Article published online: 2020-10-28

Policy Statement on Clinical Informatics Fellowships and the Future of Informatics-Driven Medicine

Joseph Kannry[1] Jeff Smith[2] Vishnu Mohan[3] Bruce Levy[4] John Finnell[5] Christoph U. Lehmann[6]
on behalf of the Clinical Informatics Program Directors Group-AMIA

[1] Division of General Internal Medicine, Icahn School of Medicine at Mount Sinai, New York, New York, United States
[2] American Medical Informatics Association, Bethesda, Maryland, United States
[3] Department of Medical Informatics and Clinical Epidemiology, OHSU School of Medicine, Portland, Oregon, United States
[4] Division of Informatics, Geisinger Health System, Pennsylvania, New Jersey, United States
[5] Department of Emergency Medicine, Indiana University School of Medicine, Indianapolis, Indiana, United States
[6] Pediatrics, Data & Population Science, And Biomedical Informatics, UT Southwestern Medical Center, Dallas, Texas, United States

Address for correspondence Joseph Kannry, MD, Division of General Internal Medicine, Icahn School of Medicine at Mount Sinai, New York, NY 10029, United States (e-mail: Joseph.Kannry@mountsinai.org).

Appl Clin Inform 2020;11:710–713.

Abstract

Board certified clinical informaticians provide expertise in leveraging health IT (HIT) and health data for patient care and quality improvement. Clinical Informatics experts possess the requisite skills and competencies to make systems-level improvements in care delivery using HIT, workflow and data analytics, knowledge acquisition, clinical decision support, data visualization, and related informatics tools. However, these physicians lack structured and sustained funding because they have no billing codes. The sustainability and growth of this new and promising medical subspecialty is threatened by outdated and inconsistent funding models that fail to support the education and professional growth of clinical informaticians. The Clinical Informatics Program Directors' Community is calling upon the Centers for Medicare and Medicaid Services to consider novel funding structures and programs through its Innovation Center for Clinical Informatics Fellowship training. Only through structural and sustained funding for Clinical Informatics fellows will be able to fully develop the potential of electronic health records to improve the quality, safety, and cost of clinical care.

Keywords
- clinical informatics
- professional training
- education
- Accreditation Council on Graduate Medical Education
- Centers for Medicare and Medicaid Services
- education and strategies for HIT

Background and Significance

The future of medicine must be characterized by the delivery of superior care with measurable improvements in outcomes and reduced cost. Necessary for this future are an optimized, usable, and interoperable health information technology (HIT) and clinicians with expertise in the systematic collection, analysis, and application of data. Board certified clinical informaticians provide such expertise in leveraging HIT and health data for patient care and quality improvement.[1,2] Clinical Informatics experts possess the requisite skills and competencies to make systems-level improvements in care

received
June 9, 2020
accepted after revision
August 21, 2020

© 2020 Georg Thieme Verlag KG
Stuttgart · New York

DOI https://doi.org/10.1055/s-0040-1717117.
ISSN 1869-0327.

This document was downloaded for personal use only. Unauthorized distribution is strictly prohibited.

delivery using HIT, workflow and data analytics, knowledge acquisition, clinical decision support, data visualization, and related informatics tools. However, the sustainability and growth of this new and promising medical subspecialty —and its effect on care delivery—are threatened by outdated and inconsistent funding models that fail to support the education and professional growth of Clinical Informaticians when compared with other clinical specialties.[3] Currently, only approximately 70 fellowship positions are available annually for Clinical Informatics. Considering the informatics expertise needed for the more than 5,500 hospitals in the United States, it becomes apparent that without an increased pipeline of trained and educated informaticians, health care systems will continue to struggle to find the talent needed to implement, maintain, update, and optimize their clinical information systems and data. Subsequently, a lack of appropriately trained and educated Clinical Informaticians perpetuates underperformance in the pillars of value-based care—patient safety, care quality, and cost reduction.

American Medical Informatics Association (AMIA) Community of Clinical Informatics Program Directors (CIPD) urges Congress and the current Administration to establish structural and specified funding mechanisms for the training of Clinical Informatics fellows. The CIPD's primary purpose is to establish and maintain high standards of excellence in Clinical Informatics training programs. Training programs are defined as those approved by the Accreditation Council on Graduate Medical Education (ACGME) that lead to eligibility for subspecialty certification by the American Board of Preventive Medicine or the American Board of Pathology in Clinical Informatics. The CIPD creates an environment that encourages the development of ACGME-accredited fellowships in Clinical Informatics and supports the continued evolution of these programs. The CIPD also provides a forum for training programs, aspiring training programs, and other interested parties to collaborate, network, and exchange information and ideas to support these purposes.

