology, the prevalence of HP infection increased to 12.5%.

**Figure 2.** Endoscopic findings of patients tested using RUT and histology
Thus, there was a 4.2% increase in diagnostic yield and a 33% increase in HP detection rate when using RUT combined with histology. Further studies are recommended specifically with subgroup analysis of PPI use in order to determine if this strategy is cost-effective and if it will change local and international test protocols for HP.

**LIMITATIONS**

The attending physician was a female gastroenterologist and a perceived risk of patient selection gender bias was anticipated due to local culture. This study was also undertaken in a single tertiary center, which may not be a general representation of patients suffering from HP infection in the country, although the patients seen in the institution come from a variety of ethnic groups and socioeconomic backgrounds. A multi-center study may be able to include more subjects.

**CONCLUSION**

The HP detection rate of RUT combined with histology increased by 33% compared with RUT alone. RUT is a highly specific test for diagnosing HP infection. Given its modest sensitivity, histology plays an important role in the diagnosis of HP infection, especially in patients taking proton pump inhibitors. We recommend doing histology when RUT is negative to increase the HP detection rate.
REFERENCES


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ABSTRACT

Objective Double contour sign (DCS) is considered part of the new gout classification. This study aims to determine the agreement of blinded musculoskeletal sonologists in identifying the double contour sign among asymptomatic hyperuricemic patients.

Methods Participants with asymptomatic hyperuricemia (n=65) underwent a gray-scale ultrasound assessment of both of their 1st metatarsophalangeal joints (MTPJs) done on 3 positions (dorsal, medial, plantar) in longitudinal view. The static images were read by 2 independent blinded sonologists for presence of double contour sign.

Results Among the 130 1st MTPJs, the sonologists were able to positively identify DCS on 48R and 52L, negative in 10R and 10L, with discordant readings in 7R, 3L. The overall kappa agreement was statistically significant at 0.674 (substantial agreement) and 0.842 (almost perfect agreement) on the right and left respectively, (both p<0.001).

Conclusion and Recommendation There is a high proportion of positive double contour sign seen among persistently asymptomatic hyperuricemic patients. It might be prudent to perform musculoskeletal ultrasound early on to detect monosodium urate crystal deposits in similar patients. A close follow up to monitor clinical gouty arthritis maybe necessary or consider utility of urate lowering drugs in crystal dissolution in prospective studies.

INTRODUCTION

Asymptomatic hyperuricemia is a condition in which the serum urate level is high, but gout—manifested by arthritis or uric acid nephrolithiasis—has not yet occurred. Majority of patients with hyperuricemia remain asymptomatic throughout their lifetimes, up to 20 years before the initial attack of gout. The definitive diagnosis of gout is by demonstration of strongly negative birefringent monosodium urate crystal under polarizing microscopy. Currently, several non-invasive tests such as imaging are used as an alternative to diagnose gout. Nowadays, ultrasound is being used to diagnose gout. The
characteristic finding is a superficial, hyperechoic, irregular band on the surface of articular cartilage, the so-called “double contour sign” or “urate icing,” and nonhomogeneous tophaceous material surrounded by an anechoic rim. [1]

In a cross sectional study done by Bhadu [2], the urate crystal deposition in asymptomatic hyperuricemic individuals were found in the 1st MTPJ (33%) and knees (25%). Furthermore, urate crystals are present in articular tissues even before classic acute monoarthritic presentation of gout is clinically evident and may give further support for the use of urate-lowering therapy in asymptomatic hyperuricemic patients [3].

The American College of Rheumatology (ACR) and European League against Rheumatism (EULAR) collaborated and came up with 2015 Gout Classification Criteria. Ultrasound and Dual-energy Computed Tomography (DECT) are imaging modalities with sufficient published data and investigator experience to support their utility in identifying urate deposition accurately, thus the double-contour sign, is considered a criterion to the new gout classification. [4]

This study aims to determine the ability of musculoskeletal sonologists in a tertiary hospital to detect double contour sign in the presented films taken from asymptomatic hyperuricemic patients.

**METHODOLOGY**

This is a prospective observational study where patients included were males 20 years old and beyond and postmenopausal women with serum uric acid determination ≥ 7.0 mg/dl not more than a week on day of consult and at least one other occasion within the past 1 year. These patients were recruited from general out-patient clinics and private consults of Rheumatology practice.

Secondary causes of hyperuricemia associated but not limited to malignancy, psoriasis/psoriatic arthritis, chronic hemolytic anemia, myeloproliferative or lymphoproliferative disorders, Paget’s disease, sickle cell anemia, and chronic renal failure as well as drug induced hyperuricemia were excluded. Ever use of any urate-lowering agents ie. allopurinol or febuxostat or uricosurics ie. probenecid as well as history of any form of inflammatory mono-, oligo-, or polyarthritis were also excluded.

**ULTRASOUND IMAGE INTERPRETATION**

All patients underwent ultrasonography of bilateral 1st MTPs using Sonosite HFL50 equipped with a 6-to15-MHz linear transducer. Presence of hyperechoic band over anechoic cartilage (double contour sign) on any or all three different positions (dorsal, medial, plantar) taken in longitudinal view was considered positive for DCS. The static images were interpreted by two musculoskeletal sonologists blinded to all patients’ medical information.

The conduct of study was approved by the USTH Research Ethics Committee.

**RESULTS**

There were 65 patients included in the study, 36 postmenopausal women, 28 men, and 1 undisclosed gender, with 130 1st MTPJs assessed. The mean age was 52.4 years, mean BMI of 24.6 kg/m2, and mean serum uric acid level of 8.5 mg/dl. Comorbidities included hypertension in 40%, diabetes in 16.9%, and dyslipidemia at 7.7%. Only 12.3% admitted family history of gout in either father, sibling, or son. (Table 1)

Ultrasound readings of the right and left 1st MTPJs by both sonologists showed overall positive results in 48/65 (73.8%) R and 52/65 (80%) L 1st MTPs. The measure of agreement (kappa) on the various planes of both 1st MTPs ranged bet 0.463 (substantial) and 0.842 (almost perfect) with all p-values <0.05. (Table 2).

Of the 65 patients, only 4 (6.2%) patients were negative for double contour sign (DCS). The remaining 61 patients (93.8%) were positive for DCS in any or all 3 positions in longitudinal view. Plantar views of both MTPs yielded most counts of positive sonographic findings from both readers compared to the dorsal and medial views. The overall percentage of agreement of both sonologists (calculated over 390 paired ratings) as shown in Table 3 is 356/390 views or 91.3%.

**DISCUSSION**

Point-of-care musculoskeletal ultrasound offers several advantages to patients with refractory hyperuricemia. Aside from being readily accessible in most hospital facilities, it also does not use ionizing
Double Contour Sign In Early Detection Of Gout Among Asymptomatic Hyperuricemic

radiation, is relatively less expensive, patient-friendly, and offers reproducible results. It has multiplanar imaging capability and is efficacious as a method of guidance for invasive procedures as well. However, among its shortcomings are its reliance on getting a good acoustic window to visualize a joint and its being generally less sensitive than MRI in detecting joint inflammation and structural changes [3].

The study of Pineda in Mexico [5] showed that the mean serum urate of the 50 patients with AH included was 8.1±0.9 mg/dl, DCS positive in 25 of the 100 1st MTP joints (50 patients). This study also focused on subclinical structural damage in both intra- and extra-articular structures of the knees and ankles where 52% had synovial fluid/hypertrophy and erosion in 12% with enthesopathies as well.

Asymptomatic hyperuricemia patients with positive DCS (36%) in the study of Stewart [6] were mostly of European descent (83%), with lower mean serum urate levels (7.7±0.8mg/dl) compared to our study. Though the same study also mentioned presence of sonographic evidence of mild joint effusion in AH

Table 1. Demographic profile of the participants with Gout. (N=65)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, n (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28 (43.1)</td>
</tr>
<tr>
<td>Female</td>
<td>36 (55.4)</td>
</tr>
<tr>
<td>Not disclosed</td>
<td>1 (1.5)</td>
</tr>
<tr>
<td>Age (in years)</td>
<td></td>
</tr>
<tr>
<td>mean (SD)</td>
<td>52.4 (15.5)</td>
</tr>
<tr>
<td>range</td>
<td>24-83</td>
</tr>
<tr>
<td>BMI (kg/m2), mean (SD)</td>
<td>24.6 (4.2)</td>
</tr>
<tr>
<td>Serum uric acid (mg/dl), mean (SD)</td>
<td>8.5 (2.2)</td>
</tr>
<tr>
<td>Family History of gout, n (%)</td>
<td>8 (12.3)</td>
</tr>
<tr>
<td>Comorbidities, n (%)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>26 (40)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>11 (16.9)</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>5 (7.7)</td>
</tr>
<tr>
<td>CAD</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 2. Detection of double contour sign among participants with Gout and measure of agreement between two sonologists

<table>
<thead>
<tr>
<th>Side</th>
<th>Reader 1</th>
<th>Reader 2</th>
<th>κ</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (dorsal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>16 (24.6)</td>
<td>18 (27.7)</td>
<td>.761</td>
<td>&lt; .001</td>
<td>0.581, 0.941</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>49 (75.4)</td>
<td>47 (72.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R (medial)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>3 (4.6)</td>
<td>9 (13.9)</td>
<td>.463</td>
<td>&lt; .001</td>
<td>0.118, 0.808</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>62 (95.4)</td>
<td>56 (86.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R (plantar)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>49 (75.4)</td>
<td>47 (72.3)</td>
<td>.682</td>
<td>&lt; .001</td>
<td>0.478, 0.886</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>16 (24.6)</td>
<td>18 (27.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>53 (81.5)</td>
<td>50 (76.9)</td>
<td>.674</td>
<td>&lt; .001</td>
<td>0.453, 0.895</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>12 (18.5)</td>
<td>15 (23.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L (dorsal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>12 (18.5)</td>
<td>16 (24.6)</td>
<td>.728</td>
<td>&lt; .001</td>
<td>0.526, 0.930</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>53 (81.5)</td>
<td>49 (75.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L (medial)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive, n (%)</td>
<td>4 (6.2)</td>
<td>8 (12.3)</td>
<td>.637</td>
<td>&lt; .001</td>
<td>0.316, 0.958</td>
</tr>
<tr>
<td>Negative, n (%)</td>
<td>61 (93.9)</td>
<td>57 (87.7)</td>
<td></td>
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</table>
(22%) more than in gout patients (9%), erosion in 1, synovial hypertrophy in 2, and synovitis in 2.

Our study showed an unexpectedly high proportion of asymptomatic hyperuricemia patients with positive double contour sign at 95.4% (62/65). With such a high yield of positive DCS and statistically significant kappa coefficients, possible other morphostructural changes involving the hyaline cartilage, tendons, and presence of tophi or erosions - could have also be present in some if not most patients. We did not expect this high positivity rate, therefore not able to fully maximize the utility of ultrasound in this cohort of patients with AH. This finding though should be duplicated in a larger sample and stricter control of confounders and effect modifiers.

**CONCLUSION**

There is a high proportion of asymptomatic hyperuricemia patients seen in the tertiary hospital with positive double contour sign. This highlights the importance of early detection of monosodium urate deposits in an easily accessible asymptomatic joint of individuals with persistent hyperuricemia.

**RECOMMENDATION**

It is not clear how soon after the presence of DCS will patients develop the clinical expression of gouty arthritis. Therefore, follow-up study of these patients to determine whether initiation of urate lowering therapy will prevent or retard the development of acute gout or even lead to the disappearance of ultrasound features [7].

**Funding**

None
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2. Bhadu D, Das SK, Wakhlu A, Dhakad U. Articular cartilage of knee and first MTP joint are the preferred sites to find double contour sign as an evidence of urate crystal deposition in asymptomatic hyperuricemic individuals. Acta Reumatol Port. 2018;43(4):264-8
Effectiveness of Combined Flipped and Classroom-based Instruction in Teaching Pulmonary Ultrasound to First-year Medical Students

Julie Christie G. Visperas, MD, MHPEd

ABSTRACT

Background and Objectives of the Study: The study aimed to determine the effectiveness of combining flipped classroom on pulmonary ultrasound instruction in first-year medical students with traditional classroom-based instruction and compared it to traditional classroom-based instruction alone. The insights of the teachers and the students on the implementation of both interventions were also evaluated.

Research Methodology: This is a mixed qualitative (concurrent triangulated) and quantitative research. Baseline procedural knowledge and skills of a total of 282 students on the lung ultrasound scanning using pre-test 20-item summative test, multiple-choice question type of examination, and a pre-test narrative test on lung ultrasound were obtained. A post-intervention summative assessment and narrative test were administered. Statistical analyses were done to compare the scores. A thematic analysis was done to evaluate the responses to the survey.

Results: 138 students were randomly assigned to the classroom-based instruction group, while 144 students in the combined flipped and classroom-based instruction group. The number of students who passed the summative (MCQ) test and were given flipped classroom and classroom-based instruction increased (6.3% to 79.9%; p<0.001) and the number of students given classroom-based instruction only, significantly increased (4.3% to 79.9%; p<0.001).

The number of students who passed the narrative test and were given flipped classroom and classroom-based instructions increased (2.1% to 84.0%; p<0.001) and the number of students given the classroom-based instruction only, also significantly increased (3.6% to 84.2%; p<0.001).

The students appreciated the classroom-based instruction because of the knowledgeable facilitators, the very concise approach, that is understandable and done in real-time. In addition, the flipped classroom was likewise helpful and a good introduction before the classroom-based instruction. The facilitators have noticed that the ease in instruction was influenced by the student’s enthusiasm and willingness to learn.

Conclusion: Flipped classroom in addition to classroom-based instruction, and classroom based instruction were effective in teaching pulmonary ultrasound to First-year medical students.

Key words: flipped classroom, lung ultrasound, pulmonary ultrasound, medical school, medical students, medical education, blended classroom, classroom-based instruction, ultrasound, ultrasound medical education, video-based instruction

INTRODUCTION

The University of Santo Tomas (UST), Faculty of Medicine and Surgery, admits over five hundred
first-year medical students yearly. For the past 9 to 10 years, the integration of ultrasound into medical education has been implemented. The UST Faculty of Medicine and Surgery is the first Asian medical school to have started teaching hands-on ultrasound across the first year to third-year levels in 2013. In the Department of Physiology, we have implemented hands-on exposure of the first-year medical students for the past nine years, both in respiratory and cardiovascular systems. The faculty staff spends over 3 hours per section. Since there are four sections in the first-year medicine level, this activity is repeated four times. The amount of time the faculty has been trained to spend on this activity is too demanding.

A flipped learning classroom is a teaching pattern that allows the learner to review a video of a lecture or subject matter, followed by application synthesis and practice in class, which is assessed in the end. Traditional teaching pattern includes homework or self-study of a subject matter, followed by a lecture by the teacher, practice, and finally, assessment. In the advent of flipped classrooms, this teaching pattern may be beneficial in teaching lung ultrasound. In a study by Lee Kang and colleagues, they looked into using a blended curriculum in the form of web-based lectures followed by dynamic ultrasound scanning in small groups and compared it to traditional classroom-based instruction with hands-on training. They concluded that there was no statistical difference in exam scores between the two groups and that they also implied that the web-based teaching model might be less expensive compared to the traditional classroom teaching model because of the lesser time spent during the actual hands-on scanning due to the previous instruction already taught online. In this study, we likewise used a video to comprise the flipped classroom. Summative assessment and narrative tests were deployed also in this study. A narrative test is a step-by-step description of a particular task asked which involves recounting or retelling a story to another person.

Summative assessment, on the other hand, is the assessment of participants used to both assess the effectiveness of the program and the learning of the students. This is in contrast to formative assessment, which is also an assessment for learning but is used to monitor student learning and provide ongoing feedback to learners.

This paper investigated the effectiveness of the addition of flipped classrooms in the classroom-based instruction of lung ultrasound in First-year medical students. Secondary objectives included determining the insights of the teachers and the students on the implementation of both interventions.

