

Emerging Roles and Occupations in the Health Workforce

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KEY FINDINGS

Systematically quantifying and tracking the evolution of the health workforce is a challenge, yet is important for identifying emerging demands for different skills and competencies. Real Time Labor Market Information (RT-LMI), a source of data that is increasingly used to monitor workforce demand, extracts information from online job ads to track demand for general labor market skills, including for the health workforce. The purpose of this study is to identify how five domains of emerging roles in healthcare have been incorporated into the job titles and descriptions of healthcare occupations by using RT-LMI data from LinkUp, a job search engine company. The key findings from this study are:

- “Care coordination” was the most common emerging role appearing in healthcare job ads, either in the job title or job description, in both 2014 and 2015, and “disease management” and “patient education” were more frequently mentioned in 2015 compared to 2014.
- Physical therapists, social workers, nursing assistants and medical assistants were among the allied health occupations mentioned in job ads in which emerging roles appeared.
- Care coordination was a dominant emerging role for occupations across all education requirement categories in the job ads examined, and disease management became a more frequently requested emerging role between 2014 and 2015.
- Jobs requiring a high school degree or below rarely referenced an emerging role (2.0% in 2014 and 3.5% in 2015) despite the relatively high frequency of job ads for healthcare jobs at this education level.
- Often, where an emerging role was identified in the job title, no other specific healthcare occupation was identified within either the job title or job description, suggesting that these occupations may be becoming stand-alone healthcare occupations.

In this study we found that RT-LMI can provide valuable information on the emergence of new skills and roles in the health workforce, including for many allied health occupations. Findings from this study contribute to the development of methods for monitoring and tracking changing healthcare workforce demands using large electronic databases of job ads. This important information on how employers associate skills with posted job titles can help educational institutions, training programs, accrediting bodies and health workforce planners better prepare workers with the competencies to meet market demand.

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INTRODUCTION

New tasks are emerging for healthcare workers to help patients coordinate their care and navigate the increasingly complex and transforming healthcare system. Job titles alone do not convey the competencies (i.e., knowledge, skills, and ability) expected from healthcare workers or how their roles may be evolving to complete these tasks. These changing competencies and roles are difficult to track with available public data sources. Real Time Labor Market Information (RT-LMI), an emerging source of data used to monitor employer demand by extracting information from online job ads, can track the competencies in demand from the general labor market,¹ but is a relatively new source for tracking changes in the health workforce. This important up-to-date information on how employers associate knowledge, skills and abilities with posted job titles may help educational institutions, training programs, accrediting bodies and health workforce planners better prepare workers with the competencies to meet market demand. To explore this new data source, we examine the extent to which emerging roles and competencies (with a focus on skills) can be identified and monitored using RT-LMI data provided by a job search engine company, LinkUp, that collects information about job ads directly from employer websites.²

Many of the large publicly available data sources such as the American Community Survey (ACS) and Current Population Survey (CPS) provide information on the supply, distribution and sociodemographic characteristics of the workforce, including healthcare occupations.³ Labor market surveys or occupation-specific studies can help to clarify the knowledge, skills and abilities in demand by employers. The Employment and Training Administration in the U.S. Department of Labor conducts regular surveys of employers to obtain this data across 1,000 different occupations and reports the results on Occupational Information Network (O*NET) online.⁴ A problem with using these data sources to identify workforce changes is their two- to three-year lag in reporting. Analysis of job ads extracted using RT-LMI methodologies has been shown to be a relatively low-cost way to obtain near real-time reporting of the occupations, skills and roles in demand by employers.^{1,5,6} Specifically, our team has found that RT-LMI can be used to monitor the growing demand for health information technology (IT)-related skills.⁷

As the healthcare system transforms under new organizational relationships such as Accountable Care Organizations and Patient-Centered Medical Home models, and as the U.S. population ages, roles and skills needed from the workforce can change rapidly. A 2016 National Academy of Medicine report addressing the workforce needed for 21st Century health and health care broadly identified areas of competency required to meet the needs of a changing demographic and health system. These competencies include the ability to manage complex patients with chronic and behavioral health issues, to work on interdisciplinary teams, and to conduct case management which involves having interpersonal, cultural and linguistic skills.⁸ Real-time data are critical for tracking the extent to which the health workforce evolves to meet changing employer demands.

There is evidence that the health workforce is evolving but challenges remain in quantifying and tracking these changes in a systematic way, and in identifying emerging demand for different competencies and roles. For example, a recent survey of large employers that asked about new healthcare jobs found that ICD-10 coder was the most common new job for which employers were currently recruiting or planning to recruit, followed by care coordinator.⁹ The survey did not clarify the credentials required to fill these roles or the overlap with other job titles. Several studies have focused on identifying emerging roles expected of nurses such as coordinating care, managing population health, and collaborating across professions.^{10,11} An

Institute of Medicine workshop report on the allied health workforce identified the need for training allied health workers in community engagement, working with underserved patient populations, using health IT effectively, and managing behavioral health problems.¹² But these studies have not quantified to what extent these competencies have been in demand.

In this study, we used RT-LMI from LinkUp to track how emerging skills (such as care coordination, patient navigation, health education) are incorporated into the job descriptions of healthcare occupations, particularly allied health occupations, and the extent to which these skills are becoming job titles and indicating a change in role for healthcare workers. Given the complexity of this type of analysis we did not examine competency requirements such as the level of ability or type of knowledge accompanying a skill. However, findings from this study contribute to the development of methods using large electronic databases of job ads for monitoring and tracking the skills and roles that employers demand of the health workforce.

METHODS

We obtained data from LinkUp, a job search engine company based in Minnesota.² LinkUp uses web-scraping or spidering tools to extract job ad information from company websites. LinkUp reports having a highly effective de-duplication process, which reduces the chance that job ads are captured multiple times when they are posted on multiple websites. LinkUp provided our team a set of job ads from 2014 and 2015 with fields including job title, company name, job description, date created, date checked, city, state, zip code, and country. LinkUp provided the set of jobs that they defined as being health or medical jobs per their proprietary algorithm. We restricted the analysis to job ads posted within the 50 U.S. states and the District of Columbia.

