

Defining Clinical Excellence in Adult Infectious Disease Practice

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Clinical excellence should be recognized, particularly in the current climate that appropriately prioritizes relationship-centered care. In order to develop a recognition model, a definition of clinical excellence must be created and agreed upon. A paradigm recently suggested by C. Christmas describes clinical excellence through the following domains: diagnostic acumen, professionalism and humanism, communication and interpersonal skills, skillful negotiation of the healthcare system, knowledge, taking a scholarly approach to clinical practice, and having passion for clinical medicine. This work references examples of infectious disease (ID) clinical excellence across Christmas' domains and, in doing so, both examines how the definition of clinical excellence applies to ID practice and highlights the importance of ID physicians. Emphasizing such aspirational standards may not only inspire trainees and practicing physicians to pursue their own fulfilling clinical ID careers, it may also encourage health systems to fully value outstanding ID physicians who labor tirelessly to provide patients with exceptional care.

Keywords. clinician; clinical excellence; infectious disease.

A fundamental responsibility of physicians is to improve patients' lives through the provision of high-quality healthcare. In contemporary medicine, the value of the excellent clinician is often overlooked due to an emphasis on more easily quantifiable bottom-line values, such as income generation and research achievements in academia [1, 2]. Many practicing physicians and trainees have been lucky to learn from master clinicians who obtain thorough histories and perform careful examinations that result in accurate diagnoses. These individuals serve as role models and may influence trainees' approach to patients and their future practice. Given the importance of value-based and relationship-centered care in medicine, some have argued that clinical excellence should be measured, recognized, and rewarded [3]. However, until recently, a definition of clinical excellence did not exist.

To generate a definition of clinical excellence, Christmas [4] conducted semistructured interviews with physicians deemed "clinically excellent" at 8 institutions. Through qualitative analysis, the following 7 domains of clinical excellence were proposed as relevant to all medical disciplines: diagnostic acumen, professionalism and humanism, communication and interpersonal skills, skillful negotiation of the healthcare system,

knowledge, taking a scholarly approach to clinical practice, and having passion for clinical medicine.

Clinically excellent infectious disease (ID) physicians are critical to the modern health system. Infections are common and may involve any organ system; as a result, ID clinicians often work closely with both primary teams and other subspecialists. Infectious disease physicians must also be prepared to address the myriad of potential surprises that present before them by using their broad knowledge of pathology and physiology. They understand the interplay between host and pathogen, suspecting different manifestations of organisms based on patients' immunity and exposures. In addition, newer diagnostic technologies, although helpful, cannot replace an ID physicians' clinical judgment, including their identification and interpretation of salient laboratory findings.

Since the introduction of Christmas' [5–7] definition of clinical excellence, articles characterizing clinical excellence in cardiology, pediatrics, nephrology, and other fields have been published. Given the wide reach of clinical ID, an investigation of ID clinical excellence may be pertinent and informative. Identifying and promoting clinical excellence in ID is especially relevant given recent decreases in applications to ID training programs [8]. Medical students and trainees should be reminded of how challenging, dynamic, and important the field of ID is. This article references examples of ID clinical excellence across Christmas' domains and, in doing so, both examines how the definition of clinical excellence may be applied to ID practice and highlights the importance of the ID physician.

METHODS

We searched PubMed using "infectious diseases" and "clinical excellence" as keywords; "case reports" was used as a limit.

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This resulted in 4 articles, none of which discussed clinical excellence. Replacing “clinical excellence” with each of the domains also did not yield relevant articles. We subsequently searched using the following MeSH (Medical Subject Headings) terms and key words: “bacterial infections and mycoses”, “parasitic diseases”, “virus diseases”, “infections”, “doctor”, “clinician”, “physician”, “clinical excellence”, “communication”, “professionalism”, “humanism”, “skill”, “diagnostic skill”, and “diagnostic acumen.” This resulted in 42 037 articles. After applying “English”, “human”, “core clinical journal”, “case reports”, and “adult” as limits, 561 articles remained, including 3 that detailed the accomplishments of prominent ID physicians. Each abstract was screened by the primary author, who reviewed selected articles and compiled candidates. The authors then reviewed the candidate articles to decide which to include. In addition, the inclusion of a group of articles about a well known master clinician was suggested for the domain “passion for clinical medicine.” The selected examples demonstrate how each domain is used by ID physicians to deliver outstanding care.