**MATERIALS AND METHODS**

**Research Design**

This is a mixed quantitative and qualitative study, a concurrent triangulation type of mixed methods research study. The quantitative data and qualitative data were concurrently collected. The findings collected were confirmed, cross-validated, and corroborated to develop a cohesive data analysis. The use of qualitative results intends to support the findings in the quantitative analysis.

**Participants of the study**

All sections taking up Physiology were tested before and after the intervention. The sample size for the experimental group (flipped classroom) was derived from published studies that have done similar methods. The flipped classroom group is composed of at least 135 students, while another group consisting of a minimum of 135 students will belong to the traditional classroom-based instruction alone.

**Sample Size Computation:**

A minimum of 135 participants in each group was used to achieve at least 80% power of the test, a two-sided 5% level of significance. This study is based on the result of Kang et al. (2015) that classroom lecture group vs. online class group had a mean score of 82.2% (95% CI: 79 to 84%) and 79.9% (95% CI: 75 to 82%), respectively. G*Power ver 3.1 was used in the sample size calculation. The participants in the flipped classroom group were randomly selected. At least 135 students viewed
the learning material before the hands-on lung ultrasound instruction.

**Data Gathering**

**Phase 1: The pre-test summative and narrative**

A narrative test was used to recount the step-by-step way of doing the lung ultrasound scanning. The students were asked to write down patient instructions, the ultrasound probe and mode to be used, the position of the subject, proper manner of holding the transducer, where to scan and the image that will be obtained. The procedural knowledge and skills on the conduct of lung ultrasound scanning were assessed in the narrative test.

Summative tests were used to evaluate student learning and skills acquisition in the conduct of lung ultrasound and were composed of multiple-choice questions of test items consisting of 20 questions. The procedural knowledge and skills when doing lung ultrasounds were assessed in this summative test.

The pre-test summative and narrative tests were reviewed by face validity testing by two independent reviewers knowledgeable about lung ultrasound instruction. They approved the narrative and summative tests to be administered to the study participants. Reliability was ensured since the post-test was given right after the hands-on lung ultrasound scanning.

**Phase 2: The intervention program**

The intervention program composed of at least one hundred thirty-five students from a class in Physiology was assigned to view 7-minute video instruction on lung ultrasound scanning, which was commissioned by the Ultrasound Institute at the University of South Carolina; the video is available on youtube: https://www.youtube.com/watch?v=WOLz8-km6hE. They were also given lung ultrasound handouts.

Students then practiced and performed ultrasound scanning to a patient model with a knowledgeable facilitator on lung ultrasound. The ultrasound units used were Sonosite ultrasound units model T from the UST Faculty of Medicine and Surgery.

In the study’s other arm, at least one thirty-five First Year medical students proceeded right away with ultrasound scanning with their facilitators.

**Phase 3: Post instruction Summative test and narrative test**

A narrative test for listing the procedure of doing lung ultrasound scanning was given to the study participants.

Summative tests in the conduct of lung ultrasound scanning were composed of 20 items similar to the pretest multiple-choice question items administered during the pretest.

The post-test - summative and narrative tests were reviewed approved by face validity testing. Two independent reviewers knowledgeable on lung ultrasound instruction reviewed and approved the narrative and summative tests to be administered to the study participants.

**Phase 4 Rubrics for Narrative Pre Test and Post Test**

A rubric for the narrative examination was available to check the pre and post-narrative tests for both combinations of the Flipped classroom and traditional instruction alone. The components of the narrative’s rubrics are as follows: patient instructions, patient positioning, correct probe selection, and narration of technique to come up with the images being asked in the narrative test.[4-6]

**Phase 5 Analysis of results using Paired T-test and Student’s T-Test**

Means and its standard error (SEM) were used to summarize the scores of the two groups in the summative and narrative tests, while counts and percentages were used to summarize the number of students who got passing scores. The passing score in the summative test is 13 points (out of 20 points), while the passing score in the narrative test is 10 points (out of 20 points).

Paired t-test was used to compare the mean pre- and post-test scores. At the same time, Student’s t-test was used to compare the means of the two groups.

Additionally, McNemar’s test compared the percentage of students who passed in pre-and post-tests. In contrast, Fisher’s exact test compared the percentage of students who had passing scores in the two groups.

All the statistical tests were performed in SPSS ver 20.0. P-values less than 0.05 indicate significant differences.
A minimum of 135 participants in each group will be used in the study to achieve at least 80% power of the test, a two-sided 5% level of significance. This study is based on the result of Kang et al. (2015) that classroom lecture group vs. online class group had a mean score of 82.2% (95% CI: 79 to 84%) and 79.9% (95% CI: 75 to 82%), respectively. G*Power 3.1 was used in the sample size calculation.

**Data collection, instruments**

We obtained baseline procedural knowledge and skills of a total of two hundred eighty-two first-year medical students on the lung ultrasound scanning using pre-test 20-item summative examination, multiple-choice question type of examination, and a pre-test narrative examination on lung ultrasound. One hundred forty-four of the students were randomly assigned to the flipped classroom instruction group, and 138 were randomly assigned to the traditional classroom-based instruction. The lung ultrasound video was viewed by the flipped classroom instruction with the traditional intervention group before the hands-on ultrasound session. In contrast, the traditional instruction group proceeded to the lung scanning with the facilitator and the patient volunteers. After the video instruction and the lung ultrasound scanning with the patient model and facilitator, a post-intervention summative and narrative examination were administered.

The responses to the survey given to the students were summarized, and thematic analysis was done to evaluate the responses. For the thematic analysis, a coding technique utilized was word repetition, keyword, context, cutting, and sorting techniques. The qualitative data as determined through the survey was used to explain the results in the quantitative data. From the coding, themes were developed, and the qualitative data were triangulated to support the data gathered in both types of data. The mixed type of research is a concurrent triangulated type that could concurrently explain the quantitative and qualitative data. It helps answer the research question of the effectiveness of these two instruction strategies in lung ultrasound.

**Ethical Considerations and Investigational Review Board**

Any information that was obtained from the data collection was kept strictly confidential. The subjects were not identified by name in the data collection form and will not be placed in any future publication of the results. Moreover, the information contained within the data collection form will only be used for this study. Consent for the study was obtained from all the participants of the study. Before conducting the study’s methodology, the research proposal was submitted and approved by the Investigational Review Board of the University of Santo Tomas, Faculty of Medicine and Surgery. This study was performed in accordance with the Declaration of Helsinki. The University of Santo Tomas approved this human study, Faculty of Medicine and Surgery. All adult participants provided written informed consent to participate in this study.

### Table 1. Scores in the Summative and Narrative Tests of the Two Groups: Flipped Vs Traditional Classroom students

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Difference</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summative Test (MCQ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Flipped classroom +</td>
<td>7.97 ± 0.23</td>
<td>14.25 ± 0.17</td>
<td>6.27 ± 0.26</td>
<td>23.893</td>
<td>&lt;0.001</td>
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<tr>
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<td></td>
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<tr>
<td>instruction</td>
<td>7.99 ± 0.22</td>
<td>14.16 ± 0.18</td>
<td>6.17 ± 0.25</td>
<td>24.376</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Classroom-based instruction only</td>
<td>3.76 ± 0.19</td>
<td>12.08 ± 0.21</td>
<td>8.31 ± 0.26</td>
<td>32.075</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Classroom-based instruction only</td>
<td>3.99 ± 0.21</td>
<td>12.14 ± 0.24</td>
<td>8.15 ± 0.27</td>
<td>29.751</td>
<td>&lt;0.001</td>
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<tr>
<td>TOTAL [40 points]</td>
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<tr>
<td>Flipped classroom +</td>
<td>11.74 ± 0.35</td>
<td>26.33 ± 0.35</td>
<td>14.59 ± 0.39</td>
<td>37.111</td>
<td>&lt;0.001</td>
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<tr>
<td>Classroom-based</td>
<td></td>
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<tr>
<td>instruction</td>
<td>11.99 ± 0.32</td>
<td>26.30 ± 0.34</td>
<td>14.32 ± 0.39</td>
<td>37.180</td>
<td>&lt;0.001</td>
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</table>

Values expressed as mean ± SEM.
**Statistical Analyses**

Means and its standard error (SEM) were used to summarize the scores of the two groups in the summative and narrative tests, while counts and percentages were used to summarize the number of students who got passing scores. The passing score in the summative test is 13 points (out of 20 points), while the passing score in the narrative test is 10 points (out of 20 points).

Paired t-test was used to compare the mean pre- and post-test scores. At the same time, Student’s t-test was used to compare the means of the two groups. All the statistical tests were performed in SPSS ver 20.0. P-values less than 0.05 indicate significant differences.

**RESULTS**

A total of 283 students were included in this study, where 139 (49.1%) were given classroom-based instruction only, while 144 (50.9%) were given classroom-based instruction and flipped classroom.

The mean summative test scores of the students who were given flipped classroom and classroom-based instruction significantly increased [Pre-test: 7.97 ± 0.23 vs Post-test: 14.25 ± 0.17; t143=32.893, p<0.001], and those who were given classroom-based instruction only, likewise significantly increased [Pre-test: 7.99 ± 0.22 vs Post-test: 14.16 ± 0.18; t138=24.376, p<0.001]. The mean increase in the summative test scores of students who were given flipped classroom and classroom-based instruction [6.27 ± 0.26] and those who were given classroom-based instruction only [6.17 ± 0.25] did not significantly differ [t281=0.289, p=0.773].

Meanwhile, the mean narrative test scores of the students who were given flipped classroom and classroom-based instruction significantly increased [Pre-test: 3.76 ± 0.19 vs Post-test: 12.08 ± 0.21; t143=32.075, p<0.001], and those who were given classroom-based instructions only, likewise significantly increased [Pre-test: 3.99 ± 0.21 vs Post-test: 12.14 ± 0.24; t138=29.751, p<0.001]. The mean increase in the narrative test scores of students who were given flipped classroom and classroom-based instruction [8.31 ± 0.26] and those who were given classroom-based instruction only [8.15 ± 0.27] did not significantly differ [t281=0.447, p=0.656].

Combining their scores in the summative and narrative tests, the mean total test scores of the students who were given flipped classroom and classroom-based instruction significantly increased [Pre-test: 11.74 ± 0.35 vs Post-test: 26.33 ± 0.35; t143=37.111, p<0.001], and those who were given classroom-based instructions only, likewise significantly increased [Pre-test: 11.99 ± 0.321 vs Post-test: 26.30 ± 0.34; t138=37.180, p<0.001]. The mean increase in the total test scores of students who were given flipped classroom and classroom-based instruction [14.59 ± 0.39] and those who were
given classroom-based instruction only [$14.32 \pm 0.39$] did not significantly differ [$t_{281}=0.497$, $p=0.620$].

**Number of Students with Passing Scores in the Summative and Narrative Tests**

Out of the 20-point summative test, 13 points were used as the cut-off to pass. The number of students who passed the summative (MCQ) test and were given flipped classroom and classroom-based instructions significantly increased [(Pre-test to Post-test): $6.3\%$ to $79.9\%; p<0.001$]. Likewise, the number of students given classroom-based instructions only, significantly increased [$4.3\%$ to $79.9\%; p<0.001$]. However, the number of students in the two groups who passed in the pre-test ($p=0.598$) and post-test ($p=1.000$) did not differ.

On the other hand, 10 points (out of 20 points) were used as a cut-off to pass the narrative test. The number of students who passed the narrative test and were given flipped classroom and classroom-based instructions significantly increased [$2.1\%$ to $84.0\%; p<0.001$]. Likewise, the number of students given classroom-based instructions only significantly increased [$3.6\%$ to $84.2\%; p<0.001$]. However, the number of students in the two groups who passed in the pre-test ($p=0.495$) and post-test ($p=1.000$) did not differ.

Out of 40 points, the total score used 23 points as the cut-off to pass. The number of students who passed the total score and were given flipped classroom and classroom-based instructions significantly increased [$2.1\%$ to $85.4\%; p<0.001$]. Likewise, the number of students given classroom-based instructions only significantly increased [$0.7\%$ to $83.5\%; p<0.001$]. However, the number of students in the two groups who passed in the pre-test ($p=0.623$) and post-test ($p=0.743$) did not differ.

**QUALITATIVE DATA**

From the questionnaire, the students appreciated the classroom-based instruction because of the knowledgeable facilitators’ very concise approach that is understandable and done in real-time. In combination with the traditional instruction, the flipped classroom was likewise helpful and a good introduction before the classroom-based instruction. Some have commented that the flipped classroom in the form of a video shown to the students was too long. The facilitators have noticed that the ease of instruction is not determined by whether the students have viewed the video before the classroom-based instruction. Instead, it would be influenced by the student’s enthusiasm and willingness to learn. The facilitators also added that some of the students, even when not exposed to the flipped classroom, grasped the hands-on instruction very quickly compared to those who benefited from being exposed to the flipped classroom.

**DISCUSSION**

This study showed a significant increase in the narrative and summative scores in both the flipped classroom combined with traditional classroom-based instruction and the classroom-based instruction alone in teaching lung ultrasound to first-year medical students. All the scores increased and were statistically significant using the paired T-test. However, in the mean scores of the two groups, in both the narrative and summative tests, there was no statistically significant difference as assessed by Student’s T-test. It may be surmised that the intervention of hands-on or classroom-based instruction alone may have been effective enough to increase the students’ test scores. However, using the survey questionnaire given to the students, most of them appreciated the hands-on, classroom-based instruction on teaching lung ultrasound. They commented that the facilitators were knowledgeable and helped them learn and do the lung scanning. Even if they thought that the ultrasound video helped them, some students commented that the video was too long. Most said that more time during classroom instruction would be best to let them learn lung ultrasound scanning. The facilitators, on the other hand, noticed that most of the students in the flipped classroom group had an easier grasp of what they were teaching during the classroom-based instruction, which is the hands-on lung scanning, compared to those who were not exposed to the flipped classroom group. As seen in the studies by Harrison and Harris in 2014, the flipped classroom teaching method entails time and adequate preparation to be effective and may be challenging for the teaching staff. In connection with this, however, the facilitators have added that the student’s level of participation and interest would be a more important determinant on
whether the students will learn more effectively during the classroom-based instruction regardless of whether they were given the flipped classroom instruction or not.

CONCLUSION

The combination of the flipped classroom and classroom-based instruction in teaching pulmonary ultrasound had similar outcomes in post-test narrative scores and post-test summative scores. However, both the post-test scores significantly increased compared to the pretest narrative and summative test scores for both groups. The students appreciated the classroom-based instruction because of the knowledgeable facilitators. In contrast, some have appreciated that the flipped classroom was advantageous before the classroom-based instruction because it is a good introduction for them. The facilitators have admitted that the ease in teaching the students was not determined by whether they belonged to the flipped classroom group. What was more important was the willingness of the students to learn and their enthusiasm which made them learn more effectively.

DISCLOSURE AND CONFLICT OF INTEREST

There is no conflict of interest or any factor which may inappropriately influence bias in the execution of the research and publication of the manuscript by the author.

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TWO THUMBS UP!
A Review of the “PULMOSERYE: Pulmonary Patient Miniseries... Dead or Alive: The Saga of Mang Jose”- a Clerkship Learning Activity During the Pandemic

Maria Piedad Rosales-Natividad, MD

ABSTRACT
The World Health Organization declared Covid 19 a pandemic in March 2020, disrupting medical education and creating a significant void in the hospital rotation of the clinical clerks. Alternative methods of teaching and learning had to be instituted, and since face-to-face encounters were still not allowed, all these activities had to be online. While the various activities were able to challenge critical analysis and thinking, the Section on Pulmonary Medicine felt that the clerks would benefit most from activities that would most closely simulate an actual patient encounter. And so, the PulmoSerye was born: a miniseries that followed the patient from initial consultation in the emergency room resulting in admission, events that happened in the ward, formulation of the Master Problem List, progress notes, giving discharge orders, writing the discharge summary, and finally a follow up via Telemedicine. This is what the clerks would have experienced if they had been in hospital. Activities such as the Pulmosereye should be highly considered as a viable option should clerkship hospital rotations once again be put on hold.

