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Brief Communication

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Clinical informatics subspecialists: characterizing a novel evolving workforce

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ABSTRACT

Background: The growing complexity of data systems in health care has precipitated increasing demand for clinical informatics subspecialists. The first board certification exam for the clinical informatics subspecialty was offered in 2013. Characterizing trends in this novel workforce is important to inform its development.
Methods: We conducted an exploratory analysis of American Board of Medical Specialties data on individuals certified in clinical informatics from 2013 to 2019 to review trends and demographic characteristics of current subspecialists.
Results: 2018 physicians were certified in clinical informatics from 2013 to 2019. The annual number of awarded certifications declined after 2016. The majority of primary certifications held by clinical informaticians were in broad-based medical specialties relative to primarily procedural specialties.
Conclusions: Disparities may exist within the clinical informatics physician workforce with respect to primary specialty certifications and geographic distribution. There remains a need for the creation of fellowship programs to sustain the growth of this workforce.

Key words: clinical informatics, health informatics, graduate medical education, medical subspecialty, physician workforce, continuing professional development

INTRODUCTION

In 2010, the American Board of Medical Specialties (ABMS) established certification pathways for physician subspecialization in clinical informatics.[1] Clinical informaticians analyze, design, implement, and evaluate information systems to enhance quality of care, improve health outcomes, and bolster clinician-patient relationships.[2,3] Since the inception of the certification program, a number of physicians have taken the clinical informatics subspecialty board examination, which is offered in October or November each year.[4] Initially, physicians with informal clinical informatics training who were board-certified in any of the 24 primary ABMS specialties and actively engaged in clinical informatics work could take the board examination to achieve certification (ie, via the Practice Pathway).[5] It was envisioned that after 2017, the Practice Pathway would close and physicians would only be able to sit for the board examination after completing a 2-year Accreditation Council on Graduate Medical Education (ACGME)-accredited fellowship. In 2016, the ABMS extended the Practice Pathway by an additional 5 years, allowing physicians without formal fellowship training to take the board certification examination through 2022.[6]

Little is known about the makeup of the current board-certified clinical informatics physician workforce; primary certifications, geographic distribution, and general characteristics of these subspecialists have not yet been investigated. Using data from the ABMS, we studied characteristics of clinical informatics subspecialists from 2013 to 2018 to identify characteristics of this emerging workforce.

MATERIALS AND METHODS

We reviewed general and subspecialty certification data for all physicians who were certified in clinical informatics under the ABMS from 2013 through 2018. This dataset included information on certification start dates and primary specialty certifications as reported to the ABMS by the American Board of Preventative Medicine (ABPM) and the American Board of Pathology (ABPath). We calculated the total number of physicians awarded clinical informatics subspecialty certifications each year, noting if certification was awarded through the ABPM or the ABPath. The ABPM generally awards physicians their certification on January 1 of the year following their examination year, while the ABPath typically certifies physicians within the month they pass the board exam. To standardize the certification start dates for physicians certified under both boards, we utilized a "calendar year" approach to determine the year in which physicians were certified. We included physicians with January 1 certification start dates in the annual certification tally for the previous calendar year (their examination year). Individuals with certification start dates of January 1, 2014, for example, were included in 2013 certification tally. We cross-referenced our annual certification counts with publicly available certification data from the American Medical Informatics Association and ABPM websites.[4,7] Information on the number of clinical informatics subspecialists who passed the 2019 board examination was obtained from the ABPM.

ABMS specialty board(s), from which subspecialists received their initial primary board certification(s), and the number of subspecialists that held multiple primary certifications were noted. Using geographical data available for a number of physicians, we categorized clinical informatics subspecialists by their current state of residence. We used the 2019 State Physician Workforce Data Report[8] from the American Association of Medical Colleges to determine the population of clinical informatics subspecialists per 1000 active physicians in each US state and in the country overall. Descriptive data were analyzed using Microsoft Excel. This study was approved by the Partners Healthcare Institutional Review Board (IRB Protocol # 2019P003065).

RESULTS

2018 physicians were certified in clinical informatics through the ABMS between 2013 and 2019. The peak year for number of new certifications was 2013 (Table 1).

1983 primary specialty certifications were held among the clinical informatics subspecialists certified through calendar year 2018 (Table 2). 123 subspecialists were certified in 2 primary specialties; 5 subspecialists were certified in 3 primary specialties. 679/1851 (37%) of subspecialists were certified in Internal Medicine. Pediatrics (n = 320; 17%) was the next most highly represented specialty, followed by Family Medicine (n = 267; 14%), and Emergency Medicine (n = 197; 11%). These 4 specialties accounted for 73% (1463/1983) of the primary certifications held by subspecialists. 21% (408/1983) of primary certifications were in primarily procedural specialties (emergency medicine, anesthesia, surgery, surgical subspecialties, ophthalmology, dermatology). Ten medical specialties had 10 or fewer physicians certified in clinical informatics.

