Comprehensive Study On General Medicine, Radiology, Laboratory Medicine, And Psychiatry

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1. INTRODUCTION

Along with universally renowned technological advancements, accrued medical insight, and global achievements, the intricate and sophisticated systems at the core of modern day healthcare remain of the utmost importance to humanity. Comprising general medicine, radiology, and laboratory medicine, and with the aid of performing each independently, modern day healthcare ensures that accurate diagnosis, efficient treatment, and maximum outcomes for the patients remain a unity. More than other fields, modern-day healthcare has provided unprecedented advancements in patient care.

Defining medicine, general medicine serves as the first and foremost a primary healthcare. Especially in initial consultations, the general practitioners at this stage of care serve as “gatekeepers” of primary care, where care coordination, and vital clinical decision-making are done to determine levels of care that are appropriate to other specialists. With knowledge and skills ranging from the diagnosis of illnesses to the management of complex problems, general practitioners manage care for patients of any age and from any background. General practitioners relieve the problems of fragmentation in the healthcare, and they are the ones who conduct the movements in the health system at all levels. The general medicine practitioners offer care for emotional and psychosocial issues, in addition to the broader problems like systems and ill conditions.

The second pillar of medicine 'Radiology' has greatly impacted the practice of medicine by making it possible for physicians to see the structure of the human body without having to perform invasive procedures. This practice has advanced beyond its origins with Rontgen's 1895 radiographs to include modern techniques such as computerized tomography, magnetic resonance imaging, ultrasound, and nuclear medicine. Radiology is one of the most important and essential diagnostic tools in modern medicine for the early detection of disease, the precise localization of disease, and the assessment of the effects of a disease treatment in real time. Diagnostic radiology has successfully incorporated theories of artificial intelligence which has greatly improved the efficiency and accuracy of diagnosing and interpreting medical care imaging. This has driven advances in the practice of medicine.

Laboratory medicine forms the third significant element, supplying data used for clinical decision-making. Clinical laboratories analyze specimens such as blood, urine, tissues, and other fluids to find abnormalities, recognize pathogens, assess disease status and monitor responses and effects of treatment. The improvement of laboratory medicine techniques from simple microscopes to molecular diagnostics has improved and progressed our understanding of diseases. Laboratory medicine is a diverse and wide-ranging field today, including clinical chemistry, hematology, microbiology, immunology, and molecular pathology, all of which provide valuable perspectives on the status of a patient’s health.

The relationship of the three branches of medicine is illustrative of the interdisciplinary nature of contemporary medicine. The clinical evaluation of the patient by the general practitioner is the main factor that guides the choice of radiological examinations and laboratory tests. Laboratory findings may lead to further radiological examinations and vary the focus of the clinical assessment. The combination of clinical assessment, radiology, and laboratory data provide a valuable insight toward the patient's conditions, reducing the likelihood of errors and enhancing treatment.

These three disciplines concern themselves with more than just patient interactions. They spearhead the core components of public health, epidemiology, and the health of the population as a whole. Major components of screening programs include tests from the lab and subspecialty imaging, and these are ordered from primary care. The public health surveillance of diseases relies on the reporting of diseases from the lab. The integration of clinicians, imaging subspecialists, and laboratory scientists is essential to the evaluation of new treatments and to the improvement of the disease control continuum in the system. The COVID-19 pandemic brought to light the importance of a system that supports the laboratory for diagnostic tests, the radiology department for chest imaging, and the primary care role that coordinates public health and patient management.

2. GENERAL MEDICINE

2.1 Definition and Scope of General Medicine

General medicine fields are also known as internal medicine in many healthcare systems. This field of medicine focuses on adults and their illnesses. General medicine does not involve surgical and procedural specialties. Instead, specialties focus on one organ system or one technical intervention. General medicine focuses on the patient care and the patient as the whole, fully integrated biological, psychological and social unit. General medicine is one of the broadest fields, covering all organ systems and disease processes, including all endagers of adult populations. This is medicine from acute infectious disease to chronic degenerative disease.