From this dataset, our study team identified job ads with job titles that matched our list of healthcare occupations and that included job descriptions (Note: LinkUp acknowledges that their algorithm did not extract job descriptions for all jobs posted within the timeframe of our analyses. They were not always saving job descriptions in the dataset covering the years we used, although they are working to improve their processes). Our team developed a list of healthcare occupations based on the Standard Occupational Classification (SOC) system with modifications to capture job titles that are commonplace such as “doctor” versus “physician,” and to focus on the title and not credential such as “nursing assistant” versus “certified nursing assistant.”¹³ (The full list of occupations is available upon request.) We used natural language processing (NLP) techniques including text parsing, string matching, and word positioning to identify specific skills and roles. Further details of the LinkUp dataset, our approach to defining healthcare occupations, and the NLP techniques used are reported elsewhere.⁷

We developed a list of emerging roles and related job titles that have also been considered skillsets based on the literature and our team’s expertise in health workforce research (see **Appendix A** for list of emerging roles and titles).^{9,11,12} We grouped emerging roles/titles into five domains: 1) care coordination, 2) disease management, 3) navigation, 4) patient education, and 5) peer role. We allowed for various permutations of an emerging role and/or title such as “patient care coordinator,” “patient care coordination,” and “coordination of patient care.” We searched for these terms among the job ads provided by LinkUp using NLP techniques in both the job title and job description fields in order to understand how these emerging roles and skills relate to more traditional healthcare jobs as defined by the SOC system.

We applied two main analytic approaches. First, we looked at the sample of job ads where the job title field matched one of the occupations from our list of healthcare occupations and looked for emerging role terms that appeared at least once in either the title field or job description. This analysis informs the extent to which traditional healthcare jobs are associated with emerging roles. Among this sample, we examined the extent to which the frequency of emerging roles was associated with the minimum education requirement of a healthcare occupation. Using entry-level education information by occupation detailed in the Bureau of Labor Statistics Occupational Outlook Handbook, we assigned occupations into one of four education

requirement categories: 1) high school degree or below, 2) postsecondary degree, 3) associate degree, and 4) bachelor's degree or above.¹⁴ Second, we looked at the sample of job ads where the job title field matched our list of emerging role terms. This analysis informs the extent to which emerging roles are not just listed skillsets, but rather stand-alone and emerging jobs. Among this sample, we then searched for healthcare occupations that appeared at least once in either title field or job description to identify whether one or more traditional healthcare jobs were potentially able to fill this emerging job.

FINDINGS

EMERGING ROLES REQUESTED FROM HEALTHCARE OCCUPATIONS

Based on LinkUp's algorithm for identifying health/medical jobs, we had 2,060,464 job ads with a job title in 2014 (**Figure 1A**), and 2,548,787 job ads with a job title in 2015 (**Figure 1B**). In 2014, 54.5% of the job titles matched our list of healthcare occupations, and 56.6% matched in 2015. About a third (32.7%) of those with a matching job title had a job description in 2014, while about half (51.7%) had a job description in 2015. This growth in available job descriptions is related to improvements by LinkUp in archiving job descriptions. Among ads with a job title matching our list of healthcare occupations and a job description, 18.6% contained at least one of our emerging role terms in either the job title or description in 2014 (68,218 job ads or 3.3% of the entire 2014 LinkUp sample), and 19.0% in 2015 (141,981 job ads or 5.6% of the entire 2015 LinkUp sample).

The emerging role domain that most frequently appeared was care coordination in both years; 83.3% out of the 68,218 job ads with an emerging role term in 2014 and 80.6% of the 141,981 job ads in 2015. We found nearly a ten-fold difference in the number of job ads for this emerging role in 2015 compared with the next most frequently occurring emerging role. In 2014, the second most frequent emerging role was patient education (8.7%) followed by disease management (6.9%), navigation (0.7%), and a peer role (0.3%). In 2015, the second most frequent emerging role was disease management (10.4%) followed by patient education (7.3%), navigation (1.0%), and a peer role (0.7%).

Table 1A and **Table 1B** shows the top five healthcare jobs that most frequently referenced an emerging role. For example, 72.5% of the 56,853 job ads in 2014 referencing care coordination were job ads for registered nurses. (For the counts of emerging role terms identified across all healthcare occupations see **Appendix B** for 2014 and **Appendix C** for 2015.) Across all domains in both years, all of our emerging roles appeared most frequently in registered nurse job ads—not surprising, given that registered nurse is the largest single occupation in the healthcare industry and also has the largest volume (44.7% in 2014 and 43.7% in 2015) of job ads in our analytic dataset. The occupation of nurse practitioner was among the top five occupations that included mention of all emerging role domains in each year, with the exception of patient education in 2014. Job ads for licensed practical/vocational nurse were also among those frequently referencing emerging role domains in both years, though patient education did not appear in 2014, and a peer role was not referenced in either year.

Job ads for physical therapists were among those referencing care coordination, patient education, and a peer role in both years (**Table 1A** and **Table 1B**). Job ads for medical assistants were among the top five occupations referencing disease management and patient education in both years. Healthcare social workers were among the top five for care coordination and navigation in both years, and for a peer role in 2014 but not in 2015. In 2015, nursing assistants rose to the top of the list (other than registered nurses) of occupations most frequently referencing a peer role, while counselors and social workers were not among the top five in 2015. It was common for occupations to reference multiple emerging roles.