Geographical data was available for 1730 of the 1851 (94%) subspecialists. California was the US state with the highest number

Table 1. Demographic characteristic of clinical informatics subspecialists certified from 2013 to 2018

Characteristics of Physicians Certified in Clinical Informatics from 2013 to 2018

	No. (%)
Total Number of Physicians Certified	1851 (100)
Age at Time of Certification	
28–37	231 (12)
38–47	746 (40)
48–57	583 (31)
58–67	277 (15)
68–77	14 (1)
Certifying Board	
American Board of Pathology	105 (6)
American Board of Preventive Medicine	1742 (94)
Certification Calendar Year	
2013	445 (24)
2014	325 (18)
2015	317 (17)
2016	413 (22)
2017	173 (9)
2018	178 (10)
Number of Primary Certifications	
1	1723 (93)
2	123 (7)
3	5 (<1)

Table 2. Primary specialty certifications of individuals certified in clinical informatics from 2013 to 2018

Primary specialization board	No. clinical informatics subspecialists
Internal Medicine	679
Pediatrics	320
Family Medicine	267
Emergency Medicine	197
Pathology	111
Anesthesiology	71
Radiology	63
Preventive Medicine	56
Psychiatry and Neurology	52
Surgery	44
Obstetrics and Gynecology	39
Physical Medicine and Rehabilitation	17
Ophthalmology	14
Otolaryngology—Head and Neck Surgery	12
Urology	10
Dermatology	7
Orthopedic Surgery	5
Nuclear Medicine	4
Medical Genetics and Genomics	4
Thoracic Surgery	3
Colon and Rectal Surgery	2
Neurological Surgery	2
Plastic Surgery	2
Allergy and Immunology	2
Total Number of Certifications	1983[a]

[a]Number exceeds the total number of clinical informatics subspecialists certified through 2018 (N = 1851) as 128 specialists held primary certifications in more than 1 specialty.

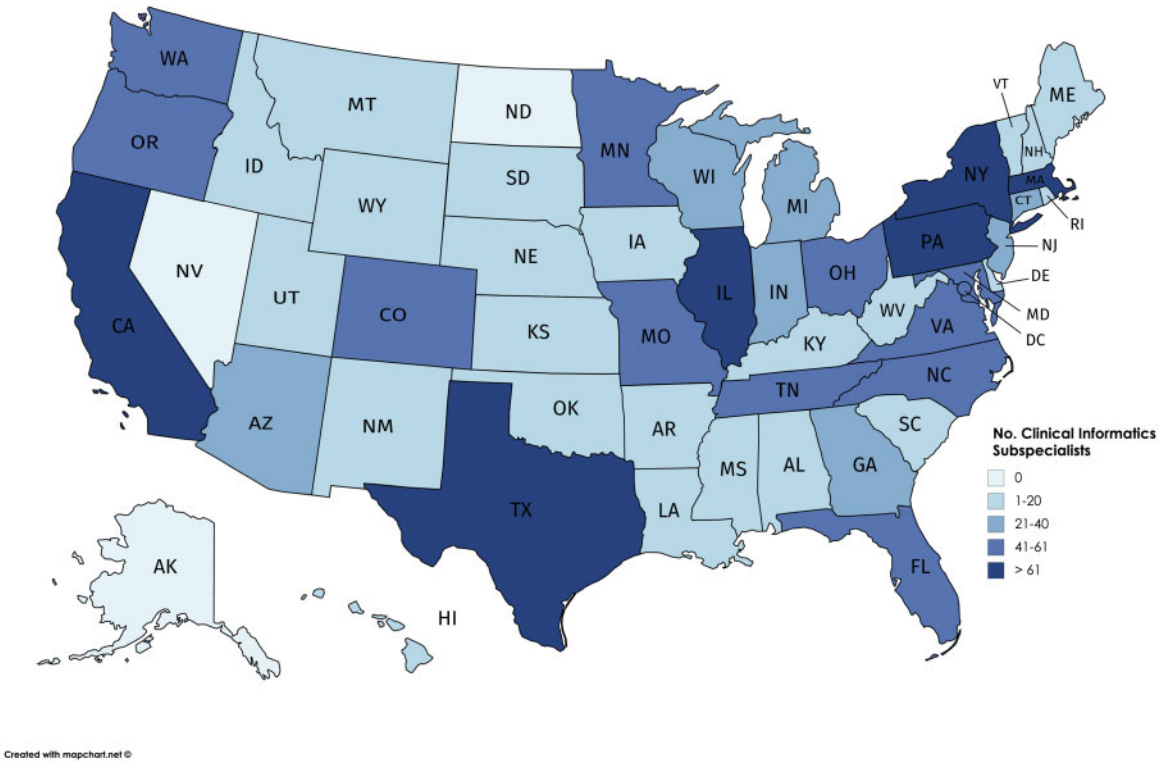

Figure 1. Geographic distribution of current clinical informatics subspecialists by US state, 2018 (N = 1730).