RESULTS

Diagnostic Acumen

The importance of diagnostic acumen has been a part of medicine for centuries; some of the most influential physicians in history, such as Rhazes and Hippocrates, were valued for their diagnostic skills [9]. The physicians interviewed by Christmas [4] characterized clinicians who displayed diagnostic acumen as being thorough, having outstanding judgment, uncovering historical features and physical findings not seen by others, and applying experience thoughtfully.

In the summer of 1983, a previously healthy 48-year-old man visited his primary care provider in England with fever, nausea, and a headache [10]. His provider noted a temperature of 38.5°C but no localizing physical findings. The patient was prescribed erythromycin and transiently improved, but his symptoms soon reappeared. He then developed a progressive headache and eventually became obtunded 2 weeks after his symptoms began. He was admitted to hospital, where he was found to have a hemoglobin of 9.8 g/dL, white blood cell count of $4.4 \times 10^9/L$, bilirubin of 2.7 mg/dL, and lactate dehydrogenase of 486 IU/L. The patient had not left England for 2 years, but given the suggestion of hemolysis in his laboratory findings, and the nature, periodicity, and duration of his symptoms, there was concern for malaria. Although the patient had never traveled to a malaria-endemic region, he did live near Gatwick International Airport. This prompted suspicion that he had been infected by an airplane-imported mosquito. Blood smears confirmed the presence of *Plasmodium falciparum*; the patient was treated and made a complete recovery. Although this patient lacked classic risks for malaria, the astute ID clinician recognized a syndrome potentially consistent with this disease.

Diagnostic expertise is particularly helpful for the many infections that lack sensitive diagnostics or present in less routine fashions. A 23-year-old man presented to a hospital in Turkey with 18 months of fever, weight loss, and significant cervical lymphadenopathy [11]. The patient was born and raised in Turkey but had always lived in urban regions. He had no pertinent animal or social exposures, and he had no significant travel history. Laboratory examination revealed a hemoglobin of 10.3 g/dL, white blood cell count of $5.2 \times 10^9/L$, erythrocyte sedimentation rate of 90 mm/h, a negative human immunodeficiency virus (HIV) test, and a normal biochemical evaluation. Blood and urine cultures were negative. A chest computed tomography scan showed right-sided paratracheal and hilar lymphadenopathy. An excisional biopsy showed necrotizing granulomatous inflammation, but it was otherwise unrevealing for infectious or malignant etiologies. The physician was thus required to rely upon his clinical judgment to develop a treatment plan. He determined the patient’s syndrome to be most consistent with *Mycobacterium tuberculosis* infection based upon the patient’s history, prolonged syndrome and clinical presentation, diagnostic results (both positive and negative), and lack of epidemiologic risk for alternate etiologies. Empiric antituberculous therapy was administered, and the patient made a full recovery.

Sharp diagnostic acumen is essential in ID, because some infections present atypically or lack directing features. Even as medicine moves towards more sensitive, molecular-based diagnostics, ID-related skills will be needed to interpret results in the context of clinical pictures. For example, we have seen how newer, more sensitive *Clostridium difficile* diagnostics have led to confusion about positive results, resulting in overtreatment due to a lack of differentiation between infection versus colonization [12].

Professionalism and Humanism

Although the basis of professionalism in medicine remains an area of active study, fundamentals such as the primacy of patient welfare and serving patients altruistically are long standing [13]. Christmas [4] described professional and humanistic physicians as generous with their time, deeply caring, dedicated, nonjudgmental, and treating all patients equally.