EMERGING ROLES BY OCCUPATION EDUCATION REQUIREMENT

When examining the frequency of job ads referencing emerging roles by the minimum education requirement of the healthcare occupation in the job ad, we found notable trends consistent across the two years. First, jobs requiring a high

Figure 1A: Number of Job Ads with Selected Healthcare Occupations and Emerging Roles in 2014

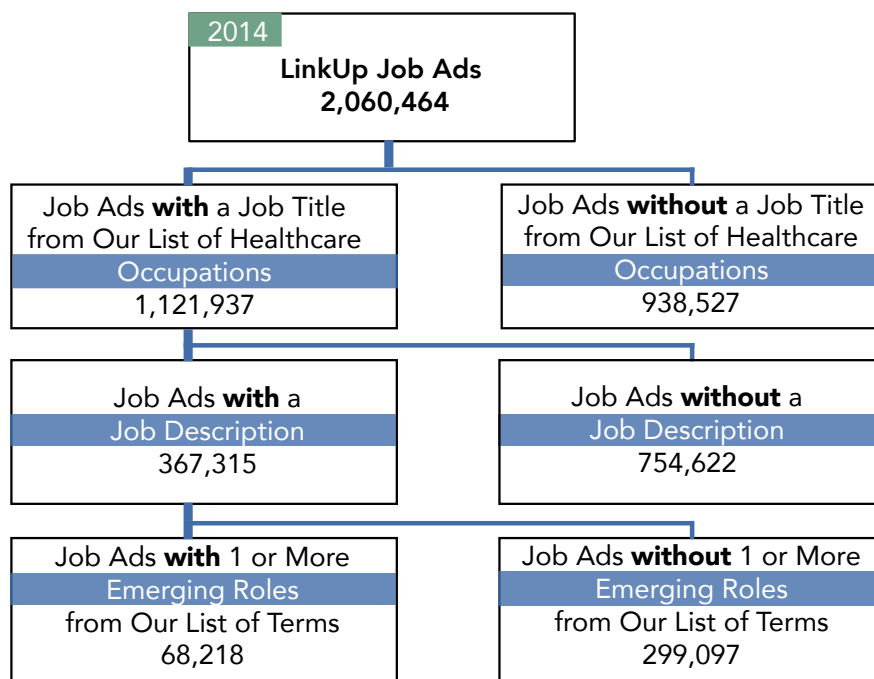


Figure 1B: Number of Job Ads with Selected Healthcare Occupations and Emerging Roles in 2015

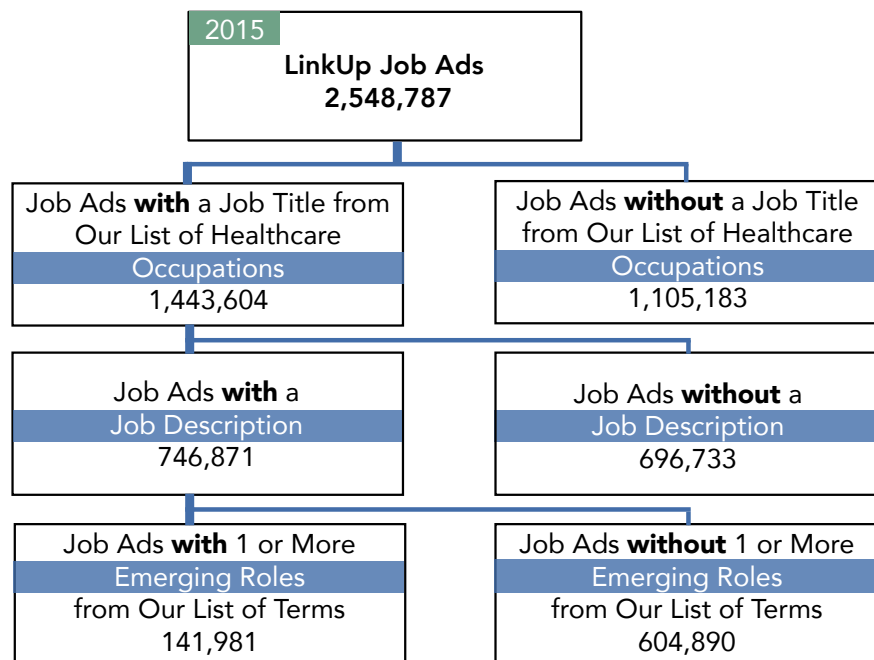


Table 1A:**Top Five Healthcare Occupations with Job Ads Referencing an Emerging Role in 2014**

Care Coordination	Disease Management	Navigation	Patient Education	Peer Role
n=56,853	n=4,736	n=499	n=5,925	n=205
Registered Nurses (72.5%)	Registered Nurses (68.2%)	Registered Nurses (80.4%)	Registered Nurses (50.8%)	Registered Nurses (49.8%)
Licensed Practical/Vocational Nurses (15.0%)	Nurse Practitioner (8.7%)	Physicians and Surgeons (4.0%)	Physician and Surgeons (8.3%)	Nurse Practitioners (14.1%)
Healthcare Social Workers (3.0%)	Physician and Surgeons (5.1%)	Licensed Practical/Vocational Nurse (3.8%)	Physical Therapists (7.4%)	Physical Therapists (10.2%)
Nurse Practitioners (2.1%)	Licensed Practical/Vocational Nurses (2.8%)	Nurse Practitioners (3.2%)	Medical Assistants (5.7%)	Counselors (6.3%)
Physical Therapists (1.5%)	Medical Assistants (2.3%)	Healthcare Social Workers (2.8%)	Occupational Therapists (5.4%)	Healthcare Social Workers (3.4%)