of clinical informatics subspecialists (n = 281; 16%. Figure 1). New York (n = 124; 7%), and Pennsylvania (n = 124; 7%) were the next most highly represented states, followed closely by Massachusetts (n = 99; 6%) and Texas (n = 78; 5%). 18 US states had 10 or fewer representative clinical informatics subspecialists, with 3—Alaska, North Dakota, and Nevada—having zero clinical informatics subspecialists through 2018.

The states with the highest number of clinical informatics subspecialists per 1000 active physicians included New Hampshire (4.0), Montana (3.6), Vermont (3.5), Oregon (3.3), and Hawaii (3.3). 34 US states had fewer than 2 clinical informatics subspecialists per 1000 active physicians, including Texas (1.2) and New York (1.7). The number of clinical informatics subspecialists per 1000 active physicians nationally was 2.2. The states with the lowest number of clinical informatics subspecialists per 1000 active physicians included Nebraska (0.43), West Virginia (0.42), Alaska (0.0), North Dakota (0.0), and Nevada (0.0) (Figure 2).

DISCUSSION

Our findings provide insights into the composition of the evolving clinical informatics workforce. The drop-off in annual physician certifications after 2016 may have arisen from an initial announcement that eligibility for board certification via the Practice Pathway would end after 2017[2]; eligible physicians may be unaware that physicians without formal fellowship training can continue to achieve certification via the Practice Pathway through 2022. Alternatively, the population of board-eligible individuals may have quickly capitalized on the first-available exam opportunities.

Physicians in broad-based clinical specialties comprise the vast majority of clinical informatics subspecialists to date; there is a paucity of clinical informaticians with certification in primary procedural specialties. One potential explanation for this finding is that proceduralists may find it difficult to take time away from their procedural responsibilities to participate in clinical informatics initiatives, especially without financial incentive to do so. While certification in clinical informatics confers a unique skill set, informatics knowledge is needed in medical care and research across all clinical disciplines.[5,9] The high concentration of clinical informatics subspecialists in a handful of primary specialties may reflect a lack of clinical diversity within the clinical informatics workforce, potentially narrowing the scope of research, innovation, or translational applications relevant to underrepresented fields.

The geographic distribution of the clinical informatics workforce across the US suggests that there is a relative paucity of clinical informaticians in the Southwest, Southeast, and West North Central US. When considering the number of clinical informaticians in each state relative to the number of active physicians, however, many US states demonstrate a need for additional clinical informatics subspecialists given the growing demands of data-driven health care. Even densely populated states such as New York, Texas, Illinois, and Florida, which each contain at least 50 clinical informatics subspecialists, had fewer than the national average of 2.2 clinical informatics subspecialists per 1000 active physicians. While no publicly available data on the state-by-state demand for health informatics specialists exists, the national demand for health informatics specialists needed has been estimated at 6000 to 13 000,[11,12] warranting the accreditation of additional fellowship programs to expand the workforce. Consideration should be given to the geographic distribution of current clinical informaticians when deciding where to accredit new fellowship programs, as these programs may play a critical role in helping to meet demand in less-concentrated geographical areas; institutions in these areas should consider the recruitment of faculty able to lead successful clinical informatics fellowships to their region as a means of bolstering the local workforce in the short- and long-term.