During the 2014 Ebola epidemic in West Africa, many ID physicians living in affected countries displayed remarkable humanism by caring for patients despite personal danger [14]. Dr. Sheik Umar Khan, an ID specialist in Sierra Leone and the country’s chief Ebola physician, led the country’s fight until he contracted the virus and subsequently died. He was aware of the risks; as he stated, “I am afraid for my life, I must say, because I cherish my life . . . even with the full protective clothing you put on, you are at risk” [15]. Dr. Khan’s words resonated with the many who were caring for infected patients. These physicians were managing dying people while wearing uncomfortable protective gear for long hours. Clinicians such

as Dr. Khan provided a great service to their patients and humanity, particularly when we consider that during prior epidemics healthcare workers were stigmatized due to fears they carried the disease [16].

Humanism and professionalism are thus integral to the care of patients with transmissible IDs due to issues such as social stigma. Nowhere has this been more evident than in the care of patients with HIV infection. In 2002, a man with HIV was admitted to a Turkish hospital's intensive care unit (ICU) after a suicide attempt [17]. When the patient's HIV status was disclosed, his primary provider became upset, stating "they (patients with HIV) live in ways that give them AIDS and then they undermine the health of other people . . . I have inserted an intravenous line without gloves . . ." The patient was then transferred to another facility that lacked ICU care. There his family members noted no one checked on him unless called; they also overheard the medical staff making jokes about him. The patient died shortly after.

Economic and societal disparities are common and place vulnerable populations with stigmatizing infections at risk for suboptimal outcomes [18]. The professionalism and humanism of clinically excellent ID physicians allows them to place patient welfare above personal interest and fears, thereby enabling patients with contagious infections to receive care; these characteristics will thus always be central components of ID practice.

Communication and Interpersonal Skills

Although the importance of communication and interpersonal skills in medicine is long standing, the favored processes of communication have changed as society has evolved. Shared decision making and patient-centered communication are now the Western medicine norm, as are principles such as harmonized goals [19]. The physicians interviewed by Christmas [4] described forging deep connections with patients, being responsive and considerate, and simplifying concepts to improve understanding.

In 1998, HIV-positive patients admitted to a New York City AIDS service underwent in-depth interviews about their experiences with their HIV providers [20]. These patients valued providers who asked questions, listened for understanding, expressed concern, and did not withhold information. Such good communication and empathy established foundations for patients' trust in their physicians. On the other hand, patients identified difficult providers by their poor communication and interpersonal skills. Such examples included those who asked the same questions repeatedly, failed to inquire about their preferences, and made poor eye contact. In an era of considerable mortality in people infected with HIV, as well as barriers to reliable adherence to early-generation antiretroviral therapy, physician behaviors leading to trusting and meaningful relationships were critical.

Physician-patient communication in HIV has changed because the disease has become a chronic infection for many in the United States, but it is no less important. This ability to adjust one's communication styles as medicine evolves will serve clinically excellent ID providers well as they tackle problems such as antimicrobial resistance and vaccine hesitancy. To successfully combat these issues, excellent interpersonal skills and communication will be required not only when interacting with patients but also when interacting with other physicians and policymakers [21].

Skillful Negotiation of the Healthcare System

The availability of treatments, patients' ability to pay for services, and the number of accessible providers affect both the ways in which care is provided and health outcomes [22, 23]. Therefore, navigating the health system has long been required of excellent physicians. In the Christmas [4] definition, skillful negotiation of the healthcare system included behaviors such as using resources appropriately and advocating for patients.

A 38-year-old homeless woman presented to a public sexually transmitted infection clinic after being found to have a positive rapid plasma regain (RPR) and microhemagglutination test, indicating active syphilis [24]. She had a history of mental illness, intravenous drug use, and a penicillin allergy. She did not want to engage in psychiatric care and refused admission for penicillin allergy testing and desensitization. In order to treat the patient while taking into account her social and economic complexities, her physician arranged for treatment at a county tuberculosis residential facility. The patient was given a free room and meals during the treatment; her follow-up RPR implied she had been cured.