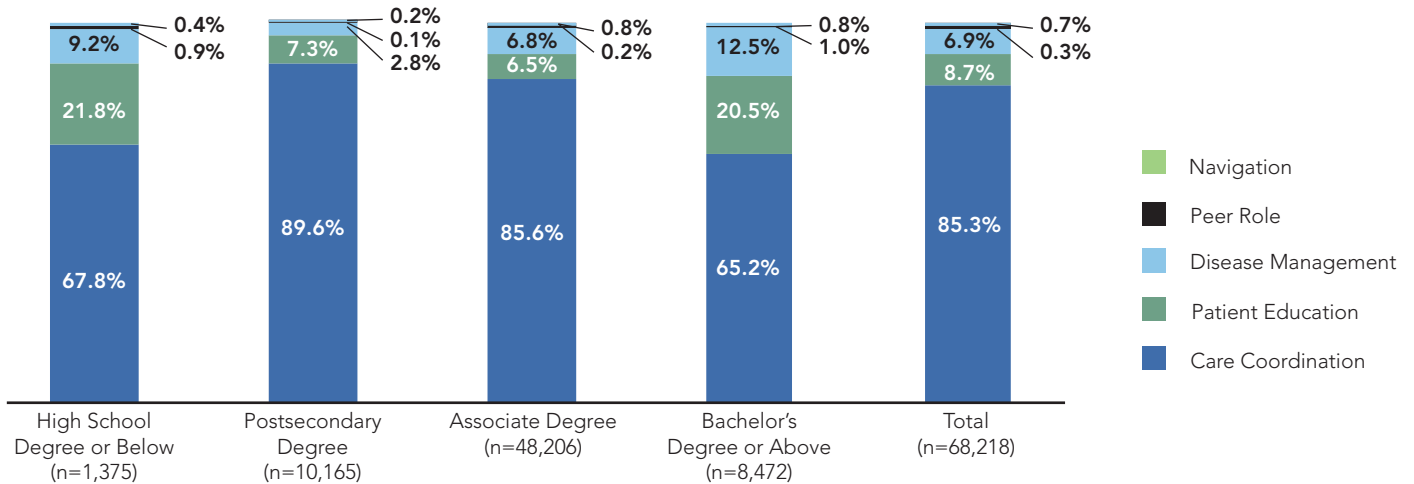
Table 1B:**Top Five Healthcare Occupations with Job Ads Referencing an Emerging Role in 2015**

Care Coordination	Disease Management	Navigation	Patient Education	Peer Role
n=114,463	n=14,754	n=1,392	n=10,407	n=965
Registered Nurses (65.8%)	Registered Nurses (62.5%)	Registered Nurses (78.6%)	Registered Nurses (43.6%)	Registered Nurses (47.8%)
Licensed Practical/Vocational Nurses (15.5%)	Physician and Surgeons (6.0%)	Healthcare Social Workers (5.6%)	Licensed Practical/Vocational Nurses (8.4%)	Nursing Assistants (18.1%)
Healthcare Social Workers (4.4%)	Nurse Practitioners (5.1%)	Licensed Practical/Vocational Nurses (4.3%)	Medical Assistants (8.2%)	Nurse Practitioners (6.6%)
Nurse Practitioners (2.1%)	Licensed Practical/Vocational Nurses (5.0%)	Physician and Surgeons (2.4%)	Physical Therapists (6.9%)	Physical Therapists (5.8%)
Physical Therapists (2.1%)	Medical Assistants (4.7%)	Nurse Practitioners (2.3%)	Nurse Practitioners (5.5%)	Physician and Surgeons (4.9%)

school degree or below were only 2.0% (or 1,375 job ads) in 2014 and 3.5% (or 5,019 job ads) in 2015 of the ads referencing an emerging role, although jobs requiring a high school degree or below represented 12.1% of all the ads in 2014 and 16.5% in 2015. The bulk of the ads referencing emerging roles were among jobs requiring an associate degree, which is in part driven by the large number of job ads for registered nurses, a workforce comprised of a high percentage with an associate degree in nursing.¹⁵

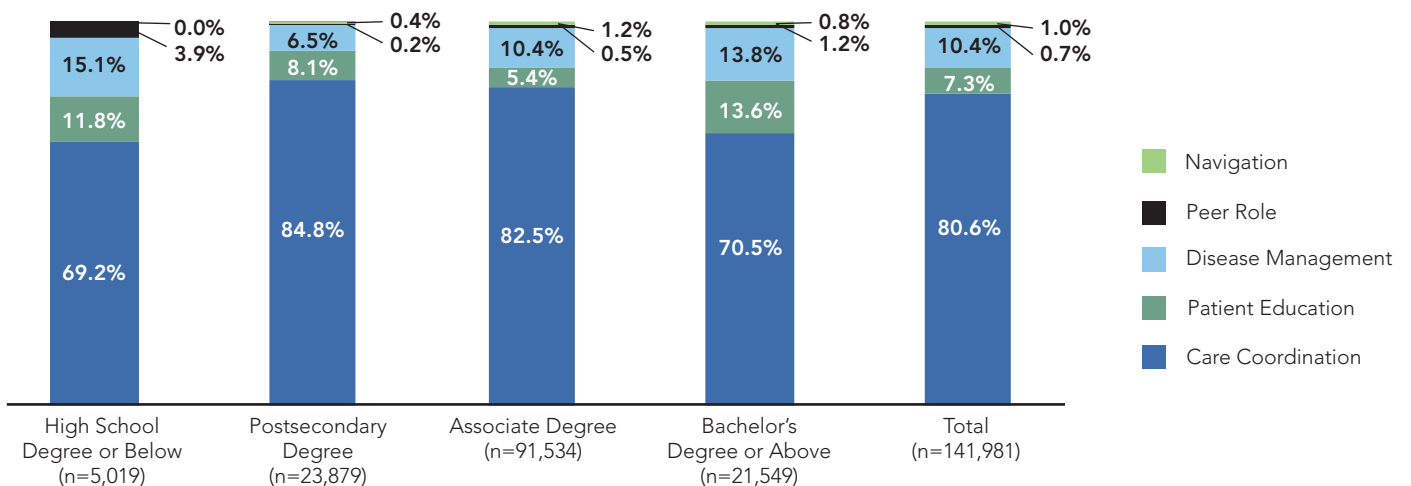
Across all education requirement categories, care coordination was a dominant emerging role domain (**Figures 2A** and **2B**). Jobs with the lowest as well as highest education requirements referenced care coordination skills less often than jobs requiring a post-secondary or an associate degree. In 2014, about 20% of the ads hiring for healthcare jobs at the lowest and highest education requirements requested that individuals play a role in patient education, compared to 8.7% of job ads that requested a patient education role across all education levels. By 2015, for jobs requiring a high school degree or below, job ads more commonly requested that individuals play a disease management or peer role. For jobs requiring a bachelor's degree or above, patient education was less frequently requested in the 2015 ads, while a higher proportion of ads requested skills in navigation and slightly higher for disease management.