Key words: Covid 19, online learning, medical education, innovation, clinical clerkship

BACKGROUND
Medical education was severely affected when Covid-19 was declared a global pandemic in March, 2020 [1]. The clinical clerks lost the opportunity to go to the hospital. Strict restrictions kept them from actual patient interaction, hindering their progress into becoming full-pledged healthcare workers and threatening a delay in their program. All the clerkship teaching and learning activities had to be done online [2,3], and many of these focused on role-playing, with the facilitators acting as patients, and the clerks eventually arriving at diagnoses and management.

The Section of Pulmonary and Critical Care Medicine believed that the clerks would most benefit from an activity that would best simulate what they would otherwise have experienced had they been in the hospital setting [4]. Thus, the Section created a “miniseries”, where the clerks would meet with five different Pulmonary facilitators, each one in charge of a particular event in a patient’s experience in the hospital.

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The clerks would be made to take care of a fictional 74-year-old COPD patient named Mr. Jose Silverio, or “Mang Jose”, who arrives at the ER with shortness of breath. There were 5 sessions prepared, each session tackling a particular set of objectives, and representing a particular time during the patient’s hospital stay. Clinical exposure from the Emergency room to the ward, performing procedures, facilitating discharge, and directing follow-up care and management are what the clerks were missing. And this is what the Pulmoserye was all about.

The five Pulmonary facilitators were assigned one session each.

THE MINISERIES

Episode 1: Mang Jose arrives at the ER.
This interactive session also used role-playing, which is still a very effective method [5] for the clerks to be able to practice gathering information from their “patient”. A Pulmonary facilitator acted as Mang Jose.

This episode had the following objectives:
• Identify urgent from emergent conditions
• Perform a focused history
• Identify the essential parts of a focused exam
• Decide to admit or discharge a patient at the ER
• Craft an admitting order

Result
The clerks were able to recognize the need to probe for the origin of the shortness of breath, and the urgency with which Mang Jose needed to be admitted, given his clinical manifestations as well as the initial results of some of the procedures done. Screenshots of the actual charts were also used in this episode so that the clerks would be more familiar with the documents being used in the hospital setting. The episode ends with Mang Jose being diagnosed as having COPD in exacerbation, Community-Acquired Pneumonia Moderate risk, and pleural effusion. He likewise had co-morbid illnesses such as Diabetes and Hypertension. He was given admitting orders, and he was brought to the ward.

Episode 2: Mang Jose worsens in the ward.
This session used the Pear Deck application, which encourages active learning [6], and which the clerks enjoyed as they were able to interact anonymously. This was appreciated even more since this session touched on arterial blood gas interpretation, which many clerks were still unsure of, and lacked confidence in interpreting the results.

This episode had the following objectives:
• Interpret arterial blood gases
• Compute for the desired FiO2
• Correlate ABG results with the clinical manifestations
• Formulate management based on the clinical manifestations and the ABG results
• Familiarize oneself with the different routes for administering supplemental oxygen
• Monitor response to the recommended treatment

Result
The clerks were able to use the signs and symptoms of the patient as well as the ABG result to recommend the best therapeutic option. The clerks chose to administer oxygen via a high-flow nasal cannula.

Episode 3: Mang Jose undergoes thoracentesis
This interactive session focused on a procedure commonly done in Pulmonary Medicine - thoracentesis. Since using videos have been proven to be of value in teaching skills [7], a video of the actual procedure was presented, as well as photos of various pleural fluid results.

This episode had the following objectives:
• Explain the signs and symptoms of the patient with the pathophysiology involved in pleural effusion
• Correlate the clinical manifestations with the chest x-ray results
• Differentiate transudative from exudative effusions
• Observe how thoracentesis is done
• Recommend laboratory requests on the pleural fluid
• Diagnose the etiology of the effusion based on the pleural fluid results

Result
The clerks were able to correlate all the clinical findings with the pathophysiology of pleural effusion, as well as the chest x-ray results. They were also able to understand how the procedure is done, as well as which laboratory requests will best identify...
the etiology of the fluid. They were then able to recommend the best treatment options for Mang Jose.

**Episode 4: Ward work. The Master Problem list and Progress Notes are formulated, and Mang Jose is prepared for discharge.**

This was a highly interactive session, with the goal of enhancing learning [8,9] and focused on the responsibilities of the clerks while their patient is in the ward. This activity was vital for the clerks to understand that their role in patient care also included the different parts of the chart that they have to complete. Again, screenshots of the actual forms used in the hospital were included in the activity so that the “ward experience” would seem more realistic. There was also an additional focus on the Problem Oriented Medical Record/approach, as this is an effective method for recording the patient’s medical issues [10].

This episode had the following objectives:

- Make progress notes using the S-O-A-P approach
- Formulate a Master Problem List
- Write discharge orders
- Prepare a discharge summary
- Complete the discharge medication sheet

**Result**

The clerks were able to familiarize themselves as to how to make progress notes using the Problem Oriented Approach. The clerks were guided in the process of using the to formulate a Master problem list. They were also able to understand how the Problem List evolves as more clinical information becomes available. Finally, the clerks were able to write their discharge summary using the clinical information in the physicians order sheet as well as the progress notes. They were then able to write discharge orders and fill up the discharge medication sheet.

**Episode 5: Follow up with Mang Jose via teleconsultation**

This interactive session starts with a brief review of the course in the ward of Mang Jose, as well as a review of his discharge documents, Mang Jose is then advised to follow up via telemedicine, which has played an even more significant role in patient care during the pandemic [11]. Role-playing was again utilized, with one facilitator using a phone app to make himself age so that he could represent Mang Jose, and the other facilitator encouraging the clerks to interview Mang Jose via Telemedicine. Different apps which could aid both patient and physician in the teleconsult were also presented.

This episode had the following objectives:

- Utilize the teleconsults for patient follow up
- Confirm patient adherence to discharge plans
- Recognize the need for additional tests
- Plan for subsequent follow-ups
- Write prescriptions correctly

**Results**

The clerks were able to observe how Telemedicine works, as well as some of the limitations that may be encountered since the consultation has to be done virtually. They were introduced to some online medical apps that are very helpful in the evaluation of the clinical status of the patient. They were able to take on the role of physicians, asking relevant questions to determine whether the patient was compliant, and has responded to the treatment. They were also taught to write medical prescriptions and recommend additional diagnostic tests that Mang Jose would need for future consultations.

**CONCLUSION**

Based on the reflections that the clerks were asked to submit after they went through the Pulmoserye, all of them felt that it was a great alternative to an actual face-to-face hospital rotation, as they were able to learn the different skills required from a clerk when attending a patient from admission to discharge, and even during the follow-up. The clerks were also very appreciative that aside from the clinical and critical reasoning that they had to apply, they were also introduced to the different forms used in the hospital, making this activity more “realistic”. The clerks were also grateful that all the 5 episodes were very interactive, and carried out in a very encouraging atmosphere, where they were always guided to the correct answers.

The clerks agreed that the PulmoSerye was a very innovative, engaging, and creative series of episodes that gave them a good idea of what a face-to-face Medicine rotation would have been like. As
an exercise, it was an overwhelming success, and a viable alternative if there are ever any face-to-face interruptions again in the future. The PulmoSerye indeed deserves a TWO THUMBS UP!

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Online Team-Based Learning in Teaching Hyponatremia Among Medical Clerks of the University of Santo Tomas Faculty of Medicine and Surgery, Philippines

Melvin Remulla Marcial, MD, MHPEd

ABSTRACT

Objectives: To determine if online team-based learning (TBL) is effective in improving knowledge outcomes and confidence about hyponatremia in its clinical recognition, classification, diagnostic workup, and management among fourth year medical students

Study Design: A quantitative evaluative design.

Population and Setting: Fourth year medical students (medical clerks) rotating in the Department of Medicine, Faculty of Medicine and Surgery, University of Santo Tomas, Manila, Philippines from July to December 2020.

Methodology: A modified TBL workshop is adopted in teaching fourth year medical clerks about hyponatremia. The TBL session was held with a group of medical clerks weekly from July to December 2020. As a pre-workshop preparation, the medical clerks were assigned to read ahead of time the clinical practice guidelines on the diagnosis and treatment of hyponatremia developed by the European Renal Best Practice. After reading it, they were asked to answer an Individual Readiness Assessment Test (IRAT) composed of 20 case-based multiple-choice questions (MCQ). The group was thereafter divided into 4 subgroups and asked to discuss the same MCQ-based exam and present it as a Team Readiness Assessment Test (TRAT). As each subgroup presented their IRAT, the facilitator discussed the underlying concepts for each question and its application in actual cases of hyponatremia. The facilitator then summarized the learning outcomes at the end of the TBL workshop. For team application (TAPP), the students created a concept map and formulated admitting orders. The medical clerks were then surveyed on their confidence in hyponatremia diagnosis and management during pre-TBL workshop, after IRAT, after TRAT, and after discussion with the facilitator.

Statistical Design: Descriptive statistics were used to summarize the study variables and included the mean, standard deviation, frequency, and percentage. Within-group comparisons of different outcomes across the different timeframes were conducted using one-way multivariate analysis of variance (one-way MANOVA). Cognizant that the study has multiple outcomes or dependent variables which were compared at four different timeframes, multivariate analysis was utilized to minimize the inflation of family-wise errors (FWE).

Results: Comparative analysis indicated that the mean readiness scores of the respondents after TRAT was significantly higher ($t=-91.61$, $p=0.001$) compared to the mean readiness scores after IRAT. Comparative analysis using paired t-test indicated that the mean confidence scores of the respondents in the recognition, diagnosis, and treatment of
hyponatremia were significantly higher among the respondents after the IRAT ($t=-24.26$, $p=0.001$), TRAT ($t=-34.58$, $p=0.001$), and facilitator discussion ($t=-42.72$, $p=0.001$) approaches compared to the mean pre-TBL confidence score. The mean knowledge score of the respondents on the creation of a concept map and the formulation of admission orders of patients with hyponatremia was $25.54 \pm 1.98$ (95% CI 25.26-25.82).

**Conclusion:** Findings of this study are not to be interpreted as demonstrating a causal relationship. Furthermore, the results are only hypothesis-generating at best. The study showed that online TBL has the potential to be an effective method in improving knowledge outcomes and confidence about hyponatremia in its clinical recognition, classification, diagnostic work-up, and management among fourth year medical students. As a preliminary evaluation of TBL, further studies can be conducted to determine its effectiveness as a teaching modality in the medical curricula in comparison to the traditional method before being adopted as a teaching-learning activity.

**Key words:** team-based learning, online learning, COVID-19, hyponatremia, medical education

**INTRODUCTION**

Fluid and electrolyte disturbances are very common in the hospital setting and can cause significant morbidity. Medical clerks being the frontliners must be able to recognize these problems early enough to initiate appropriate interventions to prevent prolonged hospitalization and mortality. They must be able to identify the etiology of the problem, understand the appropriate diagnostic approach, determine the formulas needed to resolve the problem, apply the formulas to the case, formulate the correct intravenous therapy, and anticipate possible complications of therapy. Moreover, fluid and electrolyte disturbances remain to be one of the hardest topics to understand, diagnose, and manage for majority of physicians, more so, for medical clerks. The traditional method of teaching this topic that is teacher-centric such as lectures, chalk-and-talk method still cannot deliver the needed in-depth understanding of the said topic. Teaching hyponatremia in a traditional face-to-face setting is already quite a challenge for the facilitators. All the more, during the COVID-19 pandemic and lockdown, online learning as an alternative method of teaching hyponatremia would really pose an additional difficulty both to the facilitators and students. Thus, there is a need for a learning and teaching activity that can address the complexity of the topic. The team-based-learning (TBL) approach has potential to address such concerns. Online TBL is an alternative learning teaching strategy that can be adopted in teaching fluid and electrolyte disturbances such as hyponatremia. The pre-class preparation in TBL would facilitate the students’ accountability for their own learning. Its collaborative design would enhance teamwork and authentic exercises would expose them to real-world hospital scenarios.

Dr. Larry Michaelsen originally developed TBL for business schools, but has been adopted by many medical schools as a structured form of learning. [1-5] This type of learning has been applied to the different levels of learners, settings, as well as content areas. [3] It has been applied in multiple disciplines in the undergraduate medical curricula, more so in pre-clinical years (basic sciences) than the clinical years. Burgess et al. in 2014 did a systematic review on the impact of TBL programs in 20 medical schools and reported that TBL had a positive impact on the learning experience of students. [3]

Team-based learning is a structured learning and instructional strategy that can be applied both in a small and large group of students (more than 100) that have been divided into small groups wherein conceptual knowledge can be applied initially as an individual work and later on collaborate with team members, after which, the facilitator would provide immediate feedback. [1] As a learning tool, students are actively engaged from start to finish of the activity, either individually or as part of the team. A large number of faculty is not necessary even with a large number of students. Thus, TBL programs would serve as a resource-saving measure for the medical school as well. In order to preserve the fidelity of TBL as an effective learning strategy and in order for other medical schools to replicate and assess outcomes, a standardized framework was formulated. In its purest form, TBL has seven core design elements, namely: (a) team formation, (b) readiness assurance, (c) immediate feedback, (d) sequencing of in-class problem solving, (e) the four S’s [must have a significant problem, same problem
for all teams to solve, all teams must have a specific choice in their answer, and simultaneous reporting for all the groups], (f) incentive structure, and (g) peer review]. [3,6]

A standard TBL program must have the following three phases: (a) advanced preparation, (b) readiness assurance, and (c) application task. A TBL program is considered modified if the program has one or two phases missing or significantly modified from the classic program. [4]

An ideal team size would be five to seven students since this number would be small enough to boost team dynamics but large enough to have knowledge sources and discussion. [2] For the readiness assurance part, both individually and as a team, the assigned reading materials are the source of the individual and team test questions reflecting everybody’s readiness, motivation, and accountability for the activity. [7,8]

Immediate feedback is provided by the faculty by discussing the test questions and emphasizing the concepts used, leading to knowledge understanding, eventual acquisition, and retention. [2,9]

Sequencing of in-class problem-solving is considered the heart of TBL since this is the time the students as a team would apply their newly gained knowledge in an authentic scenario. Through the collaborative effort of the group, they should be able to defend their plans and choices from their own point of view. [1] The incentive structure of the TBL program must be well-defined for the students from the very start. A grading system with well-defined parameters is crucial to provide motivation for both individual inputs and effective team dynamics. Assigned weighted grades should be given for individual readiness assessment test (IRAT), team readiness assessment test (TRAT), team application of the problem (TAPP), and peer review. Peer review would substantiate student accountability. Giving peer feedback would cultivate the students’ competencies in objectively assessing a colleague’s contribution to the team, hopefully guiding them on how to practice professionalism, more so as an aid to learning. [10,11]

The concept of “collective scaffolding” is very important in TBL. Inside the class, each member may contribute only partially in completing the task. But this partial knowledge from each member combines together under the teacher’s guidance to achieve complete understanding and accomplishment of the task. The idea of collective scaffolding grounded in Vygotskian thinking suggests that the group ZPD is larger than the individual ZPD. This means that what a group of trainees can do together is much beyond what each individual can do alone. The model of involvement in a development process suggests that trainees acquire different skills and knowledge through collaboration with peers. From Vygotskian perspective, the group members can provide collective scaffold for each other to remedy their instructional problems. They engage in

THEORETICAL FRAMEWORK

Team-based-learning follows on the principle of constructivist learning theory, both cognitive constructivism by Jean Piaget and social constructivism by Lev Vygotsky. [12]

Piaget’s cognitive constructivism is founded on the principle that learning is an active rather than a passive process and it should be whole, authentic and real to be effective. Vygotsky’s social constructivism is based on the principle that social interaction plays a very important role in the cognitive development. It involves the More Knowledgeable Other (MKO), which refers to anyone who has better understanding or higher ability level than the learner, i.e., normally thought of as being a teacher, trainer, or older adult, but may also be peers, a younger person, or even computers. In this case, the MKO is the facilitator. Vygotsky’s Zone of Proximal Development (ZPD), refers to the area where the most sensitive instruction or guidance should be given, allowing the students to develop skills that they will then use on their own that would later result in developing their higher mental functions. In the case of TBL, it is the immediate feedback part wherein the facilitator discusses the underlying concepts for each question, as well as the application exercises (i.e., TAPP) where the students create concept maps and formulate admitting orders that serve as the ZPD. [12-15]