The relevance of health system navigation to ID is considerable, especially for those who have difficulty procuring services. For example, low socioeconomic status has been associated with higher rates of certain infections in the United States, including chronic hepatitis C and rickettsialpox [25]. Even as the Patient Protection and Affordable Care Act (ACA) expands health insurance coverage, whether patients with infections such as HIV, tuberculosis, or hepatitis C are aware of how to use the ACA is unclear [26]. Clinically excellent ID physicians will be aware of available resources in their communities and, when necessary, use creative solutions to provide outstanding care.

Knowledge

The pursuit of knowledge has been valued as a tenet of medicine for centuries [27]. As science and technology have advanced, our understanding of medicine has grown; this has reinforced the need for physician self-directed learning. According to the participants in Christmas' [4] study, master clinicians were described as being abreast of changes in other disciplines, in addition to being up to date in their own fields. These lifelong learners spoke of their inherent enthusiasm for acquiring and using new information [4].

In October of 2001, a man presented to a hospital with fever, vomiting, and confusion but without meningismus or focal neurological deficits [28]. A chest radiograph showed a widened mediastinum and bilateral pulmonary infiltrates. A lumbar puncture was performed, which revealed large Gram-positive rods in the cerebrospinal fluid. The physician suspected infection with *Bacillus anthracis*, immediately administered high-dose intravenous penicillin G, and rapidly notified public health authorities. *Bacillus anthracis* grew within 24 hours. This patient represented the index case of 11 inhalational anthrax cases. Although *Listeria monocytogenes* is a more common rod-shaped, Gram-positive, central nervous system pathogen, the astute ID physician's differential diagnosis, complexed with an unusual clinical presentation, led him to suspect anthrax despite its absolute rarity. Had he not had knowledge of this infection, there would have been a delay in notifying authorities, potentially resulting in additional cases.

Knowledge in ID practice is particularly critical for infections that lack defining features. A 73-year-old man who presented to an emergency department with 6 weeks of fever and weakness was found to have hepatomegaly, lymphopenia, thrombocytopenia, and an elevated lactate dehydrogenase [29]. Upon questioning, he reported spending time in Long Island, New York 1 week before the beginning of his symptoms. He was thus empirically begun on treatment for babesiosis and was later found to have 3% parasitemia in his blood. This patient's syndrome was nonspecific; had the physicians caring for him not combined their knowledge of the epidemiology, presentation, and laboratory findings of babesiosis, blood smears would not have been obtained and treatment would have been delayed.

The scope of ID practice requires a broad knowledge base, particularly given the number of human bacterial, fungal, viral, and parasitic infections that exist. Combining knowledge of all potential pathogens with sound clinical judgment is required to gain an efficient and accurate diagnosis. Given that new pathogens regularly emerge and previously known pathogens change apparent characteristics (such as Zika virus), self-directed learning is a top feature in the global human-pathogen dynamic. This will likely accelerate as modern laboratory sequencing techniques such as deep sequencing lead to the discovery of new disease-causing microorganisms [30].

Scholarly Approach to Clinical Practice

Medicine has advanced through observation and experimentation, but it is only through the dissemination and adoption of new knowledge that practice patterns change [9]. Christmas' [4] work defined a scholarly approach to clinical practice as being cerebral in the approach to patient care, applying evidence to patient care decisions, studying the impact of new methods of care delivery, and disseminating new clinical knowledge.

In 1980, Drs. Roger Nieman and Bennett Lorber [31] reviewed 186 cases of adult listeriosis from 1968 to 1978, and

they noted that the epidemiology of the disease seemed to be changing from what was historically understood. They reported an increase in listeria bacteremia, especially in groups not then known to be at risk: patients with immune suppression and individuals at the extreme ends of life. Their work was also the first to report an association between listeriosis and renal transplantation. This publication dramatically advanced our understanding of who was at risk for listeriosis. Over time, further research led to guidance to include antibacterial coverage for *L monocytogenes* in the empiric treatment of meningitis in high-risk populations. Furthermore, food safety campaigns were launched that cautioned susceptible patient groups to consider avoiding high-risk foods such as deli meats and soft cheeses.