Having recognized a growing need for more Clinical Informatics education, we call on policymakers and federal funders to create direct support for ACGME-accredited Clinical Informatics fellowships through competitive, institutional grants funded through the Centers for Medicare and Medicaid Services (CMS) Innovation Center.

Inadequate Use of Clinical Informatics Has Stymied Health Information Technology Optimization, Value-Based Care

The federal government has subsidized the U.S. health care system's modernization with $37 billion to encourage hospitals and physicians to adopt and use electronic health records (EHRs) and other HIT. Unfortunately, the entanglement of EHRs and HIT with clinical workflows, business processes, and regulatory compliance activities has had the opposite effect of the anticipated benefits of a digital health care system by harming the patient–doctor relationship,[4] reducing clinician satisfaction,[5,6] increasing physician burnout,[7,8] increasing costs,[9] and leading to mixed effects on quality and safety of patient care.[10] Moreover, the significant investment in technology failed to be linked to an equally significant investment in professionals, who can be interlocutors between clinicians in the front lines of health care delivery and the developers and engineers, who build the technology. In fact, our national investment in HIT infrastructure has not been matched by any federal investment for the training and support of physician informaticians, who are trained to optimize clinical workflows and decision support and deliver data-driven insights for better patient care, resulting in a disconnect between physicians' needs and systems built.

The effects of failure to invest in the education of informaticians are not only visible in our fee-for-service systems, but the national foray into value-based payment models, which has also shown little results. From bundled payments[11] to medical homes and value-based purchasing,[12,13] the savings accrued through risk sharing have been underwhelming, especially when compared with the predicted savings.

While the mediocre status quo can be attributed to many reasons, a primary culprit is lack of a sufficiently trained workforce, qualified to make systems-level improvements in care delivery using informatics. The implementation of EHRs alone is insufficient as much of the functionalities of commercial EHRs are designed poorly and require extensive improvements and customization.[14]

A key missing ingredient has been formal Clinical Informatics education and training.[15,16] Without experts trained to extract the potential value out of EHRs for patients, payers, and providers, the government's investment in HIT will continue to generate only a fraction of the anticipated gains.

Federal Funding Models for Medical Education Must Be Reformed

Accreditation by ACGME is considered by United States the gold standard for graduate medical education because it sets the foundation for a structured fellowship program with defined goals, objectives, and evaluations resulting in board eligibility. Subsequent "board certification is important as it[1] allows physicians to demonstrate exceptional expertise in a particular specialty and/or subspecialty[1] and benefits society by encouraging physicians to seek, maintain, and demonstrate a higher level of skills, knowledge, and expertise than is required of nonboard certified physicians."

CMS in the United States has traditionally subsidized specialty and subspecialty education programs. However, Clinical Informatics fellowships are not supported by CMS, unlike residencies and fellowship in most other specialties and subspecialties. In the 5-year history of the subspecialty, less than 40 individuals have become board-eligible in Clinical Informatics through completing an ACGME-accredited clinical informatics fellowship. Rather, the vast majority of board-certified Clinical Informaticians (~1,700) became eligible through the practice pathway (i.e., experience), which will end permanently in 2022.[1] The fellowship pathway will remain as the only way to Clinical Informatics

This document was downloaded for personal use only. Unauthorized distribution is strictly prohibited.

certification and will be unable to provide sufficient numbers of graduates unless more programs become available, which remains highly unlikely due to the lack of funding.

Training a Clinical Informatics fellow creates a cost of over $150,000 per year including the fellow's salary and benefits, as well as the educational costs. Currently, these costs are carried solely by the training health care system. The first ACGME-accredited Clinical Informatics fellowship programs were initiated with philanthropic donations and supported through myriad, nonsustainable financing mechanisms at medical centers. Unlike most other ACGME fellowships and residencies, Clinical Informatics lacks a revenue stream directly related to billing for patient services. Additionally, as most institutions are at or exceed the cap of trainees supported directly by CMS, most Clinical Informatics programs do not benefit from this federal support. Even though Clinical Informaticians have an enormous effect on patient care through HIT, CMS does not consider this direct patient care for reimbursement purposes. While a few Clinical Informatics programs have grown over the last 5 years, many nascent programs are unable to initiate training due to a lack of funding and existing programs struggle to maintain financial support year over year.

Despite these challenges, some forward-thinking organizations have recognized the value informaticians deliver for patients, payers, governments, and health systems. These institutions are funding informatics fellowships and employing Clinical Informaticians because they recognize that HIT, optimized through informatics tools and methods, is critical for the delivery of safe, economical, and effective clinical care. However, with more than 5,500 hospitals in the United States and less than 100 training positions currently offered annually, there is clearly insufficient expertise to meet the demand for trained and qualified informaticians. Federal support for Clinical Informatics fellowships will improve the pipeline of informaticians, who are necessary to improve health care and address long-overdue shortcomings in how we fund medical education.