The concept of “collective scaffolding” is very important in TBL. Inside the class, each member may contribute only partially in completing the task. But this partial knowledge from each member combines together under the teacher’s guidance to achieve complete understanding and accomplishment of the task. The idea of collective scaffolding grounded in Vygotskian thinking suggests that the group ZPD is larger than the individual ZPD. This means that what a group of trainees can do together is much beyond what each individual can do alone. The model of involvement in a development process suggests that trainees acquire different skills and knowledge through collaboration with peers. From Vygotskian perspective, the group members can provide collective scaffold for each other to remedy their instructional problems. They engage in
conducting collaborative research and discussions. Later on, the process of internalization will occur. During the repeated engagement of the MKO and the learner where scaffolding is always provided, there is transformation of social behavior from the inter-mental to the intra-mental state where the real process of internalization occurs, leading to the learner no longer needing scaffolding. It is during internalization wherein the learner upgrades to a higher level or even highest level of learning regarding certain knowledge or skill like an expert. [16]

The three phases of memory formation, namely learning, consolidation, and reconsolidation of knowledge, transpire during the TBL sessions. Schmidt et al. suggested that the psychological foundation for TBL involves the knowledge reconsolidation hypothesis. This hypothesis is based on the four psychological mechanisms (i.e., retrieval practice, peer elaboration, feedback, and transfer of learning) that are individually correlated with the different phases of TBL. The pre-class preparation involves learning new materials resulting in initial consolidation of newly learned knowledge after sleeping. As they go to the scheduled classes, the class activities will cause reconsolidation of previously learned or consolidated knowledge. Knowledge reconsolidation saves, strengthens and refines the students’ previous knowledge that has already been saved as long-term memory. During the IRAT, the retrieval of consolidated knowledge happens. The TRAT facilitates peer elaboration wherein team discussion happens. TRAT is the phase of TBL that provides immediate feedback to their IRAT answers, as well as a different perspective of the difficult concepts encountered. All unresolved questions serve as a burning question wherein the facilitator can give elaborate feedback. The TAPP phase enables the students to apply what they have learned to other situations or contexts, thus transfer of learning would occur. [17]

**CONCEPTUAL PARADIGM**

**Research Setting**
Department of Medicine, Faculty of Medicine and Surgery, University of Santo Tomas, Manila, Philippines

**RESEARCH APPROACH**

**Study Design**
Quantitative, evaluative design

**Study Population**
The study population included fourth year medical students (medical clerks) from Groups 1 to 12 of the University of Santo Tomas Faculty of Medicine and Surgery Batch 2021 rotating in the Department of Medicine.

Sample size computation for one-way MANOVA was conducted using GPower version 3.1.9.4. For a moderate effect size $f$ of 0.25, a minimum power of 80%, and a significance level of 5% (two-tailed), a sample size of 48 respondents was computed.
Research Instrument
Clinical practice guidelines on the diagnosis and treatment of hyponatremia developed by the European Renal Best Practice was used as an assigned reading material prior to the TBL workshop proper. Then, 20 case-based multiple choice questions (MCQ) were used as the Individual Readiness Assessment Test (IRAT) on the diagnosis and management of hyponatremia and also as the Team Readiness Assessment Test (TRAT). A 10-point Likert scale survey on their confidence about hyponatremia diagnosis and management during pre TBL workshop, after IRAT, after TRAT, and after discussion with the facilitator was used.

METHODOLOGY
A modified TBL workshop was adopted in teaching fourth year medical clerks about hyponatremia. The TBL session was held with a group of medical clerks weekly. As pre-workshop preparation, the medical clerks were assigned to read ahead of time the clinical practice guidelines on the diagnosis and treatment of hyponatremia developed by the European Renal Best Practice. After reading it, they were asked to answer an IRAT composed of 20 case-based multiple choice questions. The group was thereafter divided into 4 subgroups and asked to discuss the same MCQ-based exam and presented it as a TRAT. As each subgroup presented their IRAT, the facilitator discussed the underlying concepts for each question and its application in actual cases of hyponatremia. The facilitator then summarized the learning outcomes at the end of the TBL workshop. For TAPP, the students created a concept map and formulated admitting orders. The medical clerks were then surveyed on their confidence in hyponatremia diagnosis and management during pre TBL workshop, after IRAT, after TRAT and after discussion with the facilitator.

STATISTICAL DESIGN
Statistical analyses were performed using STATA MP Statistical Software, version 13, College Station, TX: StataCorp LP. A p-value ≤0.05 was considered statistically significant. Descriptive statistics were used to summarize the study variables and included mean, standard deviation, frequency, and percentage. Within-group comparisons of different outcomes across the different timeframes were conducted using one-way multivariate analysis of variance (one-way MANOVA) [18]. Cognizant that the study has multiple outcomes or dependent variables which were compared at four different timeframes, multivariate analysis was utilized to minimize the inflation of family-wise errors, thus, decreasing the likelihood of type I (false positive) errors. [18]

RESULTS
Table 1 illustrates the within-group comparison using paired t-test among the respondents using the IRAT and TRAT methods. As presented, the mean readiness score of those who underwent the IRAT was 28.69 (SD=1.67), while those who had the TRAT had a mean score of 39.58 (SD=0.76) with a mean difference of –10.89 (SD=1.64). Comparative analysis indicated that the mean readiness scores of the respondents after TRAT was significantly higher (t=–91.61, p=0.001) compared to the mean readiness scores after IRAT.

The within-group comparison of the mean confidence scores before the TBL and after the TBL (i.e., IRAT, TRAT, and facilitator discussion) are presented in Table 2. It can be noted that the mean

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Within-Group Comparison of Readiness Scores using IRAT and TRAT among the Respondents (N = 191)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>IRAT Scores (N = 191)</td>
</tr>
<tr>
<td></td>
<td>TRAT (N = 191)</td>
</tr>
<tr>
<td></td>
<td>Mean Difference</td>
</tr>
<tr>
<td>Readiness Score</td>
<td>28.69 (1.67)</td>
</tr>
</tbody>
</table>

*Significant at 0.05
†Significant at 0.01
Online Team-Based Learning in Teaching Hyponatremia

The confidence score of the respondents in the recognition, diagnosis, and treatment of hyponatremia before the TBL approach was 3.97 (SD=1.66). In contrast, the mean confidence scores of the respondents after the different TBL approaches – IRAT, TRAT, and facilitator discussion approaches – were 6.41 (SD=1.54), 7.50 (SD=1.20), and 8.77 (SD=0.90), respectively. Comparative analysis using paired t-test indicated that the mean confidence scores were significantly higher among the respondents after the IRAT (t=−24.26, p=0.001), TRAT (t=−34.58, p=0.001), and facilitator discussion (t=−42.72, p=0.001) approaches compared to the mean pre-TBL confidence score.

The mean knowledge score of the respondents on the concept map creation and admission of patients with hyponatremia was 25.54±1.98 (95% CI 25.26-25.82).

DISCUSSION

Teaching and learning activities (TLA) ideally must always be engaging and must result in the realization of the intended learning outcomes. The active participation of each student from beginning to end as well as the peer involvement in the active learning process can be realized in the adoption of TBL as a TLA. This study has shown its effectiveness in terms of mean readiness and confidence scores of the medical clerks that were higher after the TRAT compared to IRAT. In this case, it can be seen that the new knowledge that has been gained...
Online Team-Based Learning in Teaching Hyponatremia

by the medical clerks on individual reading was strengthened after peer collaboration and immediate feedback by the facilitator. Peer discussion definitely opens an avenue of different perspectives on a particular aspect of the new knowledge gained, thus strengthening the understanding of such knowledge. Haidet et al. recognized the fact that TBL could be applied in many aspects of medical education, such as from basic sciences to solving clinical problems in authentic life situations. They have suggested a conceptual model and a set of guidelines to follow in using TBL for standardization and reporting purposes. [6] This suggestion may not be easy to carry out in certain situations such as having time constraints and will depend on the targeted learning outcomes as assessed by the involved facilitator. Thus, TBL in its purest form may not be realized at all times.

The advantage of adopting TBL was realized during the course of this research activity. TBL definitely eliminated the time consuming and boring teacher-centered lecture on hyponatremia. Early identification of an appropriate reading material on hyponatremia (2014 European Clinical Practice Guidelines on Hyponatremia) anchored the TBL activity. [19] The independent pre-activity reading preparation 2 to 3 days before jumpstarted the TBL activity. This asynchronous activity reinforced self-directed learning. Likewise, it proves that in this kind of TLA, minimal instruction supervision from the facilitator is demanded, thus, independent and critical thinking are developed. However, it was noted that most of the time, majority of the medical clerks were honest enough to confirm that they were not able to read in full the assigned reading material as expected of them. Most of them just focused on the part where the answers for the IRAT questions can be extracted. Many factors can be considered at this point. One major factor would be the online fatigue these medical clerks have been experiencing since it has been more than a year since the COVID-19 pandemic started and these medical clerks were confined to their houses for a long time. The peer discussion and the facilitator feedback compensated for all these shortcomings and resulted in a much clearer concept on the problem and treatment of hyponatremia.

In a study by Vasan et al. in 2008, they compared TBL and traditional lectures in delivering medical gross anatomy and embryology subjects. They documented that students utilizing the TBL approach performed better in examinations compared to the group of students exposed to the traditional lecture-based teaching. [20] These students gained independence, actively participated in TLAs and became team players. This type of study would be ideal to adopt in the local setting wherein there will be a head-on comparison between the TBL and the traditional lecture type of topic delivery.

Aside from pre-activity readiness and team interaction, application tasks of the TBL activity is the most important aspect of this TLA. The creation of the concept map on the recognition, diagnosis, and management of hyponatremia truly reflect the consolidation of knowledge about hyponatremia. The different concept maps created by the different groups showcased the diversity of thinking these medical clerks have about hyponatremia despite having read the same reading materials. Nevertheless, no matter how simple or complicated the concept maps created, the structured thinking about hyponatremia was projected in all which for sure cannot be accomplished by a traditional teacher-centered type of TLA. The formulation of the admitting orders in a patient with hyponatremia served as another application task of the TBL activity that makes this TLA authentic in nature. The transfer of learning is very evident as the admitting orders defined the expected diagnostic and therapeutic plans in patients with hyponatremia. Thus, the ability of the medical clerks to create a well-constructed concept map and to formulate appropriate admitting orders in patients with hyponatremia reflected that the expected learning outcome of TBL was realized.

This study has methodological limitations. As an evaluation of the TBL approach and with the COVID-19 pandemic, a comparative analysis with a control group was not feasible. Hence, the true effects of TBL were not compared with the traditional teaching method which may lead to overestimations. With this, the current results must be analyzed and interpreted with caution. In addition, as an evaluative study, the findings of this study may only reflect the potential of TBL in improving teaching of hyponatremia but needs to be verified with the prevailing or traditional method of teaching in medical institutions.
CONCLUSION

Findings of this study are not to be interpreted as demonstrating a causal relationship. Furthermore, the results are only hypothesis generating at best. The study showed that online TBL has the potential to be an effective method for teaching hyponatremia among medical clerks. It improves knowledge outcomes and confidence about hyponatremia in its clinical recognition, classification, diagnostic work-up, and management pre-TBL workshop, post-IRAT, post-TRAT, and post-discussion. As a preliminary evaluation of TBL, further studies can be conducted to determine its effectiveness as a teaching modality in the medical curricula in comparison to the traditional method before being adopted as a teaching-learning activity.

Declaration of Competing Interests: None
REFERENCES


APPENDIX A. CASE AND IRAT/TRAT TEST QUESTIONS

HYPONATREMIA WORKSHOP: IRAT: CASE:

55 year old bank executive female diabetic, hypertensive admitted due to dyspnea. She has history of 2 previous AMI and heavy smoker. She has easy fatigability , 2 pillow orthopnea. On high back rest, in distress, no cyanosis . BP 160/90, PR 110 RR 25 T 37.4 Wt. 50 kg. JVP 5cm at 45 degree Use of accessory muscles of respiration, bilateral crackles on T7. Apex displaced to 6th ICS AAL With s3 gallop. With bipedal edema. CBC normal .Creatinine 0.8 mg/dl.Na 115 mmol/L. K 3.8 mmol/L/ FBS -10 mmol/L BUN – 7 mmol/L12 EKG NSR, poor r wave progression, old inferior wall mi
1. What is the main problem of the patient?

2. What is the most likely temporal classification of hyponatremia?
   A. acute
   B. chronic

3. What is the biochemical severity level of hyponatremia?
   A. mild
   B. moderate
   C. severe

4. Classify the degree of patient’s manifestation of symptoms secondary to hyponatremia.
   A. Manifesting severe symptoms
   B. Manifesting moderately severe symptoms
   C. Without severe or moderately severe symptoms

5. What is the patient’s extracellular volume status?
   rationalize
   A. Decreased
   B. Normal
   C. Increased

6. What will be the computed serum osmolality?
   A. 235
   B. 247
   C. 266
   D. 285

7. Compute for the corrected level of serum Na with the present serum glucose result to rule out hyperglycemic hyponatremia.
   Na 115 mmol/L
   FBS 10 mmol/L
   A. 115
   B. 115.8
   C. 116
   D. 117

8. State the complete description of patient’s hyponatremia.
   A. Chronic Moderately Sx Euvolemic Profound Hypotonic Hyponatremia
   B. Chronic Severely Sx Hypovolemic Moderate Hypotonic Hyponatremia
   C. Chronic Asx Hypervolemic Mild Hypotonic Hyponatremia
   D. Chronic Moderately Sx Euvolemic Moderate Hypotonic Hyponatremia
   E. Chronic Severely Sx Hypervolemic Profound Hypotonic Hyponatremia

9. Which parameters to be used for differentiating causes of hypotonic hyponatremia?
   A. Urine osmolality
   B. Urine Na
   C. Vasopressin level

10. Our patient has chronic severely symptomatic, what is the management needed in the first hour?
    State the type of IV fluid, volume and infusion time.
    A. 150 ml 3% hypertonic over 20 min
    B. 150 ml of 0.9% saline in 20 min
    C. 150 ml 0.45 % saline over 20 min
    D. 150 ml of 0.3% saline in 20 min

11. Our patient has chronic moderately symptomatic hyponatremia, what is the immediate management needed?
    State the type of IV fluid, volume and infusion time.
    A. 150 ml 3% hypertonic over 20 min
    B. 150 ml of 0.9% saline in 20 min
    C. 150 ml 0.45 % saline over 20 min
    D. 150 ml of 0.3% saline in 20 min

12. Our patient has chronic moderately symptomatic hyponatremia, what is the target increase in the serum Na in 24 hours?
    A. 5 mmol/l
    B. 8 mmol/l
    C. 10mmol/l
    D. 12 mmol/l

13. If our patient has acute hyponatremia without severely or moderately symptomatic hyponatremia, what is the management needed?
    State the type of IV fluid, volume and infusion time.
    A. 150 ml 3% hypertonic over 20 min
    B. 150 ml of 0.9% saline in 20 min
    C. 150 ml 0.45 % saline over 20 min
    D. 150 ml of 0.3% saline in 20 min

14. Our patient has chronic hyponatremia without symptoms, what is the recommended maximum increase in serum sodium concentration of during the first 24 h and during every 24 h thereafter?
    A. 5 mmol/l; 7 mmol/l
    B. 8 mmol/l; 8 mmol/l
    C. 10mmol/l; 8 mmol/l
    D. 12 mmol/l; 10 mmol/l
15. Chronic hyponatraemia without severe or moderately severe symptoms: Patients with expanded extracellular fluid
Female 50 kg Na 115
What is the computed total body water?
A. 15
B. 20
C. 25
D. 30