General practitioner or internist is a medical detective. They put together the pieces from patient histories, from physical and diagnostic exams and clinical reasoning. Then they arrive at the appropriate conclusions and develop multi-faceted treatment plans. This step is largely reliant on one's knowledge of anatomy, physiology, pharmacology, and pathology and their overlaps in epidemiology. In addition to all this knowledge, general physicians must manage communication on the level of advanced explaining to develop and to maintain therapeutic relationships with their patients, to understand their issues and preferences, to teach them about their diseases, and the possible paths to treat them.

The scope of general medicine goes beyond handling present illnesses to include preventive health care, health advocacy, and the early detection of diseases. General practitioners are instrumental in profiling risk of prevalent illnesses such as heart diseases, diabetes, and cancer, and taking measures in reducing such risk and carrying out relevant screenings in an appropriate age range to detect and address such illnesses when they are in their most treatable stages. This aspect of medicine has enormous relevance to public health and early intervention to mitigate the disease burden and the costs of health care at the population level.

General medicine history

General medicine, like other fields, has experienced transformation from one stage to another, and has, indeed, undergone a remarkable transition from a bare science to a system based on empirical evidence. In ancient times medicine was practiced on an empirical basis, as a science was not a part of the knowledge system as systematic investigations on mechanisms of diseases had not been developed. Among the ancient Greeks Hippocrates was the first to elaborate and establish principles of medicine as a observation and symptom recording with attention to the role of the physical and social environment in the production of a disease. In the Hippocratic school medicine was first rationalized and removed from the realm of religion and magic.

Throughout the medieval centuries the Islamic world cultivated and expanded the knowledge of medicine. Ibn Sinna and Al-Razi made important advances in the fields of clinical medicine, pharmacology and medical pedagogy. Avicenna's Canon of Medicine was the first to be introduced in the syllabuses of Euro- pean medical schools, which indicates the rapid and first Islamic medical scholarship impact on Western medicine. In the Renaissance period, renewed interest in ancient texts and anatomical studies was witnessed. The detailed dissections and illustrations of Vesalius put an end to the anatomical misconceptions of the ancient texts.

The 1800s were the dawn of a new era of scientific medicine in the form of experimental and pathological disciplines. General medicine began to include the microscopic study of diseased organs and tissues to understand the disease process. Pasteur and Koch's germ theory of disease formed the basis of preventative medicine and scientific infectious disease care, leading to antiseptics, vaccination, and infection control. Medical education became a discipline in its own right with the advent of modern medical schools, which offered a standardized and comprehensive curriculum including the scientific method and clinical education.

General medicine underwent another paradigm shift in the 1900s with the rapid expansion of medical knowledge and technology. Treatment of bacterial infections, which were once frequently fatal, became easily treatable due to the antibiotic discovery. Treatment advancements in chronic conditions, such as hypertension and diabetes, created a shift in disease burden away from predominately infectious disease and towards non-communicable diseases. In the late 1900s, evidence-based medicine emerged, which emphasized the necessity of clinical research and clinical trials for the formulation of therapeutic strategies and the flexibility of treatment rather than the archaic frameworks of treatment which were based on the authority of the clinician.

2.3 Core Principles and Competencies in General Medicine

In assessing and treating patients in modern medicine, there are certain guiding principles, and one such principle is the patient-centered approach. This principle values the understanding and consideration of individuals in their uniqueness, such as their needs, values, and preferences, as well as circumstances that ought to be factored in treatment decisions. This is in contrast with the disease-centered approaches that center solely on the diseases and pathological processes and neglect the patients as individuals and their quality of life.

A core competency in general medicine is diagnostic reasoning, which, in general, is the organized process of collecting and analyzing pertinent clinical data. This is done in order to construct a differential diagnosis and subsequently arrive at the diagnosis that best explains a patient's clinical presentation. This is accomplished mainly through a comprehensive history. This history taking ought to be in the form of a detailed inquiry about the symptoms with regards to their nature, onset, duration, severity, and context, as well as the pertinent past medical history, family and social histories, and a systems review. Further to the history, the clinician ought to perform a physical examination to obtain more subjective data by inspection, palpation, and auscultation of the relevant systems. An integration of the findings of the historical and physical examinations enables a physician to formulate a working diagnosis and to seek additional data to confirm or rule out the diagnosis.