An Imperative for the Future of Medicine and the Future of U.S. Health Care

Clinical Informaticians benefit both patients and payers through reduction of errors, increased safety, reduced costs, more efficient care, and improved care coordination. In contrast to other physicians, who typically focus on the individual patient, most clinical informaticians work at a practice or population level, affecting the care of many patients through their efforts. In addition, many solutions developed by informaticians can be transferred to or duplicated at other institutions, increasingly the possibility that informaticians may save lives or reduce costs in institutions that they have never visited.

We view Clinical Informatics competencies as prerequisite for value-based payment success and an imperative for the modernization of medicine through health informatics. Thus, through the CMS Innovation Center, we strongly recommend that CMS provide structural and sustained funding for Clinical Informatics fellows. To operationalize this recommendation, we offer below a series of options leading toward funding of ACGME accredited Clinical Informatics fellowships.

First, dozens of innovative funding models have been tested and analyzed through the CMS Innovation Center, also known as CMMI.[17] However, these models have not been reviewed holistically to understand how a workforce trained to collect, analyze, and apply data to patient care can affect safety, quality, and cost. CMS should task its Innovation Center to offer a multiyear training grant for ACGME-accredited institutions to propose, measure, and report how Clinical Informatics fellows would improve the quality and cost of care. Such an approach would highlight the achievements and benefits derived from the clinical Informatics subspecialty and would create evidence and would bring the work of Clinical Informatics into visibility.

Second, CMMI should engage in targeted evaluations to identify the benefits created by participants, who employ trained physicians in Clinical Informatics. These grants could determine average costs savings per program/fellow to CMS, a portion of which could be dedicated to expanding institutional limits of ACGME trainees, with the goal of creating a long-term and sustainable funding model.

While we recommend that CMS provide dedicated funding for Clinical Informatics training grants, an additional recommended approach would be for CMMI to implement enhanced application requirements that further promote and optimize the use of informatics tools and capabilities in select payment models tested by CMMI. Indeed, AMIA has advocated for this in previous policy statements.[18,19] Based on the results of these informatics-enhanced payment models, appropriate steps by CMS could find sustainable funding mechanisms or implement incentives for institutions to prioritize training for these specialists.

We have entered an era, where the practice of medicine is no longer limited to medical devices and drugs to improve patient outcomes. Clinical Informatics and data are an integral part of the practice of medicine in the 21st century. Practicing medicine without the help of Clinical Informatics equals practicing outdated or inefficient medicine. We must demand that EHRs leverage evidence-based informatics tools and methodologies. However, we cannot expect health care organizations to support an unfunded mandate of improving the usability and usefulness of HIT systems without trained expert help. By providing grants for training and supporting efforts to define and document the value that clinical informaticians bring to modern medical care, we cannot only meet the above goals but also provide the evidence that will lead to health systems' increasing willingness to support these activities financially in the future. Only through structural and sustained funding for Clinical Informatics fellows will the future, we are striving to achieve, be within reach.

Clinical Relevance Statement

Clinical Informatics is a boarded specialty in which fellows are trained in the systematic collection, analysis, and application of data. Board certified Clinical Informaticians provide such expertise in leveraging HIT and health data for patient

This document was downloaded for personal use only. Unauthorized distribution is strictly prohibited.

care and quality improvement. Clinical Informatics experts possess the requisite skills and competencies to make systems-level improvements in care delivery using HIT, workflow and data analytics, knowledge acquisition, clinical decision support, data visualization, and related informatics tools. The sustainability and growth of this new and promising medical subspecialty is threatened by outdated and inconsistent funding models that fail to support the education and professional growth of Clinical Informaticians.

Multiple Choice Questions

1. To be board eligible in 2023, Clinical Informaticists must complete a
   a. ACGME Fellowship Program
   b. Doctoral Degree Program
   c. Information Technology Internship
   d. Computer Science Certification

   Correct Answer: The correct answer is option a. In 2023, the only pathway to board eligibility in Clinical Informatics is an ACGME-accredited Clinical Informatics Fellowship. Answers b and c might have provided alternative pathways prior to 2023. Option d has not been such a pathway.

2. All ACGME-accredited Clinical Informatics Fellowships are funded by
   a. CMS support of house staff training
   b. Institutional support
   c. Industry support
   d. Multiple mechanisms

   Correct Answer: The correct answer is option d. The challenge facing Clinical Informatics fellowship is the funding mechanisms are multiple, inconsistent, and vary literally by site. Some of the mechanisms are not sustainable. The question asks about "all" fellowships so while options b and c are true at some sites they are not true for all. Option a could be true but each site receives limited funding from CMS and not every site uses this limited fund to support Clinical Informatics Fellowships. Again, the question asks "all."