16. What is the target serum Na correction for the day?
A. 6
B. 10
C. 12
D. 14

17. What is the computed Na deficit?
A. 150
B. 250
C. 300
D. 350

18. What type of IV fluid will be used in this case?
A. D5Water
B. 0.45% NaCl
C. 0.9% NaCl
D. 3.0% NaCl

19. How much of the chosen IV fluid would you need to achieve your computed deficit? (approximately)
A. 100 cc
B. 200 cc
C. 300 cc
D. 400 cc

20. What would be the rate of your IV fluid? (approximately)
A. 5
B. 10
C. 15
D. 20

---

APPENDIX B. CONCEPT MAP GRADING RUBRICS* 20 POINTS

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>WEIGHT</th>
<th>MAXIMUM</th>
<th>MPL</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Form and Appearance</td>
<td>5%</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Full of spelling errors, very hard to read: 0.2 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some spelling errors, moderately organized 3.4 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neat, well-organized, no spelling errors: 5 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Accuracy</td>
<td>5%</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Many inaccurate concepts: 0.2 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A few inaccurate concepts: 3.4 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All concepts are accurate and factual: 5 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Completeness</td>
<td>19%</td>
<td>10</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Limited number of concepts and relationships used: 0.2 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included mostly minor concepts but missed important major concepts and relationships: 3.4 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed the major important concepts and relationships: 5.7 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Significance and Meaningful Connection</td>
<td>10%</td>
<td>10</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>No meaningful connections between concepts: 0.2 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A few meaningful connections were significant and meaningful: 5.7 points</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

*Adapted from Mueller's Classroom Concept Map Rubric

TOTAL POINTS

APPENDIX C. ADMITTING ORDERS GRADING RUBRICS 10 POINTS

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>WEIGHT</th>
<th>MAXIMUM</th>
<th>MPL</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correctness of prioritization, clearness and sequence of orders</td>
<td>5%</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>All or Majority of orders are not in order of priority, vague and not in sequence 0.1 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some orders are not in order of priority, not all clear and in acceptable sequence 2.3 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All or Majority of orders are in order of priority, clear and in sequence 4.5 points</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Completeness</td>
<td>5%</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Limited number of diagnostic and therapeutic orders: 0.2 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included mostly the important diagnostic and therapeutic orders 3 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included most of the major important diagnostic and therapeutic orders 4 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete and included the important major diagnostic and therapeutic orders 5 points</td>
<td></td>
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<td></td>
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</tbody>
</table>

TOTAL POINTS
Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence of Fourth-Year Medical Students During First-Time Patient Encounter: An Effective Bridging Tool After Online Didactic Undergraduate Classes During the COVID-19 Pandemic

Maria Faye Anne S. Gomez, MD, Leonid D. Zamora, MD, Paul John Ablaza, MD, Melvin R. Marcial, MD, MHPEd, Leilani B. Mercado-Asis, MD, PhD, MPH, MEd (DE)

ABSTRACT

Background and Objective: Teaching clinical skills to undergraduate medical students has brought significant challenges during the COVID-19 pandemic. Patient discussion utilized hypothetical cases from history taking to diagnosis and management. Further, everything was delivered online. Target-Oriented Clinical Skill Enhancement (TOCSE) is a teaching and learning tool that integrates the basic medical sciences, such as anatomy, physiology, pathology, microbiology, and pharmacology, at the clinical level. TOCSE has been proven to improve the clinical performance of fourth-year medical students. However, clinical confidence remains an issue, especially for medical students on pure online mode of learning during the pandemic. Therefore, this study was undertaken to determine if TOCSE also facilitates the development of confidence in the clinical performance of 4th-year medical students during the first-time patient encounter after online undergraduate classes.

Methods: Eight-item Clinical Performance Confidence Scale survey was performed at three (3) time points of fourth-year medical student’s rotation in the Department of Medicine: (1) prior to the deployment to the outpatient department (Pre-OPD), (2) after the first-time patient encounter without TOCSE workshop (Post-OPD no TOCSE), and (3) after the patient encounter with TOCSE workshop (Post-OPD with TOCSE). Mean and standard deviations were used to summarize the confidence level of the 4th-year medical students, based on the 10-point differential scale being 0 as not confident at all and 10 as very confident. Wilcoxon Signed Rank assessed improvements.

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Department of Medicine, Faculty of Medicine and Surgery, University of Santo Tomas, Manila, Philippines
of confidence level from Pre-OPD to Post-OPD. Effect sizes were also calculated to compare the improvement in the items. All statistical tests were performed in SPSS version 26.0. P-values less than 0.05 indicate a significant increase in the confidence level of 4th-year medical students.

**Results:** There is a significant increase in the clinical confidence of 4th-year medical students from Pre-OPD to Post-OPD no TOCSE (mean ± SD: 6.32 ± 1.02 to 7.06 ± 0.95, p<0.001). Comparing the eight items between Pre-OPD and Post-OPD with no TOCSE, performing a complete physical examination has the most remarkable improvement. Further, there is a significant increase in the clinical confidence of 4th-year medical students from Post-OPD no TOCSE to Post-OPD with TOCSE (mean ± SD: 7.06 ± 0.95 to 7.51 ± 0.89, p<0.001). The performance of a complete history-taking has the most considerable improvement (7.29 ± 1.03 to 7.89 ± 1.01, p<0.001). Correspondingly, the most significant increase in the clinical confidence of 4th-year medical students was seen among the Post-OPD with TOCSE compared to their Pre-OPD confidence scores (mean ± SD: 6.32 ± 1.02 to 7.51 ± 0.89, p<0.001). Among the eight items between Pre-OPD and Post-OPD with TOCSE confidence scores, the item on performing a complete physical examination has the most remarkable improvement (mean ± SD: 6.32 ± 1.02 to 7.20 ± 1.22, p<0.001), closely followed by performing a complete history-taking (6.53 ± 1.19 to 7.89 ± 1.01, p<0.001). The most significant improvements in clinical confidence were seen in all the items in the Post-OPD with TOCSE than in the Post-OPD with no TOCSE versus Pre-OPD confidence scores. In addition, with TOCSE, the number of medical students who scored 7.50 and above was amplified more than 3 times (17.4% to 58.7%, p<0.001, Pre-OPD vs. Post-OPD with TOCSE, respectively).

**Conclusion:** Target-Oriented Clinical Skill Enhancement (TOCSE) effectively builds up confidence during first-time patient encounter among fourth-year medical students taught online with hypothetical cases during their undergraduate classes.

**Key Words:** Target-Oriented Clinical Skill Enhancement, clinical confidence, clinical skill, fourth-year medical students, medical undergraduate challenge, online teaching in COVID-19 pandemic.
teachers regarded as assessors and supervisors in the student formulation of study strategies, they were likewise perceived as the source of student stress and anxiety [11]. This enormous challenge of imparting clinical skills to undergraduate medical students has been significantly compounded by the COVID-19 pandemic [12,13]. As a result, curricular restructuring resorting to online teaching has been implemented. Several teaching and learning strategies have been applied to offset the shortcoming of a virtual approach to clinical skill teaching. Online simulation and web-based resources have been utilized [14]. However, since social distancing is imperative in a pandemic, didactic knowledge and clinical skill teaching could only be applied to hypothetical cases. Foong and colleagues have reported that although virtual problem-based learning (PBL) during the pandemic improved students’ understanding of basic didactic sciences, clinical confidence is lacking, and they remained concerned about passing clinical examinations and content acquisition [13].

Our group has recently introduced the Target-Oriented Clinical Skill Enhancement (TOCSE), a teaching and learning tool [15,16] that has proven to be effective in bridging didactic knowledge to clinical skills and has enhanced the clinical performance of fourth-year medical students [17]. The experimental and control groups of medical students perceived the TOCSE tool as helpful in their graded clinical performance [17]. Whether the TOCSE tool can address the issue of confidence development among fourth-year medical students whose undergraduate years happened during the COVID-19 pandemic is a challenge for the current paper. This study was therefore undertaken to determine if TOCSE also facilitates the development of confidence in the clinical performance of fourth-year medical students during the first-time patient encounter after online undergraduate classes.

METHODOLOGY

The subjects were fourth-year medical students (N=109) during their two-months clerkship rotation at the Department of Medicine. An eight-item Clinical Performance Confidence Scale survey (Figure 1) was formulated based on the original TOCSE concept map [17] and was performed by the department’s Clerkship Supervisor at three (3) clinical stages (Figure 2): (1) prior to the deployment to the outpatient department (Pre-OPD), (2) after the first-time patient encounter without TOCSE workshop (Post-OPD with no TOCSE), and (3) after the patient encounter with TOCSE workshop (Post-OPD with TOCSE). At the

<table>
<thead>
<tr>
<th>Clinical Tasks</th>
<th>Not Confident At All (0)</th>
<th>Somewhat Confident (5)</th>
<th>Very Confident (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review the different normal signs and symptoms</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. Review the different abnormal signs and symptoms</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3. Perform a complete history taking</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4. Perform a complete physical examination</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5. Formulate relevant salient features based on the clinical data</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. Formulate plausible differential diagnosis/es, if any</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7. Recognize and assess comorbidities, if any</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. Formulate an appropriate and comprehensive management plan</td>
<td>0</td>
<td>1</td>
<td>2</td>
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</tbody>
</table>

Figure 1. The eight-item Clinical Performance Confidence Scale survey.
Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence

**Initial Assessment of level of confidence (Pre-OPD Survey)**

Clerks to apply Med 1 Med 2 learning in real OPD case

**Assess level of confidence (Post-OPD no TOCSE Survey)**

Clerks to undergo TOCSE workshop by Dr. Mercado-Asis

Clerks to apply TOCSE in Real Patients

**Assess level of confidence (Post-OPD with TOCSE Survey)**

*Figure 2. Algorithm of how the research was implemented depicting the three-staged survey: Pre-OPD, Post-OPD no TOCSE, and Post-OPD with TOCSE.*

initial deployment, the clerks discussed their cases applying the knowledge they had acquired from Medicine 1 and Medicine 2 modules during their undergraduate years. The Pre-OPD and Post-OPD no TOCSE surveys of the students were made to be the control for the Post-OPD with TOCSE.

The students were blinded that research was being performed to avoid bias in their self-assessment. Informed consent from the students was obtained after the third survey. Figure 2 depicts how the program was delivered to obtain the desired study outcome.

**RELIABILITY OF THE CLINICAL CONFIDENCE QUESTIONNAIRE**

The researchers in this study formulated the Clinical Confidence questionnaire. It was initially composed of nine items, with a 10-point differential scale of 0 as *not confident* and 10 as *very confident*. The nine items were about 1) reviewing the different normal signs and symptoms, 2) reviewing the different abnormal signs and symptoms, 3) performing a complete history taking, 4) performing a complete physical examination, 5) formulating relevant salient features based on clinical data, 6) formulating plausible diagnosis 7) formulating plausible differential diagnosis/es, 8) recognizing and assessing comorbidities, and 9) formulating an appropriate and comprehensive management plan.

The reliability index of the nine-item questionnaire during Pre-OPD was 0.939, while at Post-OPD no TOCSE was 0.942, indicating acceptable internal consistency. However, for the Post-OPD with TOCSE, the reliability index of Item 6 was 0.580. Thus, it was decided to remove Item 6, leading to an eight-item questionnaire. After removing Item 6, the eight-item questionnaire leads to reliability indices of 0.935 during Pre-OPD, 0.932 for Post-OPD no TOCSE, and 0.930 for Post-OPD with TOCSE, indicating acceptable internal consistency.

**STATISTICAL ANALYSIS**

Mean and standard deviations were used to summarize the confidence level of the 4th year medical students,
based on the 10-point differential scale being 0 as not confident at all and 10 as very confident. In addition, Wilcoxon Signed Rank assessed improvements in confidence level from Pre-OPD to Post-OPD. Effect size as recommended by Rosenthal [18] was also calculated in the comparison of the items. All statistical tests were performed in SPSS version 26.0. A p-value less than 0.05 indicate a significant increase in the confidence level of 4th year medical students.

**RESULTS**

Table 1 shows that on all items, there is a significant increase (p<0.05) in the confidence level of the 4th-year medical students from Pre-OPD to Post-OPD no TOCSE. Comparing the eight items between Pre-OPD and Post-OPD no TOCSE, item 4 (performing a complete physical examination) has the most significant improvement reported by the 4th year medical students. It is followed by item 8 (formulating an appropriate and comprehensive management plan) and item 6 (formulating plausible differential diagnosis/es, if any). The criterion with the slightest improvement seen is item 5 (formulating relevant salient features based on clinical data).

Generally, results show a significant gain in the clinical confidence of 4th-year medical students from Pre-OPD to Post-OPD no TOCSE (mean ± SD: 6.32 ± 1.02 to 7.06 ± 0.95, p<0.001). Likewise, Table 1 shows that on all items, there is a significant boost (p<0.05) in the confidence level of the 4th year medical students from Post-OPD no TOCSE to Post-OPD with TOCSE. Among the eight items between Post-OPD no TOCSE and Post-OPD with TOCSE, item 3 (perform a complete history taking) has the highest improvement as assessed by the 4th year medical students. It is followed by item 7 (recognizing and assessing comorbidities, if any), and item 5 (formulating relevant salient features based on clinical data). The criterion with the least improvement is item 4 (performing a complete physical examination).

There is a significant increase in the mean score of clinical confidence surpassing the threshold score of 7.5 (for very confident) of 4th year medical students from Post-OPD no TOCSE to Post-OPD with

<table>
<thead>
<tr>
<th>Items</th>
<th>Pre OPD</th>
<th>Post OPD no TOCSE</th>
<th>Post OPD with TOCSE</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review the different normal signs and symptoms</td>
<td>6.75 ± 1.12</td>
<td>*7.49 ± 1.10</td>
<td>*↑7.92 ± 1.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2. Review the different abnormal signs and symptoms</td>
<td>6.20 ± 1.24</td>
<td>*7.02 ± 1.02</td>
<td>*↑7.45 ± 1.06</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>3. Perform a complete history taking</td>
<td>6.53 ± 1.19</td>
<td>*7.29 ± 1.03</td>
<td>*↑7.89 ± 1.01</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>4. Perform a complete physical examination</td>
<td>5.67 ± 1.37</td>
<td>*6.82 ± 1.25</td>
<td>*↑7.20 ± 1.22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>5. Formulate relevant salient features based on clinical data</td>
<td>6.93 ± 1.08</td>
<td>**7.23 ± 1.09</td>
<td>*↑7.77 ± 1.03</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6. Formulate plausible differential diagnosis/es, if any</td>
<td>5.90 ± 1.26</td>
<td>*6.74 ± 1.20</td>
<td>*↑7.06 ± 1.11</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>7. Recognize and assess comorbidities, if any</td>
<td>6.81 ± 1.27</td>
<td>*7.22 ± 1.23</td>
<td>*↑7.83 ± 1.16</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>8. Formulate an appropriate and comprehensive management plan</td>
<td>5.70 ± 1.38</td>
<td>*6.65 ± 1.24</td>
<td>*↑7.00 ± 1.07</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td>6.32 ± 1.02</td>
<td>*7.06 ± 0.95</td>
<td>*↑7.51 ± 0.89</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values expressed as mean ± SD, based on the 10-point differential scale.

* p<0.01, ** p<0.05 vs. Pre-OPD, * p<0.001 vs. Post-OPD no TOCSE.
TOCSE (mean ± SD: 7.06 ± 0.95 to 7.51 ± 0.89, \(p<0.001\)) (Table 1 and Figure 3).