Figure 2A: Emerging Roles Referenced in Job Ads by Education Requirement of Healthcare Occupation, 2014



Minimum Education Requirement for Healthcare Occupation

Figure 2B: Emerging Roles Referenced in Job Ads by Education Requirement of Healthcare Occupation, 2015



Minimum Education Requirement for Healthcare Occupation

EMERGING ROLES AS OCCUPATION TITLES

Recognizing that emerging roles could also represent occupations, we found that among the 2,060,464 healthcare job ads in our dataset with a job title in 2014, 10,626 (or 0.5%) unique job ads had an emerging role listed within the job title. In 2015, 22,072 unique job ads, or 0.9% of the sample of 2,548,787 job ads with a job title, had an emerging role listed within the job title. A small percentage of these uniquely identified job ads had more than one emerging role identified within the job title field (approximately representing 2% of the 2014 and 4% of the 2015 job ads with a job title).

Among job ads that had an emerging role in the job title, about half also referenced one of our defined healthcare occupations, which appears to be driven by the high volume of job ads with care coordination in the job title (**Table 2A** and **Table 2B**). Over half of the job ads with patient education in the job title also referenced one of our healthcare occupations in 2014, but in 2015 the trend reversed. About three-quarters of job titles with disease management and navigation were not associated with a healthcare occupation in both 2014 and 2015. Almost none of the job titles stating a peer role was associated with a healthcare occupation in both years.

In both years, the most common emerging role domain that appeared as a job title was care coordination. Where the care coordination domain term appeared in the job title, there were several healthcare occupations frequently listed either alongside the job title or within the job description. Among the most common were registered nurses (49.1% in 2014; 49.5% in 2015), licensed practical/vocational nurses (2.8% in 2014; 2.2% in 2015), healthcare social workers (1.8% in 2014; 2.4% in 2015), physical therapists (0.5% in 2014; 0.6% in 2015), and physicians and surgeons (0.6% in 2014; 0.4% in 2015). This may suggest that, when employers are not advertising for a care coordinator as a stand-alone occupation, employers are enlisting RNs, LPNs, social workers, physical therapists and/or physicians to take on care coordination duties.

Registered nurse was the occupation most often associated with three other emerging roles we studied: disease management, navigation and patient education services. This finding was not surprising because registered nursing is the largest single healthcare occupation in the U.S. in terms of the number of people employed.¹⁶ But the finding also indicates that registered nurse, as an occupation, is often responsible for providing disease management, navigation, and patient education services, as well as care coordination. Other allied health occupations that were commonly requested to fill these three emerging roles included counselors, medical assistants, and nursing assistants in both years. In 2015, emergency medical services/paramedics also appeared with notable frequency. Not surprising, that patient education was frequently associated with the job title, the healthcare occupation of “health educators.”

LIMITATIONS

Our analyses had several limitations, which was expected given that the objective of this study was to test a relatively new source of data for tracking changes in the health workforce. First, our list of five domains of emerging roles focused on a narrow scope of roles relatively unique to healthcare. Further work is needed to examine the growing demand of occupations not yet in the SOC such as nursing informaticists, or occupations that are in the SOC but not healthcare-specific, such as computer engineer, that are appearing more frequently in healthcare job ads.

Our list of emerging roles does not indicate the ability level or type of knowledge expected to accompany these skills. More work is needed to identify which of these less-common occupation titles are new occupations versus variations on, or subspecialties of, more common titles. Similarly, we are not able to identify softer skills such as leadership, communication, and customer service, which are not healthcare-specific yet are important areas of expertise for healthcare workers and complement the skills we identified in our study. Further NLP work is needed to identify the context in which our emerging roles are being described.

A challenge in identifying emerging roles is the extent to which they are implied by an occupation title rather than explicitly stated in a job description. For example, a community health worker may be assumed to be a “peer” with job descriptions indicating the individual should come from or have involvement with the community the position is to serve. Social workers, by virtue of their education and training, may be expected to provide service coordination or education, and a registered nurse may be expected to provide disease management, without explicitly stating that expectation in the job description.

Another challenge is that these emerging roles may be overlapping and are not mutually exclusive. For example, patient navigation may include care coordination and disease management. A peer role may involve patient education. While this study provides a baseline of knowledge around the nature in which these emerging roles appear and their frequency in job ads, the evolution of these emerging roles may be monitored with greater use of RT-LMI and more complex NLP techniques, which is subject for future study.