2.4 Clinical Practice in General Medicine

Concerning outpatient consultations, ward rounds, emergency evaluations, and preventive care, general medicine consists of a myriad of activities. In outpatient consultations, general practitioners take, on average, 15-30 minutes, and within that time, they have to take a relevant history, perform a physical exam, assess test results, devise a plane of action, prescribe medicine, and educate the patient, all while documenting the consult. One of the challenges in medicine is how to devise constructive and efficient processes to optimize time for patient evaluations, and within the time constraints of medicine, to focus on the primary concerns of the patients.

2.5 Common Conditions in General Medicine

Cardiovascular diseases are the leading causes of suffering and dying all over the world and are therefore of primary importance in general medicine. Across the world, billions of adults are said to be suffering from hypertension, one of the most significant risk factors for stroke, heart attack, heart failure, and chronic kidney disease. General practitioners have the responsibility of monitoring and controlling blood pressure, starting and adjusting blood pressure lowering medications, and managing lifestyle factors that contribute to high blood pressure. Moreover, prompt detection and management of coronary artery disease, especially stable angina and acute coronary syndromes, with antiplatelet drugs, statins, and modification of other cardiovascular risk factors is essential.

In general medicine, diabetes mellitus, especially type 2 diabetes, is one of the most diagnosed conditions lately due to the growing obesity and sedentary lifestyle. General medicine is responsible for the diagnosis of diabetes by performing glucose tests, starting and adjusting glucose lowering drugs, monitoring for acute and chronic complications, and overall prognostic risk management. Diabetes is a chronic disease that makes diabetes management very complex, requiring a multidisciplinary team to take care of it that includes dietitians, diabetes educators, and nephrologists and other specialists for the aggressive management of associated risk factors.

Some of the illnesses in the primary care domain with an infectious disease component include those with upper respiratory common colds and those with systemic infectious diseases such as sepsis. The primary care provider must determine if the causative organism is viral and will not need an antibiotic and (or) if it is bacterial in which case an antibiotic will be needed. The viral resistance to antibiotics is a major factor in the epidemiology of infectious diseases, and in particular, primary care epidemiology. The response and vigilance to infectious diseases and the epidemiology of infectious diseases was clearly illustrated during the response and impact of COVID 19.

3. RADIOLOGY

3.1 Introduction to Medical Imaging

The field of radiology has also been one of the great advancements in the field of medicine. It has granted the ability for clinicians to use non-invasive approaches to view patients' internal anatomy, as well as pathologies. It has also paved the way for transforming diagnostic approaches to be more efficient, allowing clinicians to view the internal anatomy of a patient for diagnostic purposes as opposed to the outdated and more invasive practices of exploratory surgeries. Medical imaging is no longer limited to X-ray radiographs as imaging techniques have gotten better, and imaging can be done in more advanced formats like 3D and in real-time to visualize and assess physiological functions and processes at the molecular level.

3.2 Types of Radiological Techniques

3.2.1 Conventional Radiography

Due to its accessibility, affordability, and fast image acquisition, conventional radiography is also known as x-ray imaging, and remains the most frequently practiced imaging modality. X-ray within the patient's body is generated from accelerating electrons to strike a tungsten target, producing a spectrum of x-ray photons, and is captured by a detector. Denser tissues such as bones absorb more x-ray and radiographs of such tissues appear white, most tissues like the lungs that has air and other structures absorb less and appear black, and soft tissues like muscles produce intermediate shades of gray. Common radiographic examinations consists of chest x-rays to assess pulmonary and cardiac conditions, skeletal radiographs to assess fractures and other bone lesions, and abdominal radiographs to detect perforation or free air that indicates an intestinal obstruction.

The incorporation of digital radiography has fully transitioned the field of radiography with improvements such as the enhancement of radiography images, improvements of the storage processes, decrease of radiation exposure, and improvements of processes related to the transmission of images. The digital systems also allow images to be manipulated in terms of brightness and contrast. Further, the removal of film processing in radiography has also resulted in the digital radiography systems providing images almost instantaneously, which are useful in providing images that aid in quick clinical decisions. On the other hand, the conventional radiography processes are still used in the field even with the two dimensional presentations and other radiography related issues such as soft tissue contrasts because some of the structures with important findings could be obscured.