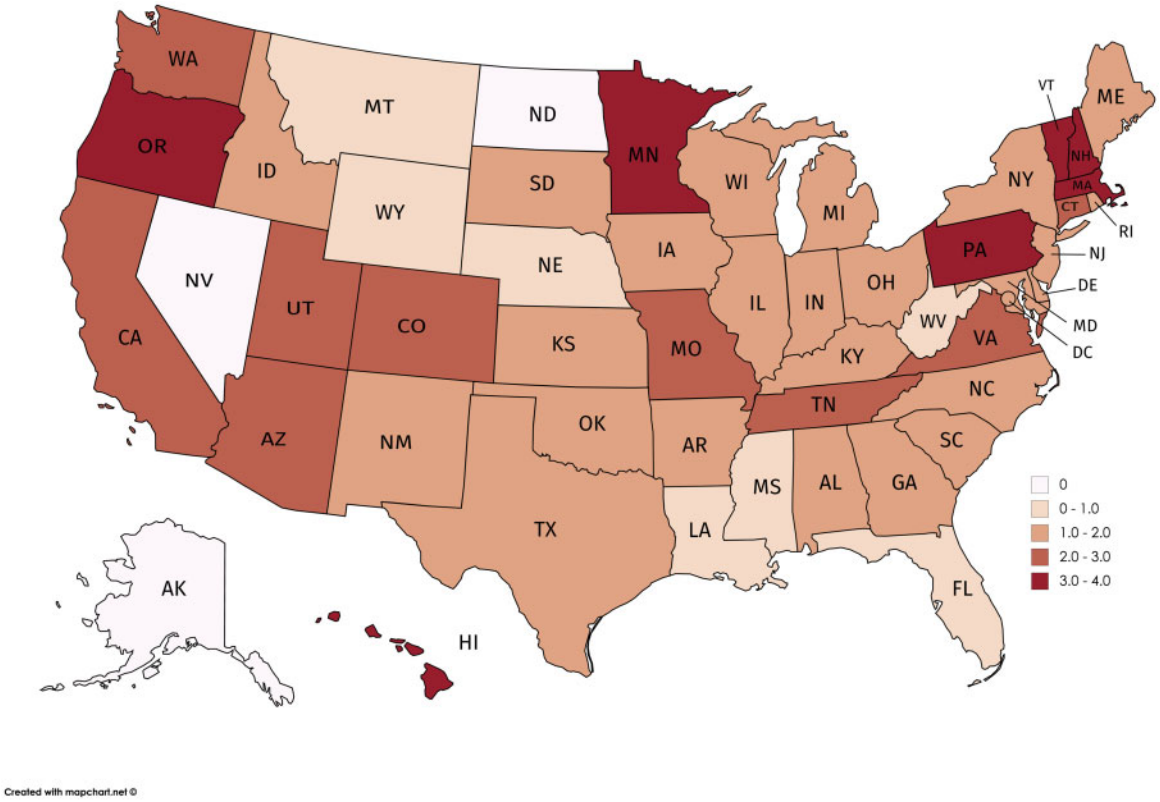

Figure 2. Number of clinical informatics subspecialists per 1000 active physicians in each US state, 2018.

It is important to note that lack of financial support is a known challenge to the development of clinical informatics fellowship programs.[12,13] Sustainable funding streams are needed to support the development of new fellowships. One proposed solution to securing long-term funding for fellowship programs is allowing accredited ACGME institutions to bill for clinical services delivered by fellows at their fellowship program site within their primary specialty.[12,13] Additionally, clinical departments may be able to dedicate funding for clinical informatics fellows with primary certification in their respective specialties. Finally, rigorous evaluations of the value added by investing in clinical informatics infrastructure—including training programs—should be demonstrated; by highlighting the business case for clinical informatics training programs, as well as the opportunity costs of failing to invest in such endeavors, program leadership may be able to convince institutional leaders of such programs' merit.

Our findings must be interpreted within the context of our study design, which was limited by our dataset. While the ABMS database provides information on physicians who successfully passed the clinical informatics board certification examination, physicians can opt out of this dataset for reasons such as retirement or practice closure, and records of deceased physicians are generally removed from the database.

Training a diverse supply of clinical informaticians and understanding the characteristics of current informaticians may help ensure this workforce is well-equipped to meet the demands of our rapidly-evolving, data-rich health system. We are unable to comment on the gender, racial, and ethnic composition of the clinical informatics workforce given lack of access to these variables, which are vitally important diversity considerations. Prior work has demonstrated that Black, Hispanic and female applicants are underrepresented among applicants to clinical informatics fellowship programs, suggesting that targeted efforts are needed to enhance interest in clinical informatics careers among women and underrepresented minorities.[14] Additional research is needed to further understand the nature of potential disparities within this growing subspecialty and evolution of the field to ensure its future growth is sustained and robust enough for an increasingly complex and technology-laden health care system.

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AUTHOR CONTRIBUTIONS

VN was the principal investigator, led this study team, and conceptualized the study design and methods. SD and VN collaboratively refined the research design. SD was responsible for data acquisition and data analysis. All authors (SD, AM, and VN) contributed to interpretation of the data. SD drafted the manuscript, and all authors contributed to refining all sections and critically editing the manuscript for important intellectual content.

CONFLICT OF INTEREST STATEMENT

None declared.

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