Although all medical disciplines evolve, the environmental and treatment pressures placed on microbes lead the field of ID to move perhaps faster than any other discipline. New organisms are identified, whereas known organisms shift; a scholarly approach is required to describe the clinical spectrum and diagnostic clues of these pathogens. Molloy et al's [32] evaluation in 2015 of the clinical manifestations and laboratory findings of *Borrelia miyamotoi*, a potentially emerging ID in the United States, is such an example. As open-access journals become more common, the direct dissemination of new ID knowledge will reach an even wider audience of providers.

Passion for Clinical Medicine

Influential physicians such as Sir William Osler have described medicine as a calling [33]. Having passion for medicine has remained a core value, and it is expected in medical students and faculty physicians alike [34]. The physicians in Christmas' [4] study felt similarly; exuding enjoyment and enthusiasm for patient care were considered critical. Few ID physicians have exemplified a love for ID more than Dr. John G. Bartlett.

Dr. Bartlett became the Chief of the Division of Infectious Diseases at the Johns Hopkins University School of Medicine in 1980 and served in that capacity until 2006. In addition to his groundbreaking work in the recognition and treatment of anaerobic infections and *C difficile*-associated diarrhea, he was a leader in the development of HIV-related guidelines, an advocate to prepare for bioterrorism, and helped raise the medical community's awareness about antimicrobial resistance [35]. In the mid-1980s, when many physicians were avoiding patients with HIV, Dr. Bartlett developed outpatient and inpatient HIV services that continue to this day. In addition, he mentored numerous ID fellows and faculty, and he provided outstanding clinical care in multiple settings [36]. Due to his achievements, the National Foundation of Infectious Diseases presented him with the Maxwell Finland Award, which recognizes persons who have shown excellence in clinical and research activities, trained future ID leaders, and had a positive impact on public health. He has also received the Infectious Disease Society of

America's highest honor, the Alexander Fleming Award, which recognizes lifetime achievement for major contributions to the field.

Clinically excellent physicians are natural role models who may impact the career choices of trainees through teaching and showing enthusiasm for their discipline [1, 37]. As Dr. Bartlett wrote about ID, "It would be difficult to find another discipline in medicine that has such extraordinary diversity, surprises, value in patient care, and clinical relevance for both domestic and international applications. For many trained in medicine, joining the field of IDs is simply the right thing to do" [38].

DISCUSSION

Although medicine constantly evolves, the need for exemplary clinicians remains steadfast [8]. Despite this, how to measure and reward clinical excellence is unclear. Modern methods of data collection and the use of metrics with accountable care have yielded a greater focus on care quality and patient outcomes. Recent literature has shown the involvement of ID clinicians in the management of diseases such as *Staphylococcus aureus* bacteremia decreases mortality and healthcare costs [3, 39]. However, whether such data will translate into better appreciation for clinically excellent ID physicians is unknown. Perhaps having a definition of ID clinical excellence can serve as a useful starting point for the development of metrics and reward models.

Another team of authors may have selected a different set of articles to illustrate the domains of clinical excellence in ID. The existence of an abundance of additional examples that could have been discussed highlights ID clinicians' capacity for clinical excellence. In addition, although case reports provide only a limited view into clinical excellence, the cited examples here may prompt readers to recall clinical encounters from their own experiences that relate to each domain, and also aspects of excellence that are applicable to ID practice, but which are not captured by Christmas' [4] definitions (such as pattern recognition and an understanding of infection control). Development of such a personal registry in these domains should lead to further professional growth and development [40]. In addition, sharing such experiences may publicize how stimulating ID practice is and how ID clinical excellence impacts patients.

CONCLUSIONS

Given that physicians seek to promote health and cure disease, future study of this framework of clinical excellence, with an eye towards how it may affect patient outcomes, is warranted. In addition, we hope that by providing a definition of ID clinical excellence we stimulate discussion regarding the development of excellence metrics that can be rewarded, both financially and academically. Recognizing and rewarding clinical excellence may not only serve to inspire trainees to pursue their own fulfilling

and productive careers in clinical ID, it may also encourage health systems to value clinically outstanding ID physicians who provide patients with exceptional care.

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