Figure 4 shows the mean score of each item comparing the 3-staged survey (Pre-OPD, Post-OPD no TOCSE and Post-OPD with TOCSE), demonstrating the significant improvements in each item in the confidence level assessment of different clinical skill performance among fourth-year medical students from Pre-OPD and Post-OPD no TOCSE to Post-OPD with TOCSE.
Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence

Given the statistical findings, the calculated effect size is 0.78, leading to the statistical power of the test as 100%, which indicates that the samples are sufficient. During the Pre-OPD survey, 19 students (17.4%) got an average confidence level score of at least 7.50. After Post-OPD no TOCSE survey, 36 students (33.0%) scored an average confidence level of at least 7.50, demonstrating a significant increase (17.4% to 33.0%, p=0.007). Comparatively, in the Post-OPD with TOCSE survey, 64 students (58.7%) assessed their confidence level at least 7.50. Likewise, this showed a significant boost (33.0% to 58.7%, p<0.001) in the number of students scoring at least 7.50 from Post-OPD with no TOCSE to Post-OPD with TOCSE. Moreover, from Pre-OPD to Post-OPD with TOCSE, the number of medical students who scored 7.50 and above was amplified more than 3 times (17.4% to 58.7%, p<0.001) (Figure 5).

**DISCUSSION**

**The importance of Clinical Confidence Development During Clerkship**

Clinical confidence has long been recognized as a desirable attribute in producing competent physicians. One of the goals of medical education is to ensure that medical graduates gain confidence in their professional skills.[19] A doctor’s confidence will influence his or her judgment in defending a clinical decision [20,21] and, more importantly, it reflects their prior and current attitudes toward becoming a safe doctor.[22] Confidence levels have been reported to correlate to reliable and decisive practice.[23] An appropriate level of confidence is necessary in order to transform medical students into medical practitioners who can deal with the predicament of life and death situations [24,25] working independently without relying on supervision, as well as a motivator for graduating medical students not to give up after an initial failure.[21]

In a longitudinal study by Foong and colleagues, among graduating medical students, clinical reasoning, problem-solving, medical knowledge, and clinical skills only yielded intermediate confidence levels.[3] The group of Lai has reported an agreeable finding.[6] However, when surveyed at last six months prior to graduation, the medical students have merely moderate confidence in all practical skills. What seems to be the missing link?
Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence

Statistically Significant Findings that TOCSE is Effective in the Development of Clinical Confidence During Clerkship: What gap is being addressed?

Identified issues relating to preparedness for clinical skills and performance of fourth-year medical students

Although clinical subjects have already been introduced in the second-year and third-year curricula, entering the arena of clinical application during the fourth year or clerkship still creates an environment of uncertainty, incompetence, disconnection, and space for poor organizational skills compounded by differences in the level of clinical mastery by teachers.[1,10]. Interestingly, although clerkship directors also recognized students’ struggles in performing clinical skills and adjusting to clinical cultures, they focused more on students’ difficulties applying knowledge to clinical reasoning and engaging in self-directed learning. [26] Wenrich et al. further pointed out that students’ expectations differ from faculty expectations which have been the cause of mounting students’ anxiety. Students had higher expectations than both faculty groups for advanced skills preparation.[27]

Sahu and colleagues framed learning objectives of the best practices to impart clinical skills in clerkship, emphasizing a patient-centered approach and understanding the significance of pathophysiology in clinical presentations.[28] Medical schools must adopt essential teaching methods that will influence student understanding of basic practical clinical skills apart from simulated learning, lectures, multimedia instruction, and problem-based learning. [7] When fourth-year medical students were exposed to teaching basic anatomy, both their anatomical knowledge and measures of perceived confidence increased.[29] Day and colleagues have reported similar observations.[5] Although fourth-year medical students exhibited a higher passing rate in musculoskeletal medicine than their third-year counterparts, their confidence level was low and the same. Increasing exposure to the subject through clinical electives resulted in greater clinical confidence and enhanced performance on the exam.[5]

The preceding discussion implies that continued proactive integration of fundamental sciences of medical knowledge during clinical skill development across all undergraduate years of medical learning is integral in building clinical confidence among medical students.

The unique features of TOCSE

Target-Oriented Clinical Skill Enhancement or TOCSE is both a teaching and clinical tool which integrates basic medical sciences such as anatomy, physiology, biochemistry, pathology, and pharmacology at the clinical level.[15,16] Recently, in a randomized controlled study, TOCSE has been effective in bridging didactic knowledge to clinical skills and enhancing the clinical performance of fourth-year medical students.[17]

TOCSE’s exemplary features evolved from its original conception as follows: 1) emphasis on risk factors for the primary disease, 2) formulating the concept map of the primary disease, 3) cropping the pathophysiology of chief complaint from the concept map, 4) writing the narrative of the chief complaint, labeling as “Anatomy of the Chief Complaint,” 5) dissection of the anatomy of the chief complaint to reflect treatment for immediate relief, diagnostic and management approaches for the chief complaint, primary disease, and related contributory comorbidities, and 6) overall abnormalities to correct in the patient as reflected in the history, physical examination, and concept map in general. Figure 6 shows students’ output of a narrative and dissection of the pathophysiology of the chief complaint and the primary disease with diagnostic and management approaches. Emphasis on the risk factors, concept mapping of the primary disease, cropping of the pathophysiology of the chief complaint, and writing a narrative and dissection of its “anatomy” are three unique features of TOCSE and will be discussed accordingly.[17]

Starting case analysis with emphasis on risk factors are helpful for novice learners since risk factors are specific for age, gender, race, and family; thus, it narrows down differential diagnoses.[30,31] In addition, the onset of non-communicable diseases cannot be precisely discerned, and therefore risk factors are utilized to estimate the temporal onset of certain diseases like diabetes, hypertension, and obesity. [32,33]

Concept mapping (CM) in medical education has significantly influenced three critical areas: 1) linking basic sciences and clinical practice, 2) developing clinical reasoning, and 3) interprofessional and
When CM methodology was introduced in medical education, it stimulated the learning of pathophysiological concepts and facilitated the dynamics of tutorial sessions. As a result, students could perform meaningful learning of pathophysiological mechanisms in the context of clinical cases. In the report by Fonseca et al., the construction of mini-maps versus a global map interestingly created a heightened degree of collaborative learning among the tutors and students. Further, concept mapping has also been shown to influence students’ interest and motivation. For example, Bala and his group demonstrated how concept mapping increased students’ awareness of HIV/AIDS, enhanced their pharmacotherapy knowledge, and improved their summative performance. Baliga and their team have shown similar observations. Over 50% of students scored full marks on the tuberculosis post-test versus their pretest scores. In addition, the students demonstrated positive responses (82.0%) using a concept map. Indeed, concept mapping is an aid for both meaningful teaching and learning. The graphical output reflects a cognitive framework and offers insight into a deeper understanding of basic medical knowledge fundamental to clinical application.

The immediate relief of a chief complaint is essential in caring for a sick individual. Chief complaint-based clinical performance offers the opportunity to assess the quality and reflect the value of care delivered. Confusion on which organ is involved primarily is offset if the pathophysiology of a chief complaint is dealt with. Some chief complaints are accurate by definition (e.g., shortness of breath), but others are not (e.g., hematemesis that turns out to be hemoptysis). Therefore, providing a diagnosis and explaining the pathophysiology of the chief complaint may reduce the time interval to the institution of immediate relief. In TOCSE, this dilemma is addressed with the dissection of the “anatomy” of the chief complaint supported by the formulation of the concept map of the primary disease, as shown in figure 6.

TOCSE and development of clinical confidence among fourth-year medical students

Confidence issue in clinical performance was heightened in the subjects of the current study because these were medical students whose undergraduate learning was purely delivered through online mode because of the pandemic. The study’s research design was made in such a way that the students themselves became the control (Figure 2). As has been demonstrated in the previous reports having mastered the basic medical science during the undergraduate years is not an assurance of
Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence

acquiring the needed clinical skill and confidence in patient care during clerkship [2-4]. Application of basic medical knowledge with ample time of immersion into various clinical settings has been demonstrated to be the needed solution to the identified gap for clinical confidence development among graduating medical students. [5-9]

The current study has shown a significant increase in the clinical confidence of fourth-year medical students from Pre-OPD to Post-OPD with TOCSE. Further, TOCSE significantly boosted the number of students with high clinical confidence scores. The current research outcome reflects that TOCSE, as a teaching and clinical learning tool, has addressed the need and expectations of fourth-year medical students on how to apply their basic knowledge in the care of a sick individual. As discussed, meaningful learning comes about thru pathophysiology-based analysis of a case.[41-44] Moreover, thru concept mapping, cognitive framework and clinical mastery are developed, leading to an enhanced understanding of the case and heightened learner motivation.[37-39] Such has been deeply marked in the core attributes of TOCSE.

Interestingly, at any point of clinical teaching and learning, incorporating basic knowledge with ample time for clinical application are two essential contributory factors in developing significant clinical confidence. Lufler and colleagues reported that integrating anatomy teaching increased anatomical knowledge and improved measures of perceived confidence among fourth-year medical students.[29] When given enough time to practice, senior medical students could perform fundoscopy confidently and have greater confidence in recognizing papilledema. [9] Further, greater clinical confidence and enhanced performance in musculoskeletal Medicine have been observed among fourth-year medical students who had exposure to the subject by taking clinical electives. [5] Notably, there was a significant correlation between experience and clinical confidence.[8] Medical students with more than five times exposure to bedside procedures like venipuncture, placing foley catheter, arterial line and chest tube, lumbar puncture, paracentesis, and thoracentesis have significantly higher confidence. Likewise, students entering anesthesia, emergency medicine, and surgery residency training have been reported to have significantly higher confidence levels.[8]

CONCLUSION

The application of TOCSE to clinical work among fourth-year medical students during their first-time outpatient encounter on a background of online mode of learning during the undergraduate years has proven to be significantly effective in building up the clinical confidence of the senior medical students.

The important unique attributes of TOCSE, which have been elaborated to be essential as contributory factors in clinical confidence-building, are the incorporation of basic medical knowledge in every stage of case analysis and pathophysiologic-based digestion of the case supported with a concept map. Concept mapping by students is a driver for sharpening in-depth cognitive understanding of diseases at the clinical level.

Teaching and learning collaboration of students with teachers remain intact even if the latter stay on the side. Overall, student motivation, an essential aspect of learning, is enhanced with increased clinical confidence.
REFERENCES


Low Sustainability of Weight Loss Among Patients with Non-alcoholic Fatty Liver Disease

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ABSTRACT

Background: Weight loss, though difficult to attain and sustain over time, remains the cornerstone of non-alcoholic fatty liver disease (NAFLD) treatment. We aimed to describe weight changes among NAFLD patients.

Methods: This was a retrospective, cohort study of consecutively-identified NAFLD patients with >2 clinic visits from March 2007–April 2018. Weight changes from baseline were categorized into weight gain, weight loss, and no change. Baseline liver and metabolic biochemistries and non-invasive liver fibrosis tests were correlated with the final weight changes. Succeeding weight changes after the initial follow-up visits were used to determine sustainability of weight loss.

Results: Of the 240 patients included, 123 (51.2%), 93 (38.8%), and 24 (10%) had weight gain, weight loss, and no change, respectively. Only 12.5% had >5% weight loss. Duration of follow-up was significantly longer for patients with weight loss (p<0.001). None of the baseline demographic and laboratory data were associated with weight loss. Patients with weight loss also did not have significant changes to their biochemistries and non-invasive liver fibrosis tests compared to patients with weight gain/no change. Compared to patients with weight gain after the initial follow-up, where only 11.8% were able to lose weight on the final visit, 73.1% of patients who lost weight after the initial follow-up were able to sustain their weight loss on the final visit.

Conclusions: Weight loss is achieved in only a third of NAFLD patients. Although 73% of patients who lost weight initially were able to sustain it, patients who gained weight after the 1st follow-up were unlikely to lose weight on further follow-up.

Key words: Non-alcoholic fatty liver disease, weight loss, sustainability

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is associated with multiple metabolic disorders, including obesity, insulin resistance, type 2 diabetes mellitus, hypertension, and hyperlipidemia. An ultrasound finding of an echogenic liver in the absence of other causes of chronic liver injury is an acceptable diagnostic criteria for NAFLD [1]. Histologically, inflammatory injury to hepatocytes in a process initiated by fat deposition in patients with NAFLD has the potential to progress to fibrosis, cirrhosis, and hepatocellular carcinoma [1]. In some patients, liver cirrhosis and hepatocellular carcinoma may even be already present on first diagnosis of NAFLD [2]. Therefore, it is imperative to identify...
these patients in the early stages of the disease and institute treatment accordingly.

Lifestyle modification leading to weight loss remains the cornerstone of management of NAFLD. Multiple studies have shown that weight loss of ≥5-7% led to a greater reduction in non-alcoholic steatohepatitis (NASH) compared to those with lesser degree of weight loss [3-5]. In addition, a ≥10% weight loss led to more ideal results of both resolution of steatohepatitis and regression of fibrosis [3]. It is generally agreed that a >5% weight loss is needed in order to see objective histologic improvement in patients with NAFLD. However, weight reduction studies show that only around 60% adhere to the lifestyle intervention regimens [6]. Moreover, studies on lifestyle intervention for NAFLD have shown that only 30-38% of patients achieve weight reduction [3,7]. As if achieving weight reduction was not a high enough hurdle, maintaining the weight loss for those who do lose weight initially, appears even harder. A meta-analysis of weight loss intervention trials show that the mean weights of patients followed for at least a year slowly increased through the years after the initial weight loss during the first 6 months, although the weights did not increase above the baseline levels [8]. A longitudinal follow-up of NAFLD patients in the United States showed that even though 32% of overweight/obese patients lost >5% of their weight at some time during their usual clinic follow-up, only 25% maintained this favorable result over time [9]. Compounding on the difficulty in maintaining weight loss is that patients, especially those with poor motivation and social and emotional support, may go through cycles of “yo-yo” dieting with resultant weight cycling. In a study of close to 180,000 patients, DerSarkissian, et al demonstrated that 60% of their obese patients had cyclic patterns in their weight changes over 2 years and that those patients who lost the most weight initially, perhaps representing patients who are more motivated to lose weight, were more likely to maintain their weight loss over time [10].

Although there have been a number of studies looking at the effects of weight loss in NAFLD patients, very few have looked at the weight loss/gain patterns of these patients over time and its effects on liver enzymes and liver function tests. We therefore aimed to determine the proportion of NAFLD patients who lost weight versus those who maintained/gained weight during the first follow-up visit, and among those who lost weight initially, the probability of sustaining their weight loss at the last follow-up visit. We also aimed to determine the correlation of weight trends determined at last follow-up, namely: 1) weight gain/no change; 2) weight loss; 3) weight cycling, on liver and biochemical tests.

**SUBJECTS, MATERIALS AND METHODS**

This was a retrospective, analytical, cohort study using data from a chart review of consecutive adult patients >18 years old with NAFLD seen in an outpatient hepatology clinic from March 2007 to April 2018. Patients were considered to have NAFLD if liver ultrasound demonstrated the presence of fatty liver, with no evidence of concomitant chronic liver disease such as autoimmune hepatitis and hepatitis B and C, no significant alcohol intake (>20 G/day for women and >40 G/day for men), and with no secondary causes of steatosis such as intake of drugs that may predispose to steatosis (amiodarone, estrogen, glucocorticoids, tamoxifen and valproic acid), those who underwent surgical procedures (i.e., gastropexy, jejunoileal bypass, extensive small bowel resection, bilipancreatic diversion and small bowel diverticulosis). Patients with hepatocellular carcinoma and those with no follow-up visit after the initial consult were excluded.

At the initial clinic visit, demographic data, viral hepatitis B and C markers, liver biochemistries such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST), albumin, and prothrombin time were determined. Other laboratory exams such as the fasting blood sugar (FBS), cholesterol, triglycerides, creatinine, blood uric acid (BUA), and platelet count were determined. At baseline and on succeeding follow-up visits, patients were advised to decrease their total caloric intake, especially carbohydrate intake, and to increase their physical activity through aerobic or resistance exercises at least three times a week at 30-60 minutes per session. No daily diaries or follow-up calls to check on their progress or adherence to the suggested lifestyle modifications were done. Follow-up visits were scheduled every 3-6 months thereafter with the same laboratory exams. The final weight change was derived from the difference between the weight on the final available clinic visit minus the baseline weight and was reported as either weight gain, weight loss or no change. Patients...
with at least 2 clinic visits were included in this part of the analysis.