Table 2A:
Emerging Role Terms Found within Job Title, and Associated Healthcare Occupations, 2014

	Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a
Found in any job ad	9,441	246	434	622	76	10,819
Not associated with healthcare occupation (Column %)	4,160 (44.1%)	196 (79.7%)	333 (76.7%)	259 (41.6%)	75 (98.7%)	5,023 (46.4%)
Associated with healthcare occupation: (Column %)	5,281 (55.9%)	50 (20.3%)	101 (23.3%)	323 (58.4%)	1 (1.3%)	5,796 (53.6%)
Counselors	8	0	0	1	1	10
Dietitians and Nutritionists	0	0	0	4	0	4
Health Educators	0	0	0	32	0	32
Healthcare Social Workers	166	1	2	3	0	172
Home Health Aides	1	0	0	0	0	1
Licensed Practical/Vocational Nurses	261	3	4	17	0	285
Medical Assistants	19	3	0	4	0	26
Nurse Practitioners	14	0	3	2	0	19
Nursing Assistants	6	0	0	0	0	6
Occupational Therapists	5	0	0	0	0	5
Pharmacists	61	1	0	0	0	62
Physical Therapists	48	0	2	0	0	50
Physician Assistants	1	0	0	0	0	1
Physicians and Surgeons	53	3	3	3	0	62
Psychiatric Technicians	1	0	0	0	0	1
Registered Nurses	4,633	39	87	297	0	5,056
Respiratory Therapists	1	0	0	0	0	1
Social and Human Service Assistants	1	0	0	0	0	1
Substance Abuse and Behavioral Disorder Counselors	2	0	0	0	0	2

^a Total emerging roles column is not a unique count of job ads given that more than one emerging role may appear in a job ad (e.g., patient educators may be asked to do patient education as well as play a peer role).

Using RT-LMI data, we encountered many difficulties in categorizing healthcare settings. Job ads provide a company name and may describe the setting, but the company name and/or setting description often does not conform to standardized codes such as the North American Industry Classification System (NAICS). For example, an academic medical center may refer to themselves simply by their University name or a health organization may have a generic name such as Hope Health. These nonstandard company names and setting descriptions made it difficult to identify the healthcare settings that are requiring these skills.

Table 2B:
Emerging Role Terms Found within Job Title, and Associated Healthcare Occupations, 2015

	Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a
Found in any job ad	19,832	798	1,180	787	282	22,879
Not associated with healthcare occupation (Column %)	8,784 (44.3%)	608 (76.2%)	838 (71.0%)	512 (65.1%)	276 (97.9%)	11,018 (48.2%)
Associated with healthcare occupation: (Column %)	11,048 (55.7%)	190 (23.8%)	342 (29.0%)	275 (34.9%)	6 (2.1%)	11,861 (51.8%)
Community Health Workers	1	1	0	0	0	2
Counselors	14	0	2	0	1	17
Dental Hygienists	1	0	0	0	0	1
Dietitians and Nutritionists	3	0	0	5	0	8
Emergency Medical Technicians and Paramedics	14	0	0	1	0	15
Health Educators	2	0	0	60	0	62
Healthcare Social Workers	472	6	12	0	0	490
Licensed Practical/Vocational Nurses	430	13	15	25	0	483
Medical Assistants	37	4	4	2	0	47
Medical Records and Health Information Technicians	0	1	0	0	0	1
Nurse Practitioners	26	8	3	1	0	38
Nursing Assistants	2	0	0	2	0	4
Occupational Therapists	6	0	0	0	0	6
Pharmacists	16	4	0	0	0	20
Pharmacy Technicians	2	0	0	0	0	2
Physical Therapists	126	1	8	1	2	138
Physician Assistants	0	0	1	0	0	1
Physicians and Surgeons	76	17	12	5	2	112
Psychiatric Technicians	0	0	0	0	1	1
Registered Nurses	9,817	135	285	172	0	10,409
Respiratory Therapists	2	0	0	1	0	3
Speech-Language Pathologists	1	0	0	0	0	1

^a Total emerging roles column is not a unique count of job ads given that more than one emerging role may appear in a job ad (e.g., patient educators may be asked to do patient education as well as play a peer role).

DISCUSSION

In this study we found that RT-LMI can provide valuable information on the emergence of new roles and occupations across the health workforce. References to these new roles appeared most commonly among nursing job ads, which is not surprising because nursing jobs comprise more than half of all healthcare jobs,¹⁶ but also include many allied health occupations such as physical therapists, social workers, and medical assistants.

Among our five emerging role domains, care coordination was the most commonly cited in job ads, which may be reflective of a pressing need to help patients manage care for complex chronic disease across a complex health system. Care coordinators may be trained to address these needs. These findings appeared to be consistent with the literature identifying care coordination as a highly sought-after occupation.⁹ References to disease management and patient education were also common and appeared to be growing. References to disease management may be reflective of a growing recognition that patients need more skills managing their conditions on their own and at home. Patient education is needed to help patients understand the health behaviors and risk factors that may contribute to exacerbating health issues.

Peer roles and patient navigation were least frequently mentioned among the five emerging role domains. We are not able to determine in this study whether the low frequency of these roles was because of low employer demand, is appropriate relative to the patient need for the skills of the worker (e.g., the role targets a specific niche), or is the result of our research methods (e.g., our coding approach). Healthcare workers in peer roles may be a patient's advocate, train patients to be self-empowered, and/or provide emotional support to patients given their own personal experiences with a disease. Peer roles may be paid or volunteer, so not all positions may be advertised. Peer roles have been found to be particularly effective in supporting patients in mental health care.¹⁷ Patient navigation was referenced least frequently among the five domains across occupations. This may be due to this role occurring most often in specific settings. For example, patient navigation services and staff are frequently deployed in cancer care where patients have many appointments to schedule, manage multiple prescriptions, and face complex health insurance paperwork, among other tasks.

Across our study period many changes were occurring in the healthcare delivery system that likely influenced the volume of jobs identified with emerging roles. For example, while chronic disease management models have been around for a long time, Medicare began reimbursing for a specific program called Chronic Care Management in 2015.¹⁸ After initiation of a clear national reimbursement mechanism, more employers may have been creating positions such as disease managers or care coordinators that directly address chronic disease management. Future tracking of these emerging roles should be considered in context of major delivery system changes.

In the future, additional assessment is needed to identify how the competencies and credentials of more common healthcare occupations align with those of emerging roles and occupations. Also, more work is needed to understand whether there are geographic differences in the roles expected among our healthcare workers. The findings from this study as well as future work building on these initial results, however, will inform education and training programs, and their accrediting bodies, to better prepare new entrants to the field to meet changing healthcare industry demands. We also hope that our findings will help organizations compiling and processing RT-LMI to better understand how their data can play a role in improving population health by tracking changes in the skills and roles needed from the healthcare workforce.