3.2.3 Magnetic Resonance Imaging

Imaging Soft tissue structures in the human body has always been challenging. However, magnetic resonance imaging (MRI) has become the gold standard because of its ability to provide high-quality resolution of soft tissues without the use of radiation. MRI works by taking advantage of the magnetic interactions with the hydrogen nuclei in the human body.

What differentiates MRI from other imaging techniques is the ability to manipulate imaging parameters repetitively to get different results in tissues. Based on the echo, different tissues can be highlighted. For example, T1 weighted sequences can be used to assess fat and tissues that have gadolinium in them. For tissues that have water (edema and inflammation), T2 weighted sequences can be used to assess them. For very early stroke detection, there is diffusion weighted imaging. For imaging without contrast, there is magnetic resonance angiography, and for assessing brain functions, there is functional MRI.

3.2.4 Ultrasound Imaging

Ultrasound imaging techniques provide the ability to visualize and map a variety of internal structures and patterns of the body in real-time. With the use of high-frequency sound waves, real-time imaging and obstetric imaging are achieved. This technique and imaging do not utilize ionizing radiation, which makes it useful for obstetric imaging and imaging over multiple short intervals of time. The ultrasound transducer, which comprises the imaging system, transmits sound waves and listens for the echoes while being reflected. Different structures, where the acoustic impedance of the tissue varies, reflect the sound waves. That information the system processes to generate and display images of the borders of the tissues and the structures encased within. The ultrasound machines are designed to provide real-time imaging and display and are thus able to image structures, such as moving hearts and blood vessels and also fetuses, as they move.

3.2.5. Nuclear Medicine and Molecular imaging

Unlike the majority of imaging modalities which concentrate on specific anatomical structures, nuclear medicine is one of the few imaging modalities that can visualize the physiological function of the body. Loosely radioactive, harmless, and metabolically engineered particles, tracers, are is administered to patient to allow imaging of specific organs. Gamma cameras and PET scanners capture the radiation that these tractors emit to produce images functioning to demonstrate the distribution and concentration of radioactivity within the body. The radio decay of the tracer that is within the structures of interest displays the metabolic activity level of the adjacent structures.

The primary reason why fluorodeoxyglucose positron emission tomography scanning is performed is to assist with diagnosing and managing different malignancies since most malignancies have increased glucose metabolism. This approach enables global cancer visualization, evaluates treatment response, identifies cancer recurrence, and identifies cancer spread beyond its primary site. If positron emission tomography is performed with computer tomography or magnetic resonance imaging, the additional anatomical information from computer tomography or magnetic resonance imaging will augment the diagnostic potential of the positron emission tomography. Other than the primary imaging applications of cancer, positron emission tomography can also help determine the functional status of cardiac tissues, assist in diagnosing a range of neurodegenerative diseases, control seizures, and is also useful in the management of epilepsy.

3.3 CLINICAL LABORATORY SCIENCES

Clinical laboratory services are a core part of modern health care. Through a clinical laboratory's work, a health care practitioner gets objective, numerical, and useful information for the entire health care management of the patient. Clinical laboratories examine biological specimens to identify disease, measure and evaluate the function of organs, manage and evaluate health status for the purpose of health screening. Although the information generated from laboratory tests affects at least 70% of clinical decisions, the laboratory service costs account for a small percentage of the overall costs in health care. This indicates the positive disparity of laboratory services in avoiding unnecessary and costly clinical services.

The elements of medical laboratories are grouped by function, whereby each unit is responsible for a distinct area of laboratory medicine. Divisions of clinical chemistry conduct quantitative analyses of the constituents of blood or other body fluids, such as electrolytes, glucose, enzymes, hormones, and therapeutic drugs. In hematology, blood cell analyses are carried out, and blood counts are done in their entirety, as well as coagulation and some specific tests for hematological abnormalities. In microbiology, the infective agents, such as bacteria and viruses, fungi, and parasites, are recognized through culture, molecular, and immunological techniques. In immunology and serology, antibodies and antigens are detected and associated with some infectious diseases, autoimmune diseases, and allergies. In anatomical pathology, which is divided into histopathology and cytopathology, tissues and cells are studied for the presence and possible explanation of diseases in their microscopic structures.