To determine the effects of weight trends on the baseline parameters, we included only patients who had at least 3 clinic visits for this part of the analysis. Weight trend was categorized as either: Weight gain – increase in weight at final visit compared to baseline with no weight decrease (compared to baseline) in between; Weight loss – decrease in weight at final visit compared to baseline with no weight increase (compared to baseline) in between; and Weight cycling – decrease/increase/no change in weight at final visit compared to baseline with either weight increase or decrease (compared to baseline) in between. We also determined the sustainability of weight loss based on the initial weight change during the first follow-up clinic visit.

The final weight change and weight trend categories were correlated with the changes in ALT, AST, and metabolic biochemistries, when available.

Statistical analysis was performed using SPSS version 22.0 software (IBM Corp, Armonk, NY, USA). Continuous variables were presented as mean ± standard deviations and analyzed using the Kruskal-Wallis test, while categorical variables were presented as number (%) and analyzed using the Fisher’s exact test. P-values of <0.05 were considered statistically significant.

The study was approved by the Institutional Review Board. All protocols and procedures used were conducted according to the Declaration of Helsinki. The data collected was handled by the researcher and confidentiality was applied in accordance to the Data Privacy Act of 2012. The database was in a password protected laptop available only to the investigators.

RESULTS

Among the 663 patients diagnosed with fatty liver on ultrasound during the time period, 240 patients met inclusion criteria. At baseline, 185 (77.1%) patients were either overweight or obese while 55 (22.9%) were considered to have lean NAFLD. After a median of 13.4 months follow-up, 24 (10%) patients had no weight change, 123 (51.2%) gained weight, while 93 (38.8%) patients lost weight at the final clinic visit. Majority of patients who gained or lost weight had weight changes of less than 5% only and very few patients had gained or lost >10% of their weight from baseline. (Figure 1) The average weight gain for patients who gained weight was 5.9 ± 6.7% (4 ± 4.3kg) while patients who lost weight lost an average of 5.1 ± 4.6% (3.6 ± 3.3kg). Among the baseline parameters, only the presence of diabetes mellitus, number of clinic visits, and duration of

![Figure 1: Weight changes of NAFLD patients at the end of follow-up](image-url)
follow-up were significantly different between the three groups of patients, with diabetic patients more likely to have either weight gain or weight loss than no weight change, and patients with weight changes more likely to have more clinic visits compared to those who did not have weight changes. Patients who had weight loss were more likely to have longer duration of follow-up compared to patients with weight gain and no changes. Patients who were lean at baseline were not more likely to have weight loss compared to overweight/obese patients (Table 1).

At the last clinic visit, 47% and 44% of patients had a decrease in ALT and AST, respectively. Meanwhile, improvement in non-invasive scores for liver fibrosis were seen in 8% (APRI), 43% (FIB4) AND 4% (NFS) of patients. However, changes in the final weight did not significantly affect these markers, as well as other biochemical markers (Table 2). Subdividing patients who had weight loss

| Table 1. Baseline characteristics according to weight changes among NAFLD patients at the end of follow-up |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| No change n=24 (10%) | Weight gain n=123 (51.2%) | Weight loss n=93 (38.8%) | p-value | |
| Gender (M/F) | 10/14 | 67/56 | 50/43 | 0.505 |
| Age | 54.8 ± 11.1 | 50.8 ± 13.4 | 52.7 ± 15.9 | 0.058 |
| BMI: | | | | |
| Lean | 5 (9.1%) | 33 (60%) | 17 (30.9%) | 0.324 |
| Overweight/obese | 19 (10.3%) | 90 (48.6%) | 76 (41.1%) | |
| Alcohol intake (G/day) | 2.7 ± 8.5 | 3.1 ± 7.4 | 2.9 ± 6.6 | 0.961 |
| Diabetes mellitus | 14 (11.8%) | 51 (42.9%) | 54 (45.4%) | 0.036 |
| Hypertension | 17 (11.9%) | 74 (51.7%) | 52 (34.6%) | 0.407 |
| Cardiovascular disease | 5 (10%) | 19 (38%) | 26 (52%) | 0.081 |
| Metabolic syndrome | 16 (11%) | 69 (47.6%) | 60 (41.4%) | 0.367 |
| ALT | 40.5 ± 21.9 | 51 ± 41.6 | 55.9 ± 42.2 | 0.094 |
| High ALT | 10 (8.6%) | 55 (47.4%) | 51 (44%) | 0.266 |
| AST | 30.6 ± 16 | 38.7 ± 23.8 | 39.3 ± 22.7 | 0.803 |
| Platelets | 235.4 ± 38.3 | 252.6 ± 61.9 | 256.3 ± 60.8 | 0.638 |
| Albumin | 4.4 ± 0.5 | 4.4 ± 0.5 | 4.4 ± 0.4 | 0.667 |
| INR | 1 ± 0.1 | 1 ± 0.1 | 1 ± 0.1 | 0.059 |
| FBS | 118 ± 28.8 | 119.2 ± 46 | 124.8 ± 42.3 | 0.057 |
| Cholesterol | 219.3 ± 32.9 | 204.9 ± 44.4 | 213.6 ± 49 | 0.321 |
| Triglycerides | 174 ± 74.9 | 159.2 ± 110 | 172.4 ± 129.5 | 0.092 |
| BUA | 6.2 ± 1.6 | 5.9 ± 1.8 | 6.2 ± 1.7 | 0.913 |
| Creatinine | 0.9 ± 0.3 | 0.9 ± 0.5 | 0.9 ± 0.2 | 0.184 |
| APRI: (n=234) | | | | |
| <0.5 | 19 (11.2%) | 87 (51.2%) | 64 (37.6%) | 0.628 |
| >0.5-1.5 | 3 (4.8%) | 32 (51.6%) | 27 (43.5%) | 0.503 |
| >1.5 | 0 | 1 (50%) | 1 (50%) | 0.059 |
| FIB-4: (n=234) | | | | |
| <1.45 | 16 (9.4%) | 86 (50.6%) | 68 (40%) | 0.850 |
| 1.45-3.25 | 6 (10.7%) | 30 (53.6%) | 20 (35.7%) | 0.084 |
| >3.25 | 0 | 4 (50%) | 4 (50%) | 0.367 |
| NFS: (n=234) | | | | |
| F0-F2 | 12 (8.8%) | 73 (53.7%) | 51 (37.5%) | 0.677 |
| Indeterminate | 9 (10.5%) | 43 (50%) | 34 (39.5%) | 0.714 |
| F3-F4 | 1 (8.3%) | 4 (33.3%) | 7 (58.3%) | 0.714 |
| Number of clinic visits | 3.2 ± 1.5 | 6.2 ± 5.9 | 5.8 ± 5 | 0.049 |
| Duration of follow-up (months) | 7.3 ± 9.1 | 31 ± 30.1 | 78.5 ± 53.9 | 0.035 |
### Table 2. Improvements in biochemistries and non-invasive liver fibrosis tests according to weight changes among NAFLD patients

<table>
<thead>
<tr>
<th></th>
<th>No change (n=24)</th>
<th>Weight gain (n=123)</th>
<th>Weight loss (n=93)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT decrease</td>
<td>12 (50%)</td>
<td>54 (43.9%)</td>
<td>46 (49.5%)</td>
<td>0.678</td>
</tr>
<tr>
<td>AST decrease</td>
<td>8 (33.3%)</td>
<td>60 (48.8%)</td>
<td>37 (39.8%)</td>
<td>0.233</td>
</tr>
<tr>
<td>FBS decrease (n=226)</td>
<td>0</td>
<td>14 (12.2%)</td>
<td>9 (10.1%)</td>
<td>0.224</td>
</tr>
<tr>
<td>Cholesterol decrease (n=227)</td>
<td>0</td>
<td>14 (12.1%)</td>
<td>4 (9%)</td>
<td>0.206</td>
</tr>
<tr>
<td>LDL decrease (n=225)</td>
<td>0</td>
<td>13 (11.3%)</td>
<td>8 (9.1%)</td>
<td>0.247</td>
</tr>
<tr>
<td>Triglycerides decrease (n=226)</td>
<td>0</td>
<td>12 (10.4%)</td>
<td>7 (7.9%)</td>
<td>0.264</td>
</tr>
<tr>
<td>Improvement in APRI</td>
<td>3 (12.5%)</td>
<td>7 (5.7%)</td>
<td>6 (6.5%)</td>
<td>0.471</td>
</tr>
<tr>
<td>Improvement in FIB4</td>
<td>11 (45.8%)</td>
<td>50 (40.7%)</td>
<td>41 (44.4%)</td>
<td>0.828</td>
</tr>
<tr>
<td>Improvement in NFS</td>
<td>2 (8.3%)</td>
<td>4 (3.3%)</td>
<td>4 (4.3%)</td>
<td>0.521</td>
</tr>
</tbody>
</table>

### Table 3. Improvements in biochemistries and non-invasive liver fibrosis tests according to degree of weight loss among NAFLD patients

<table>
<thead>
<tr>
<th></th>
<th>No change/Weight gain (n=147)</th>
<th>&lt;5% Weight loss (n=63)</th>
<th>≥5% Weight loss (n=30)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT decrease</td>
<td>66 (44.9%)</td>
<td>32 (50.8%)</td>
<td>14 (46.7%)</td>
<td>0.735</td>
</tr>
<tr>
<td>AST decrease</td>
<td>68 (46.3%)</td>
<td>25 (39.7%)</td>
<td>12 (40%)</td>
<td>0.615</td>
</tr>
<tr>
<td>FBS decrease (n=226)</td>
<td>14 (10.2%)</td>
<td>5 (8.2%)</td>
<td>4 (14.3%)</td>
<td>0.677</td>
</tr>
<tr>
<td>Cholesterol decrease</td>
<td>14 (10.1%)</td>
<td>4 (6.6%)</td>
<td>4 (14.3%)</td>
<td>0.499</td>
</tr>
<tr>
<td>LDL decrease</td>
<td>13 (9.5%)</td>
<td>4 (6.6%)</td>
<td>4 (14.3%)</td>
<td>0.517</td>
</tr>
<tr>
<td>Triglycerides decrease</td>
<td>12 (8.8%)</td>
<td>4 (6.6%)</td>
<td>3 (10.7%)</td>
<td>0.784</td>
</tr>
<tr>
<td>Improvement in APRI</td>
<td>10 (6.8%)</td>
<td>3 (4.8%)</td>
<td>3 (10%)</td>
<td>0.635</td>
</tr>
<tr>
<td>Improvement in FIB4</td>
<td>61 (41.5%)</td>
<td>28 (44.4%)</td>
<td>13 (48.3%)</td>
<td>0.920</td>
</tr>
<tr>
<td>Improvement in NFS</td>
<td>6 (4.1%)</td>
<td>2 (3.2%)</td>
<td>2 (6.7%)</td>
<td>0.731</td>
</tr>
</tbody>
</table>

### Table 4. Improvements in biochemistries and non-invasive liver fibrosis tests according to the weight trend among NAFLD patients

<table>
<thead>
<tr>
<th></th>
<th>No change/Weight gain (n=45)</th>
<th>Weight loss (n=39)</th>
<th>Weight cycling (n=34)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT decrease</td>
<td>20 (44.4%)</td>
<td>17 (43.6%)</td>
<td>18 (52.9%)</td>
<td>0.679</td>
</tr>
<tr>
<td>AST decrease</td>
<td>23 (51.1%)</td>
<td>19 (48.7%)</td>
<td>17 (50%)</td>
<td>0.976</td>
</tr>
<tr>
<td>FBS decrease (n=109)</td>
<td>6 (27.3%)</td>
<td>6 (16.2%)</td>
<td>10 (31.3%)</td>
<td>0.177</td>
</tr>
<tr>
<td>Cholesterol decrease (n=110)</td>
<td>5 (12.2%)</td>
<td>5 (13.5%)</td>
<td>11 (34.4%)</td>
<td><strong>0.033</strong></td>
</tr>
<tr>
<td>LDL decrease (n=110)</td>
<td>4 (9.8%)</td>
<td>5 (13.5%)</td>
<td>11 (36.7%)</td>
<td><strong>0.010</strong></td>
</tr>
<tr>
<td>Triglycerides decrease (n=110)</td>
<td>3 (7.3%)</td>
<td>6 (16.2%)</td>
<td>9 (29%)</td>
<td><strong>0.049</strong></td>
</tr>
<tr>
<td>Improvement in APRI</td>
<td>3 (6.7%)</td>
<td>4 (10.3%)</td>
<td>1 (2.9%)</td>
<td>0.463</td>
</tr>
<tr>
<td>Improvement in FIB4</td>
<td>18 (40%)</td>
<td>16 (41%)</td>
<td>13 (38.2%)</td>
<td>0.971</td>
</tr>
<tr>
<td>Improvement in NFS</td>
<td>1 (2.2%)</td>
<td>2 (5.1%)</td>
<td>1 (2.9%)</td>
<td>0.753</td>
</tr>
</tbody>
</table>
into those who lost <5% and ≥5% likewise did not lead to differences in all the biochemical and non-invasive fibrosis markers (Table 3). In addition, sub-analysis of patients who were overweight/obese at baseline were not more likely to experience improvement in liver enzymes and non-invasive scores of liver fibrosis with weight loss, compared to lean patients. (p>0.05)

For patients who had at least 3 clinic visits, we were able to divide patients according to the following weight trends: No change/weight gain (38%); Weight loss (33%); and Weight cycling (29%). Except for a significantly greater decrease in cholesterol, LDL, and triglycerides in the Weight cycling group, there were no other significant differences in biochemical and non-invasive fibrosis score changes between the three groups (Table 4). For this same subgroup of patients, we determined that on the first follow-up clinic visit, 15 (12.7%) had no weight change, 51 (43.2%) had gained weight, and 52 (44.1%) had lost weight. At the final clinic visit, patients who had lost weight during the first follow-up visit were more likely (p<0.001) to maintain and still have weight loss (73%) compared to patients who did not have weight changes (40%) and patients who initially had weight loss (25%) (Figure 2).

DISCUSSION

The present study shows that weight loss was achieved in 38.8% of NAFLD patients during routine clinical care, with no additional more extensive enforcement of the recommended lifestyle changes. However, majority (67.7%) of the patients with weight loss only had a mild loss of <5% of their baseline body weight, with patients having ≥5% weight loss accounting for only 12.5% of the overall population. Although our patient population was advised to lose weight by decreasing total caloric intake and increasing physical activity, a structured program to ensure that they follow this recommendation was not provided. This finding is in line with a randomized controlled trial of more intensive lifestyle modification to effect weight loss in NASH patients, where a weight loss of at least 4% can be achieved in 38% of the intensive intervention compared to only 19% for the less intensive group [7]. Similarly, a more intensive enforcement of the desired lifestyle changes resulted in a higher proportion of patients with >10% weight loss compared with the control group (40% vs. 0%) in one of the earliest randomized controlled trials of lifestyle intervention in NASH patients [11]. It is clear that trials comparing more
stringent lifestyle interventions versus less structured interventions/control groups result in a greater degree of weight loss. However, prospectively followed patients with less extensive lifestyle modifications, even outside the context of controlled trials, may lead to only slightly lesser degrees of weight loss [3,9]. Compared to retrospective data, prospectively following patients may give healthcare providers more opportunities and urgency to encourage weight loss. Furthermore, studies done in specialized centers may already have programs in place to maximize patients’ chances of achieving weight loss [9].

We found that although there was no difference in the number of clinic visits between patients who lost and gained weight, patients who lost weight had a significantly longer duration of follow-up. This may be because patients who lose weight were likely more motivated and had a longer-lasting relationship with their healthcare provider, leading to better adherence to lifestyle change recommendations. While it is surprising to find that weight loss did not have a significant effect in improving the liver enzymes and biochemical parameters of patients, it may be because only a minority of our patients achieved >5% weight loss, which has been pegged as the minimum weight loss to achieve a reduction in hepatic steatosis in a meta-analysis [12]. However, weight loss of as little as 3% has been found to be associated with resolution of NAFLD in 41% [4]. It is therefore possible that histologic improvements may not always be reciprocated by improvements in serologic markers. The fact that close to 50% of our patients had improvements in their liver enzymes regardless of weight changes may be reflective of other variables that were not quantified in this study such as the level of physical activity. It has been found that exercise alone, regardless of weight loss, may reduce the amount of hepatic steatosis and serum free fatty acids [13].