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SUGGESTED CITATION

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APPENDIX A: EMERGING ROLE DOMAIN AND CORRESPONDING SEARCH TERMS

Emerging Role Domain	Search Term
Care Coordination	care coordinating
	care coordination
	care management
	coordination of care
	coordination of patient care
	management of patient care
	patient care coordination
	patient care management
	case manager
	care coordinator
	Disease Management
managing disease	
managing risk	
population health	
risk management	
disease manager	
Navigation	care navigation
	navigate care
	navigate patient care
	navigation of care
	patient navigation
	care navigator
	nurse navigator
	health services navigator
	health service navigator
	care continuum navigator
	care coordination navigator
	patient navigator

Emerging Role Domain	Search Term
Patient Education	health coach
	health coaching
	health educating
	health education
	consumer education
	health educator
	Peer Role
peer education	
peer specialist	
peer mentor	
peer advocate	
peer partner	
peer navigator	
peer counselor	
peer coach	
peer support	
peer liaison	
peer recovery specialist	
peer support specialist	
peer advisor	
peer recovery coach	

APPENDIX B: COUNTS OF EMERGING ROLES REFERENCE IN JOB ADS BY HEALTHCARE OCCUPATION AND MINIMUM EDUCATION REQUIREMENT, 2014

		Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a	Total Job Ads with Healthcare Occupation ^b
	All Healthcare Occupations ^c	56,853	4,736	499	5,925	205	68,218	1,188,086
High School Degree or Below	Dietetic Technicians	18	1	0	0	0	19	5,394
	Health Educators	1	2	0	184	0	187	198
	Home Health Aides	93	2	0	18	4	117	5,704
	Medical Appliance Technicians	0	0	0	1	0	1	36
	Medical Equipment Preparers	0	1	0	0	0	1	950
	Nursing Assistants	224	84	0	39	6	353	70,219
	Occupational Therapy Assistants	21	1	0	5	0	27	7,761
	Orderlies	0	5	0	0	0	5	496
	Personal Care Aides	1	0	0	4	0	5	285
	Pharmacy Aides	21	0	0	0	0	21	1,093
	Pharmacy Technicians	300	20	5	4	0	329	31,919
	Physical Therapist Aides	3	0	0	0	0	3	553
	Physical Therapist Assistants	71	3	0	2	1	77	10,529
	Psychiatric Technicians	171	2	0	12	1	186	4,130
	Social and Human Service Assistants	7	0	0	0	0	7	66
Surgical Technologists	1	5	0	31	0	37	3,925	
Postsecondary Degree	Community Health Workers	99	3	5	54	3	164	726
	Dental Assistants	0	0	0	43	0	43	9,482
	Emergency Medical Technicians and Paramedics	28	13	0	0	0	41	6,325
	Licensed Practical/Vocational Nurses	8,530	132	19	307	0	8,988	102,886
	Massage Therapists	1	0	0	0	0	1	4,127
	Medical Assistants	424	111	1	335	3	874	45,169
	Medical Records and Health Information Technicians	7	0	0	0	0	7	323
	Medical Transcriptionists	2	0	0	0	0	2	712
	Phlebotomists	19	24	0	2	0	45	22,095

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		Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a	Total Job Ads with Healthcare Occupation ^b
Associates Degree	Dental Hygienists	0	0	0	21	0	21	1,810
	Diagnostic Medical Sonographers	14	9	0	81	1	105	5,360
	Health Technologists and Technicians, All Other	1	1	0	2	0	4	665
	Magnetic Resonance Imaging Technologists	6	3	0	6	0	15	4,184
	Medical and Clinical Laboratory Technicians	1	0	0	0	0	1	605
	Medical and Clinical Laboratory Technologists	0	0	0	7	0	7	1,062
	Nuclear Medicine Technologists	0	2	0	6	0	8	768
	Orthotists and Prosthetists	0	1	0	2	0	3	140
	Radiation Therapists	40	1	1	3	0	45	1,045
	Registered Nurses	41,196	3,230	401	3,009	102	47,938	531,096
	Respiratory Therapists	28	24	0	7	0	59	10,299
Bachelor's Degree or Above	Audiologists	0	1	0	0	0	1	514
	Counselors	320	27	0	19	13	379	8,599
	Dentists	0	0	0	16	0	16	4,904
	Dietitians and Nutritionists	124	61	0	56	3	244	9,821
	Exercise Physiologists	3	13	0	11	0	27	569
	Healthcare Social Workers	1,729	77	14	44	7	1,871	28,625
	Mental Health Counselors	10	0	0	0	1	11	1,053
	Nurse Anesthetists	0	2	0	0	0	2	768
	Nurse Midwives	3	0	0	2	0	5	292
	Nurse Practitioners	1,181	410	16	207	29	1,843	31,571
	Occupational Therapists	328	11	0	318	2	659	30,465
	Pharmacists	189	64	1	23	0	277	27,680
	Physical Therapists	853	100	11	438	21	1,423	70,493
	Physician Assistants	133	46	5	111	3	298	10,951
	Physicians and Surgeons	517	240	20	492	1	1,270	42,415
	Podiatrists	3	0	0	0	0	3	3,932
	Recreational Therapists	14	0	0	0	0	14	597
Speech-Language Pathologists	94	4	0	1	4	103	20,541	
Substance Abuse and Behavioral Disorder Counselors	24	0	0	2	0	26	383	

^a More than one emerging role may appear in a job ad, hence there may be a higher total for emerging roles than total job ads for a specific occupation, e.g., patient educators may be asked to do patient education as well as play a peer role.

^b Total job ads is not a unique count of job ads. Job ads may be counted more than once if more than 1 healthcare occupation appears in a job title, e.g., medical assistant and phlebotomist appearing in the same job title.