The practice of laboratory medicine involves more than just the technical performance of an assay; it also entails the selection of tests, interpreting results, and consulting with the clinician. Interpretation of results and consultations with clinicians involves laboratory physicians and clinical chemists who develop, validate and implement new assays. They also establish and maintain quality control systems, provide assistance to analytical trouble shooting, and offer guidance on the proper use and interpretation of the laboratory tests. The more complex and sophisticated the laboratory testing is, and because of newer advancements in molecular biology and automation, the more ongoing education and training is required to measure competence with these developments. The laboratory accreditation programs and laboratory proficiency testing guarantee that laboratories sustain high standards in analytical performance and maintaining regulatory compliance.

3.4 Types of Laboratory Tests and Their Clinical Applications

3.4.1 Clinical Chemistry

Clinical chemistry is a broad field because it concerns the analysis of numerous tests that determine the chemical constituents of blood and other fluids of the body, urine included. Basic metabolic panels test the kidney's function through the measurements of creatinine and blood urea nitrogen; assess control the control of glucose in diabetes, and measure the key electrolytes: sodium, potassium, chloride, and bicarbonate, which are important in the maintenance of acid-base balance and function of the body cells. Comprehensive metabolic panels include additional tests to that of basic panels to assess liver function through tests that measure, along with others, the level of: alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, bilirubin, and albumin. This comprehensive panel provides a broad metabolic status assessment that guides the diagnosis and monitoring of various conditions.

The diagnosis and risk assessment of acute coronary syndrome has been changed forever by cardiac indicators. Troponin, a type of protein released from cardiac muscle tissues when damaged, accounts for the metric standard assigned to indicators of myocardial infarction, and troponin tests allow for prompt identification of cardiac injury earlier than previously possible. Brain natriuretic peptide and N-proBNP aid in the identification of heart failure, its severity assessment, and in the direction of therapy, along with furnishing prognostic prognostic of heart failure. The differing time sequences in the rise and fall of the biochemicals', combined with the clinical history and electrocardiogram, allow the differentiation among the various forms of acute coronary syndromes and the proper choice of extra- or intracardiac procedures.

4.Hematology section

Hematology laboratories aid in the diagnosis and monitoring of a variety of conditions impacting the hematological system with specific focus the the blood cells and the blood coagulation. The complete blood count forms the anchor of laboratory tests in hematology providing a quantification of the red cells , the white cells, along with the platelets. Parameters of red cell hematologic indices such as hemoglobin concentration, hematocrit, mean cell volume, and red cell distribution width identify the type of anemia and further assessment of the range of red cells in distribution. Evaluating the white blood cell count and its differential in percentage can aid in indicating the presence of infection, inflammations, bone marrow illnesses and cancer diseases of the blood. The morphology and the amounts of platelets can assist in the evaluation of the functions of blood to clot and in recognition of a condition of too few platelets or too many platelets.

4.1 Quality Control, Standardization, and Laboratory Accreditation

Assuring quality within medical laboratories consists of processes designed to ensure quality of the test results, and ensure the test results are reliable and are of clinical utility. Quality assurance entails internal quality control and external quality assessments wherein the laboratory analyzes the same specimens as peer laboratories and results are compared. Quality control data is analyzed statistically and is presented as Levey-Jennings plots; if analytical errors, as defined by the Westgard rules, are detected, investigations and re-analyses are initiated prior to the release of the patients' results. Routine instrument calibrations, equipment maintenance, and checks of the laboratory environment are performed to ensure the highest analytical performance is achieved.

Efforts to standardize and to harmonize results to address the variability that exists within laboratory results are critical. Variability can exist from differences in methodologies, reagents, instruments, and even in the calibrators used. The consequences of variability can be very serious and can result in different laboratory results from the same patient sample. This can happen if the sample is sent to different laboratories due to the difference in methods used in the laboratories. Standardized reference measurement methods and the use of reference materials can provide traceable metrology to international standards, which can reduce within-method and within-laboratory variability. The variability of hemoglobin A1c and thyroid function test results have been standardized through harmonization to reliably improve the test results across different health care systems.