We found that among patients with weight loss on the initial follow-up clinic visit, 73.1% were able to maintain their weight loss while 25% regained weight on further follow-up. This is consistent with another study which showed that 21% of their patients who had weight loss initially had regained weight on further follow-up [9]. A large study in obese patients showed that the ability to maintain weight loss may however be harder in non-specialized care settings, with 79% of patients unable to maintain their weight loss in 2 years [10]. One the possible reasons for weight regain is because following weight loss, there are physiologic compensatory changes that result in increased hunger and energy storage. Increases in orexigenic hormones such as ghrelin and decreases in anorexigenic hormones such as leptin and glucagon-like peptide-1 have been implicated in weight regain [14-15]. Furthermore, psychosocial factors [16], and the lack of supervised programs [6], especially during the maintenance phase, have been implicated in weight regain. This highlights the need for better programs and psychosocial support systems to keep our patients motivated to keep up with their lifestyle changes. In our study, patients who lost weight initially were more likely to have weight loss at the final visit compared to patients who gained weight initially (figure 2), implying that the weight change in the initial follow-up visit is a good indicator of patients’ willingness and motivation to follow through with losing weight.

Our study has several limitations. The retrospective nature of the study prevents us from further exploring other factors that determines weight loss in patients with NAFLD. Although all patients were consistently advised to have lifestyle changes to achieve weight loss during each clinic visit, the lack of a structured program with regular accountability of the patients’ adherence to the program may hinder the objective of achieving weight loss. Finally, paired liver biopsies to confirm histologic changes were not done and could have shed light on improvements in steatosis, inflammation and fibrosis that may otherwise not be deduced from the biochemistries. However, it is hard to convince patients to undergo liver biopsies for NAFLD outside of therapeutic trials.

CONCLUSION

In summary, we have shown that 39% of NAFLD patients achieve weight loss during routine clinic follow-up visits. However, only 12.5% achieve ≥5% weight loss. Patients who lost weight on the initial visit were able to maintain their weight loss 73% of the time and are most likely to be more motivated to lose weight compared to patients who gained weight after the initial visit. Achieving weight loss in NAFLD patients is evidently difficult to achieve and will need a structured lifestyle change program and a multidisciplinary approach to tackle the psychosocial, genetic, behavioral and biochemical factors contributing to weight changes in NAFLD patients.
Low Sustainability of Weight Loss Among NAFLD Patients

REFERENCES


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In 1927, the Department of Medicine of the University of Santo Tomas Faculty of Medicine and Surgery was first formally organized by Dr. William J. Burke, who served as the head of the department until 1939 when he was succeeded by Dr. Gervasio de Ocampo. Dr. Burke was a cardiologist and a philanthropist born in San Miguel, Manila, who finished his medical studies in Dublin, Ireland, and returned to practice medicine in Manila in 1900. While he was known to have received pontifical orders for his benevolent contributions from several institutions, little is written about his major contribution to the field of medicine and cardiology in particular.

It was Dr. William Burke who introduced and installed the first electrocardiograph in the Philippines. A commemorative plate built in his honor through an ordinance by the Manila City Council and signed by then Mayor Alfredo Lim on January 7, 1993, celebrates this milestone. This ornamental plate stands up to this present day in the Burke Building along Escolta Road in Binondo (Figure 1), which incidentally, is also documented as the first building in the Philippines to have an elevator [1,2].

His exploits as a cardiologist is further preserved and celebrated in an iconic picture with him holding an electrocardiographic tracing, and discussing its interpretation with a fellow physician, a classic black and white photograph with the caption “Dr. William Burke – A Portrait of a Physician” (Figure 2). This nostalgic picture wonderfully depicts the pedagogical relationship of the mentor and the student and stands as a symbolic representation of the clinician as a teacher.

However, not long before William Burke organized the department and brought the electrocardiograph to the Philippines, another visionary with a related name, “Willem” to be exact, became responsible for the invention of this medical tool which stands to this day as the most important diagnostic apparatus for the detection of myocardial ischemia and cardiac rhythm abnormalities, and remains an essential part of the initial evaluation of cardiac diseases.

Between the years 1900-1901, Willem Einthoven, a Dutch physician and physiologist, invented the first surface lead electrocardiograph—a string galvanometer using a fine quartz string coated in silver, which would later provide the first electrocardiographic recording, jumpstarting an era of greater understanding of cardiac rhythm disorders. The equipment then weighed around 600 pounds, needed several personnel to set up, and required the subject to dip his extremities in pails filled with electrolyte solution. He was awarded the Nobel Prize in physiology and medicine in 1924 [3].

Willem, however, credited another French physiologist, Augustus Waller, for the first human electrocardiogram in 1887, fifteen years before his string galvanometer recorded the first surface lead ECG tracing. Waller recorded electrical currents of the heart using a mercury capillary electrometer. This first electrogram consisted of only two deflections—ventricular depolarization and repolarization. Waller’s work inspired Einthoven to refine the electrometer and subsequent string galvanometer,
Figure 1. The commemorative plaque in Burke Building in Escolta St., celebrating the milestones of Dr William J. Burke, the founding chairman of the Department of Medicine. [photo taken by the author]
leading to the recording of the waveforms that we know today: the P wave, the QRS complex and the T wave. This paved the way for a better understanding of cardiac arrhythmias [4–6].

While Waller's work laid the foundation for electrocardiography, Willem’s vision transformed it into the finest moment in electrocardiology, and William’s heart initiated a new era of medicine and cardiology in the country.
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The things that truly matter...

Sandra V. Navarra, MD

Every Patient is Unique, and “time personally spent with the patient is the most essential ingredient of excellence in clinical practice”. [1] Voltaire (1694-1778) wrote “The art of medicine consists of amusing the patient while nature cures the disease”[2], and modern-day Patch Adams reiterates “You treat the disease, you win or lose; you treat both the patient and the person, you always win no matter what the outcome”. [3] Emphasizing the importance of shared decision-making, Dave deBronkart notes that “Medicine should let patients help improve care, share responsibility, and think for themselves”. [4] Patient advocacies like PEARL© (People Empowerment for Arthritis and Lupus) and LUISA© (Lupus Inspired Advocacy) focus on patient-centeredness as key to improved patient outcomes and achievement of optimal patient well-being. For these patients, life can be fulfilling despite a debilitating condition.

“Ultimately, patients need to find their own solutions and motivation and must take responsibility for their health; we must empower them to do just that”. [5] Even in the terminally ill, the patient’s feelings deserve to take precedence over the actual diagnosis. Let me share my personal experience and humble tribute to a patient named Frederick: “No more needles nor biopsies please…” We sensed his frustration after the battery of tests, procedures and physician-specialists he had gone through... still without a diagnosis. Here was a young man at the pinnacle of his career, recently married and ready to start a family, fully in control of his life … until this illness. The months of hospital confinement was an intricate intertwining of extreme science and delicate art, a roller-coaster ride through major as well as seemingly trivial yet crucial decisions i.e. starting steroids despite failure to arrive at a definitive diagnosis, painstakingly explaining the need for intubation in a fully awake patient, distinguishing the fine line between aloofness, aggression, sedation and simple narcotic side-effects and/or drug-drug interactions, and finally insisting to transfer out of the depressing confines of intensive care to a regular room where he can be with his loving family. It was a truly profound experience to witness this young man transform from the turmoil of uncertainties to anger to denial to stoic acceptance and valiant display of tranquility – despite being paralyzed from waist down! Wherever this ride takes us, it will ultimately be Frederick who will take control and make things happen in his time, in God’s time.

The Patient is the Best Teacher. The Patient Partners© educational program of Rheumatology actively involves patients with chronic inflammatory arthritis i.e. rheumatoid arthritis, spondyloarthropathies, who are trained and certified to teach musculoskeletal exam, and lupus patients who share their individual struggles and triumphs over their chronic condition. The program “doesn’t force students to give patients a diagnosis, instead, it allows them to experience their patient’s life and gain skills to be more effective caregivers” [6] – these are valuable learnings which are not obtained from books or lectures even by esteemed professors. Some feedback from appreciative medical students: “No matter how debilitating, these patients continue to live their lives to the fullest, transforming sheer disability to positivity” and “the program is not something I usually catch within the four corners of the classroom; from experiences like these I learn about the things that truly matter, inspiring us future...
The things that truly matter…

“…doctors to strive hard in order to make our patients’ lives comfortable as best as we can.”

**The Practice of Medicine is a continuous Interplay of Science and Art.** Artificial intelligence (A.I.) has come to permeate our lives in ways previously unthinkable, providing us with the remarkable convenience of diagnosis and management options at the tap of a finger. However, along with the conveniences and opportunities brought by A.I., are the risks and challenges… including the consequences of instant gratification leading to instant frustrations, and the many ways digital health is affecting the doctor-patient relationship. Imagine a patient bluntly telling you ‘I already diagnosed myself on the internet, I’m only here for a second opinion’!?!

How then to stay relevant – and keep sane? Learn from, rather than dwell on, your mistakes. It is said that a person who never made a mistake never tried anything new. “I can is 100 times more important than I.Q.” [7]. To share a few pearls gathered in training and clinical practice: (1) The best time to make mistakes is while still under supervision of people who are more experienced, but remember not to commit the same mistake twice. (2) Make the most out of each patient encounter no matter how mundane or ‘toxic’; never dodge unusual, challenging and complicated cases that will define you as an astute physician, the next chance to see a similar patient will likely be in your clinical practice where you must establish your credibility as a certified ‘M.D.’; (3) I advise trainees to remember the mnemonics ‘I.A.P.’ to guide management decisions in clinical practice: initiative in self-directed learning, constantly search for relevant resources and references. Anticipate and recognize possible consequences of your decisions including drug side-effects and drug-drug interactions. Prioritize decisions such as medications over diagnostics, refrain from ordering a test unless it will impact your treatment decision; (4) The practice of Medicine is a lot of common sense. For instance, a well-written prescription is utterly useless if the patient does not, or could not afford to, take the medications. Be the sensible physician who treats the person and not the laboratory test. Be a good communicator striving to earn and enhance the patient’s trust and confidence by actively engaging her/him in clearly laying out immediate, intermediate and long-term plans tailored for the individual patient.

**Serving Others is the Best Medicine.** A pair of doctors recently published “Wonder Drug: 7 Scientifically Proven Ways That Serving Others Is the Best Medicine for Yourself”.[8] Backed by scientific evidence, the book makes us rethink our notions of self-care entrapped in a narcissistic sense of entitlement, and realize that focusing on others is a “potent antidote to the weariness that so many of us feel in modern times. Kinder people not only live longer, they also live better. Science actually shows that serving others is not just the right thing to do, it’s also the smart thing to do”.[8]

The COVID-19 pandemic has created unprecedented havoc in our lives and brutally forced us to confront our vulnerability and mortality. On the other hand, it has compelled us to recognize that every person is created in the image of God and worthy of our respect and care. It has made us better appreciate the true beauty of the world around us and “revealed a vast sea of kindness and benevolence in our midst, led to countless acts of selfless heroism, and impelled many of us to use our greatest strengths to serve humanity, giving our lives new, inspiring meaning”.[9] It is thus crucial not to

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**A Precious Gem**

**PEARL** theme song lyrics by Adrian Ramirez, music by Catherine Zulueta

A chance to share, a chance to care  
A chance to be, whoever I can be  
This is us, this is we…  
A precious gem… this is me  
I am my dream, not my condition  
I’m not a disease, I am my volition  
I am useful I know, so…Give me that chance to grow  
This is life, and it’s worth living  
We see the light amidst the blur  
We can face whatever life may hurl  
We are strong, this is PEARL  
See us shine as we open our shell  
Listen to our stories to tell  
It’s our right to be respected  
To dream and win as we’re expected

**Refrain:**  
A chance to shine, to love, to soar. A chance to live is what we long for.  
We are friends, we are family. Look beyond what you see…
revert back to our pre-pandemic wasteful self-serving interests. As educators, we must remind ourselves and our students to appreciate our most essential needs, uphold our highest values, and fervently renew our commitment to care for Mother Earth and battle climate change. Good things await those who hope: “To us Christians, the future has a name, and its name is HOPE. It is the virtue of the heart that does not lock itself up, does not dwell on the past and not only survives the present, but is able to see tomorrow” [10].

Be Grateful, be Humble. Life is a gift. “Don’t go around saying the world owes you a living. Actually the world owes you nothing. It was here first” [11]. Remember that “someone is sitting in the shade today because someone planted a tree a long time ago”[12]. Always be grateful for your countless blessings, and the countless opportunities to pay these forward…

In the conundrum of this restless world, we need to focus on the things that truly matter. “It is only with the heart that one can see rightly; what is essential is invisible to the eye.” [13] Many times, it simply depends on the choices we make.
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INSTRUCTIONS TO AUTHORS

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Types of Papers

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The manuscript must have the following:
• title page (start of manuscript, title of the manuscript, authors with academic titles and addresses, correspondence, running title, five keywords, number of words, number of tables, and number of figures)
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• article body (see detailed instructions below)

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1. Although embedded in the JMUST platform too (see details), a PLAGIARISM Check be performed by the Author prior to submitting your manuscript;
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6. Review of literature should not be a sub-heading, should not be bulleted, and should be part of INTRODUCTION; Same is true for Presentation of Objectives and Significance of Study, and are therefore made in paragraph form (rather than numbered); These are correspondingly placed in the tail-end of the INTRODUCTION;

7. METHODS should have fewer sub-headings; Sample size estimation, equations, and Statistical Applications be part of METHODS;

8. Ethical consideration and Institutional Review Board approvals should be shortened to two to three sentences and incorporated in the METHODS;

9. RESULTS, coming in paragraphs be encouraged, and with fewer sub-headings; Results can be beefed up by Tables and Figures, thus reducing redundancy in statements;

10. CONCLUSIONS should be short; Recommendations should not be a separate heading, instead, they should be incorporated as statements after the CONCLUSION in that paragraph;

11. DECLARATION OF COMPETING INTERESTS (or Conflict of Interest/COI) be necessary after the CONCLUSION; This includes Sources of FUNDING (partial, total, pharmacological) or a declaration of No source funding;

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Here is an example.


14. TABLES and FIGURES are supposed to be numbered, Tables that are lengthy need to be compacted together, and a maximum of 5 Tables be all needed; Footnotes be encouraged, if necessary; Ensure that each Table and Figure is likewise alluded to in the content of the manuscript;

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Vancouver style must be used for reference citation and reference writing. In the manuscript, the citing of references must be as follows:

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Sy MG, Calimag MM, de Sagun RQ, et al. We got to move it, move it: The lived experiences of family carers of youth with chronic neurodevelopmental disorders as they enter into adult health care. J Med UST. 2020,4(2):486–99.

If there are 7 or more authors, only the first 6 authors will be cited, followed by “et al.”


Figure and Tables – more details

Use Arabic numerals for Tables and Figures. Both Tables and Figures are placed at the end of the manuscript. Tables must be in Word format with a descriptive title related to the data being presented. Figures, charts, and images must be in high resolution in JPEG format. Legends will be separately placed after the references.
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Jannah Lee Terranza, Christine Joy Bongon, et al.
DOI: 10.35460/2546-1621.2022-SP03

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Melvin Remulla Marcial
DOI: 10.35460/2546-1621.2022-SP07

Target-Oriented Clinical Skill Enhancement (TOCSE) Builds Up Confidence
Mara Faye Gomez, Leilani Mercado-Asis, et al.
DOI: 10.35460/2546-1621.2022-SP15

Medical Professionalism in the Time of the COVID-19 Pandemic and Beyond
Angeles Tan Alora
DOI: 10.35460/2546-1621.2022-SP02

Internal Medicine at 95: An Illustrious Past, A Dynamic and Vibrant Present and A Revolutionary Future