^c Healthcare occupations without any emerging role domains include athletic trainers; cardiovascular technologists/technicians; community and social service specialists, all other; dental laboratory technicians; health diagnosing and treating practitioners, all other; healthcare practitioners and technical workers, all other; healthcare support workers, all other; medical secretaries; occupational therapy aides; ophthalmic medical technicians; opticians, dispensing; optometrists; psychiatric aides; radiologic technologists; respiratory therapy technicians.

APPENDIX C: COUNTS OF EMERGING ROLES BY HEALTHCARE OCCUPATION AND MINIMUM EDUCATION REQUIREMENT, 2015

		Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a	Total Job Ads with Healthcare Occupation ^b
	All Healthcare Occupations ^c	114,463	14,754	1,392	10,407	965	141,981	1,506,696
High School Degree or Below	Dietetic Technicians	66	8	0	2	0	76	8,320
	Health Educators	8	1	0	203	1	213	192
	Home Health Aides	223	4	0	164	4	395	7,125
	Medical Appliance Technicians	2	0	0	2	0	4	48
	Medical Equipment Preparers	0	1	0	0	0	1	1,820
	Nursing Assistants	1,173	552	0	94	175	1,994	107,164
	Occupational Therapy Assistants	210	37	0	10	0	257	9,168
	Orderlies	0	14	0	0	0	14	415
	Personal Care Aides	22	0	0	3	0	25	505
	Pharmacy Aides	78	0	0	0	0	78	2,084
	Pharmacy Technicians	630	83	1	21	1	736	82,962
	Physical Therapist Aides	4	0	0	0	0	4	609
	Physical Therapist Assistants	519	36	0	4	3	562	13,476
	Psychiatric Technicians	508	9	0	6	12	535	7,532
	Social and Human Service Assistants	6	0	0	0	0	6	60
Surgical Technologists	26	11	1	81	0	119	5,421	
Postsecondary Degree	Community Health Workers	96	10	19	118	6	249	995
	Dental Assistants	214	1	0	48	0	263	9,739
	Emergency Medical Technicians and Paramedics	58	37	1	17	0	113	9,299
	Licensed Practical/Vocational Nurses	17,705	733	60	878	22	19,398	110,984
	Massage Therapists	5	4	0	4	0	13	4,478
	Medical Assistants	1,907	690	20	853	17	3,487	60,524
	Medical Records and Health Information Technicians	9	5	0	0	0	14	442
	Medical Transcriptionists	9	1	0	0	0	10	947
	Phlebotomists	254	70	3	5	0	332	22,898
Associates Degree	Cardiovascular Technologists and Technicians	0	1	2	0	0	3	563
	Dental Hygienists	5	3	0	43	0	51	2,858
	Diagnostic Medical Sonographers	30	25	1	209	0	265	8,144
	Health Technologists and Technicians, All Other	0	1	0	6	0	7	710

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		Care Coordination	Disease Management	Navigation	Patient Education	Peer Role	Total Emerging Roles ^a	Total Job Ads with Healthcare Occupation ^b
Associates Degree	Magnetic Resonance Imaging Technologists	11	46	3	44	0	104	6,112
	Medical and Clinical Laboratory Technicians	5	0	0	0	0	5	974
	Medical and Clinical Laboratory Technologists	5	2	0	14	0	21	1,437
	Nuclear Medicine Technologists	2	0	0	22	0	24	1,006
	Orthotists and Prosthetists	3	0	0	12	0	15	505
	Radiation Therapists	9	3	2	13	0	27	1,410
	Radiologic Technologists	3	0	0	0	0	3	478
	Registered Nurses	75,331	9,227	1,094	4,541	461	90,654	657,898
	Respiratory Therapists	125	167	2	61	0	355	15,007
Bachelor's Degree or Above	Athletic Trainers	10	1	0	1	0	12	295
	Audiologists	5	1	0	1	0	7	739
	Counselors	902	33	4	111	15	1,065	10,676
	Dentists	10	1	0	31	0	42	4,027
	Dietitians and Nutritionists	384	334	0	100	5	823	11,647
	Exercise Physiologists	2	15	0	27	0	44	593
	Health Diagnosing and Treating Practitioners, All Other	0	0	0	1	0	1	213
	Healthcare Social Workers	5,028	371	78	156	40	5,673	30,808
	Mental Health Counselors	104	0	0	4	2	110	1,593
	Nurse Anesthetists	2	15	0	1	0	18	1,873
	Nurse Midwives	9	11	0	2	0	22	357
	Nurse Practitioners	2,447	751	32	572	64	3,866	41,239
	Occupational Therapists	1,021	46	2	488	11	1,568	30,222
	Optometrists	6	7	0	4	0	17	629
	Pharmacists	526	188	3	26	0	743	36,719
	Physical Therapists	2,356	133	22	722	56	3,289	67,521
	Physician Assistants	480	148	8	266	9	911	14,782
	Physicians and Surgeons	1,508	889	33	362	47	2,839	58,915
	Podiatrists	21	4	0	0	0	25	4,042
Recreational Therapists	20	5	0	0	0	25	566	
Speech-language Pathologists	341	19	1	53	10	424	23,651	
Substance Abuse and Behavioral Disorder Counselors	20	0	0	1	4	25	593	

^a More than one emerging role may appear in a job ad, hence there may be a higher total for emerging roles than total job ads for a specific occupation, e.g., patient educators may be asked to do patient education as well as play a peer role.

^b Total job ads is not a unique count of job ads. Job ads may be counted more than once if more than 1 healthcare occupation appears in a job title, e.g., medical assistant and phlebotomist in the same job title.

^c Healthcare occupations without any emerging role domains include community and social service specialists, all other; dental laboratory technicians; healthcare practitioners and technical workers, all other; healthcare support workers, all other; medical secretaries; occupational therapy aides; ophthalmic medical technicians; opticians, dispensing; psychiatric aides; respiratory therapy technicians