Laboratory quality is further validated via accreditation by such bodies as the College of American Pathologists and regional accreditation organizations. Standards in accreditation programs address different facets of the laboratory operation such as personnel, maintenance of the instruments, validation of methods, quality control, reporting of results, and control of documents. Laboratories are subjected to periodic audits by trained surveyors who assess compliance to the standards by reviewing documents, observing the practices, and interviewing the staff. Accreditation is not only an indicator of dedication but of ongoing dedication to quality. As such, patients and clinicians are assured that the laboratory results are accurate and will benefit the patients in the context of the clinical problem.

5. INTERGRATION OF THE THREE DISCIPLINES

The interrelationship among general medicine, radiology, and laboratory medicine is one of the foundations of modern evidence-based health care. Each discipline offers a different perspective, and when these perspectives are integrated, they provide a far greater understanding of the patient's problems than is available from any one discipline. Their integration begins at the most basic level of clinical practice, where general practitioners combine and integrate the details of the patient's history and physical examination with the findings of diagnostic imaging and the results of laboratory tests in order to arrive at a diagnosis and initiate a treatment plan. The process of clinical reasoning, which is the generation and testing of a series of hypotheses, relies heavily on the information from these three disciplines.

When considering a patient who displays signs of chest pain, the first thing that a general practitioner must do is pain characterization to assess the pain's quality, location, and possible radiation. This pain characteristic assessment also includes determining what symptoms are present and what factors aggravate or relieve the pain. Findings from the physical examination, which include heart sounds, lung auscultation, and peripheral perfusion, provide even more evidence to the practitioner. Other tests such as blood draws help determine which cardiac biomarker are present such as troponin that helps rule out whether there is a cardiac event or possible myocardial infarction. Further tests such as electrocardiography and chest x ray or CT angiography help rule out or determine other possible cardiac events or respiratory events such as pneumothorax or embolism. The combination of the clinical assessment, laboratory results, and imaging outcome enable the practitioner to make a concrete diagnosis and accurate management decisions that include differential diagnosis and risk assessment.

Section 6: Future Directions and New Developments

Over the years the field of medicine has been greatly influenced and shaped by technological advances, changes in health care delivery, epidemiology, and the diseases themselves. One of the major developments within the field of medicine is the concept of Integrative Medicine; a branch of medicine which facilitates a synergic approach between genetics, environment, and lifestyle so that prevention and treatment protocols can be customized at the individual level. The field of genomics in conjunction with proteomics and metabolomics is able to produce an incredible volume of biological data that when integrated with clinical data, medicine imaging, and laboratory data, can allow for the unprecedented individualization of the disease phenotype. The major clinical challenge that continues to elude us is how to turn this data, in a cost-effective and simplified manner, into actionable outcomes which will improve the patients health and overall clinical outcomes.

In all three fields, artificial intelligence, and machine learning are set to enhance already existing human functions. In general medicine, AI-supported clinical decision support systems are able to assist in diagnosis by cross-referencing and analyzing patient data and suggesting possible diagnoses according to learned patterns from millions of past cases.

Nevertheless, the concerns about the balance between human vs machine, liability, interpretability, validation, and other issues regarding the integration of AI into medical practice remain unresolved. There are doctors and patients who do not understand the medical reasoning behind some of the black box algorithms that make recommendations without revealing their reasoning, and this gap will likely result in reluctance or resistance. There is a need for AI validation because it is necessary to show that a machine Lee's AI in medical practice is not biased. It will take a variety of datasets, a variety of classes, and AI machine learning validation to show that a machine is Lee's AI in medical practice is not biased. The scope of the regulatory framework is continuous monitoring of the performance of medical devices, and performance determines the rate of change in the algorithms used in the medical devices, as well as the need for new data, which is determined by performance.

The advancement of telemedicine and remote monitoring technologies is transformational to the delivery of health care. All three of these areas are being impacted. Remote consultations allow general practitioners to review and assess a patient remotely. This can potentially improve the ability to obtain care in hard to reach areas and can decrease unnecessary visits to the emergency department. There are important considerations that can impact the quality of care with this remote monitoring technology.