Protection of Human and Animal Subjects

None.

Conflict of Interest

C.U.L. reports that he is designated to be the Fellowship program director, UT Southwestern. J.S. reports that he was employed by the American Medical Informatics Association, which serves as the professional home for Clinical Informatics Fellows.

References

1 Lehmann CU, Gundlapalli AV, Williamson JJ, et al. Five years of Clinical Informatics Board Certification for Physicians in the United States of America. Yearb Med Inform 2018;27(01):237–242
2 Lehmann CU, Shorte V, Gundlapalli AV. Clinical informatics subspecialty board certification. Pediatr Rev 2013;34(11):525–530
3 Lehmann CU, Longhurst CA, Hersh W, et al. Clinical Informatics Fellowship Programs: in search of a viable financial model: an open letter to the centers for medicare and medicaid services. Appl Clin Inform 2015;6(02):267–270
4 Alkureishi MA, Lee WW, Lyons M, et al. Impact of electronic medical record use on the patient-doctor relationship and communication: a systematic review. J Gen Intern Med 2016;31(05): 548–560
5 Khairat S, Burke G, Archambault H, Schwartz T, Larson J, Ratwani RM. Perceived burden of EHRs on physicians at different stages of their career. Appl Clin Inform 2018;9(02):336–347
6 Shanafelt TD, Dyrbye LN, Sinsky C, et al. Relationship between clerical burden and characteristics of the electronic environment with physician burnout and professional satisfaction. Mayo Clin Proc 2016;91(07):836–848
7 Downing NL, Bates DW, Longhurst CA. Physician burnout in the electronic health record era: are we ignoring the real cause? Ann Intern Med 2018;169(01):50–51
8 Linzer M, Poplau S, Babbott S, et al. Worklife and wellness in academic general internal medicine: results from a national survey. J Gen Intern Med 2016;31(09):1004–1010
9 Arndt RZ. No end in sight: EHRs hit hospitals' bottom lines with uncertain benefits. Available at: https://www.modernhealthcare.com/article/20181013/NEWS/181019945/no-end-in-sight-ehrs-hit-hospitals-bottom-lines-with-uncertain-benefits. Published 2018. Accessed Sept 9, 2019
10 Lawes SMG. Medication errors attributed to health information technology. Available at: https://psnet.ahrq.gov/resources/resource/30704/medication-errors-attributed-to-health-information-technology Published 2017. Accessed January 2019
11 Joynt Maddox KE, Orav EJ, Zheng J, Epstein AM. Evaluation of medicare's bundled payments initiative for medical conditions. N Engl J Med 2018;379(03):260–269
12 Government Accounting Office (GAO). Hospital value-based purchasing: initial results show modest effects on Medicare payments and no apparent change in quality-of-care trends. Available at: https://www.gao.gov/assets/680/672899.pdf. Published 2015. Accessed September 9, 2019
13 Papanicolas I, Figueroa JF, Orav EJ, Jha AK. Patient hospital experience improved modestly, but no evidence medicare incentives promoted meaningful gains. Health Aff (Millwood) 2017;36 (01):133–140
14 Koppel R, Lehmann CU. Implications of an emerging EHR monoculture for hospitals and healthcare systems. J Am Med Inform Assoc 2015;22(02):465–471
15 Kannry J, Sengstack P, Thyvalikakath TP, et al. The Chief Clinical Informatics Officer (CCIO): AMIA task force report on CCIO knowledge, education, and skillset requirements. Appl Clin Inform 2016;7(01):143–176
16 Kannry J, Fridsma D. The chief clinical informatics officer (CCIO). J Am Med Inform Assoc 2016;23(02):435
17 Centers for Medicare and Medicaid Services. Innovation Models. CMS Innovation Center. Available at: https://innovation.cms.gov/innovation-models#views=models
18 American Medical Informatics Assocation (AMIA). AMIA offers new directions for CMS innovation. AMIA. Available at: https://www.amia.org/news-and-publications/press-release/amia-offers-new-directions-cms-innovation. Published 2017. Accessed July 20, 2020
19 American Medical Informatics Assocation (AMIA). AMIA urges CMS to focus on health IT improvement activities in hospital payment rule. Available at: https://www.amia.org/news-and-publications/press-release/amia-urges-cms-focus-health-it-improvement-activities-hospital. Published 2018. Accessed July 20, 2020

This document was downloaded for personal use only. Unauthorized distribution is strictly prohibited.