Learning health systems build on the premise that healthcare institutions are able to learn from practice in order to improve the quality of care provided. Learning health systems require the routine collection and analysis of clinical, laboratory, and imaging data to define and document optimal practices and to discern adverse events and new associations between risk factors and outcomes. Effectiveness of treatment is best demonstrated by a randomized controlled trial, however, there are many cases where a real world trial is required. Effectiveness of treatment in practice is a pivotal research question in prescription medicine and has had a considerable amount of research published in recent years. However, in order to address the important question of learning from clinical data, there needs to be data infrastructure, standardization of data collection, and considerable thought given to the privacy, security, and analytical methods that address the confounding and selection bias in the observational data.

Increasing value of care and controlling costs are two important drivers that impact the ability to incorporate clinical data. Impacting the ability to incorporate clinical data is the need to control costs and avoid unnecessary testing and imaging to ensure high value care. The impact of the campaign is seen in appropriate imaging and testing procedures being selected. Considerable thought needs to be provided to the costs of diagnostic procedures that may be required in order ensure that appropriate diagnostic testing is employed. The appropriate diagnostic testing may be determined by the clinical context and the individual patient's preferences and the medicolegal context.

7. CONCLUSION

The analytical nature of this scholarship on general medicine/radiology/laboratory medicine has shown us the primary value of where these three disciplines converge and how they serve as the foundation of modern healthcare delivery. General medicine as a discipline offers the basic/master level of clinical knowledge, clinical reasoning, and patient-centered care that serves as the foundation for the whole cycle of diagnosis and management of a patient. General medicine as a discipline focuses on the vast domain of human disease and is the only discipline that challenges its practitioners to integrate parallel streams of data into a logical clinical diagnosis and management. The holistic care of patients that general medicine practitioners deliver is what sets this discipline apart and differentiates it from the other specialties. General medicine is the only discipline that recognizes that healthcare is more than the focus on a disease and that it is the holistic well-being of a patient that is more important. General medicine is the only discipline that delivers healthcare that is more than the focus on a disease and that it is the holistic well-being of a patient that is more important.

Radiology has changed the field of medicine with new, non-invasive, and minimally invasive (in some cases) ways to explore the human body and the diseases that affect it with exemplary precision. From the first X-ray, to the first picture, to the first image, and now to the first functional image, diagnostic imaging has changed the way we retrieve information, plan and monitor the treatment of patients and plan and monitor treatment of patients to the point of precision. Diagnosis and treatment are no longer limited to the chronic late, difficult to control diseases; pathology can now be localised with precision, and treatment and responses can be monitored. Technology in imaging hardware, image processing and artificial intelligence for the first functional image continues to flow, and closed flow systems for the first functional guide, and the vast field of science radiology continues to expand.

The field of laboratory medicine contributes foundational, quantifiable, and empirical evidence to aid in sound clinical decision making. This multifaceted area of study encompasses numerous laboratory tests, ranging from the simple to the more complex (e.g., blood counts, molecular, and genetic testing), and generates data concerning physiological functioning, biochemical abnormalities (deficiencies and excesses), infectious agents, and molecular disease mechanisms. The modern clinical laboratory possesses both high-throughput and high-accuracy, and together with meticulous quality control and standardization, the laboratories provide crucial test results upon which the most important decisions in medicine depend. The field of laboratory medicine, and its expansion into molecular diagnostics, and personalized medicine, place laboratory medicine at the cutting edge of medicine, and its effort in customization of medical therapy to the individual patient.

As technology continues to advance, Precision Medicine gains emphasis, and models of healthcare continue to evolve, the future of general medicine, radiology, and laboratory medicine will change. AI and Machine Learning will be integrated into all three disciplines to facilitate and improve performance of tasks that require human intelligence. Efficiency and accuracy will be improved, and potential gains of the technology will be realized, but only if human discretion is exercised to find the correct equilibrium between the use of the technology and remaining humanistic qualities of medicine. A shift to value-based care will require the appropriate use of diagnostic tests and imaging, and ensuring high-value services reach high need patients will be of utmost importance.

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