

Digital Health and Professional Identity in Australian Health Libraries: Evidence from the 2018 Australian Health Information Workforce Census

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Article abstract

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Methods – Health librarians' responses to the May 2018 Australian Health Information Workforce Census were analysed and compared with results obtained in earlier census counts. The health librarian characteristics were also compared with other health information occupations included in the Census.

Results – There were 238 usable health librarian responses. These indicate that the health librarian workforce continues to be a comparatively mature population, with substantial experience, increasing involvement in data- and technology-intensive functions, high levels of professional association membership, and participation in continuing education activities. Notably there are emerging role titles and job functions which point to a greater digital health focus in the changing work realm.

Conclusion – The health librarian workforce has adapted its skills, in line with the increased digital emphasis in health information work. However, as with other health information occupational groups, it is possible that health system planners and funders are not aware of librarians' current functions and skills. This mature workforce may undergo significant attrition and consequent loss of expertise in the next decade. Continued advocacy and strategic planning around these factors with workforce, healthcare quality, and educational organizations will be required.



Research Article

Digital Health and Professional Identity in Australian Health Libraries: Evidence from the 2018 Australian Health Information Workforce Census

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Abstract

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Introduction

Information and communication technology advances are transforming the way that health care systems operate and the kind of care they provide (Marques & Ferreira, 2019). Major technologies include telemedicine, smartphone apps, sensors and wearables for diagnostics and remote monitoring, reading and writing the genome, speech recognition and natural language processing, virtual and augmented reality, artificial intelligence based image analysis, predictive analytics, and rehabilitative robotics (Topol, 2019). "The use and scale up of digital health solutions can revolutionize how people worldwide achieve higher standards of

health, and access services to promote and protect their health and well-being," according to the World Health Organization (WHO, 2019).

The digital transformation of health highlights the need to strengthen that part of the overall health workforce who are specialists in the information and communication methods and tools used in digital health. These practitioners are responsible for the development, maintenance, and governance of the systems used to manage health data, health information, and health knowledge. Yet this workforce is poorly defined in general. For example, Standards Australia's Digital Hospital Handbook identifies only two relevant roles:

chief clinical information officers and health information managers (Standards Australia, 2017). Health information specializations such as health librarianship are often invisible to those responsible for digital health implementations and the consequent quality and safety of patient care (Gray, Gilbert, Butler-Henderson, Day, & Pritchard, 2019). There is not yet consensus on the capabilities required in the specialists who manage digital health information. A recent voluntary survey by the Health Informatics Career Pathways Project illustrates this divergence: it identified a wide variety of skills, specializations, and job titles in the current non-clinical health informatics workforce in the United Kingdom and Ireland (Cowey, 2019). Professional education bodies such as Digital Health Canada include multiple domains of knowledge and expertise in their informatics certification programs (Digital Health Canada, 2019).

The ill-defined status of the health information labour force is also apparent in the incomplete workforce data available. In Australia, for example, estimates of the size of the Australian health information workforce, by Health Workforce Australia (HWA) and other organizations between 2009 and 2013, ranged from around 6,000 to 11,800. These varying numbers were due to differences in the occupations that were included by the data-collecting bodies and to different data collection methods.

Numbers for the professional workforce in Australian health libraries are not included in these estimates. Unlike many other work groups in health, librarians are not a regulated practitioner group, and there is no national board licence or registration needed to practice. Health librarians are thus relatively unseen even in the health workforce. Providers of librarianship education programs do not offer a medical or health information specialty subject, which means that course graduate numbers are not useful for counting new entrants to the health area. For these reasons, detailed

descriptions of the Australian health librarian workforce are reliant on efforts by professional bodies and interested researchers.

This paper focuses on data about the current health librarian workforce in Australia, as a case to illustrate the workforce issues implicit in adoption of digital health. Factors such as adequate supply, changes in work role, and preparation through specialist training will be considered.

Literature Review

A strong body of literature has appeared in the past decade on predicted changes in the health librarian profession. The scoping review by Ma, Stahl, and Knotts (2018) described nine evolving and active roles, with embedded librarians as a strong theme. Several authors have identified external and occupational drivers of change, and discussed the need for the profession to respond (Brettell & Urquhart, 2011; Crum & Cooper, 2013; Henderson, 2014; Holst et al., 2009; Hopkins, 2017; King & Lapidus, 2015; McGowan, 2012; Murphy, 2013). Hallam et al. (2010) concisely stated the challenges and outlook for the health librarian workforce: "Traditional library work is diminishing, professional boundaries are blurring, and emerging areas of work are being claimed by other professional groups" (p. 355).

Health Librarian Workforce Surveys

In the past decade surveys of librarians in health roles have revealed shifts in the responsibilities and skills of this group. Sen, Villa, and Chapman (2014) collected data on health information professionals practicing across Europe, as a means to understand their current roles, skills, professional development needs, and views on the impact of their work. The data were obtained through an online survey, focus groups, and individual interviews. The 513 respondents identified a wide range of roles: "evidence-based roles (e.g., literature searching and teaching/training) and management roles, including library-specific management roles,

more generic management roles, communications roles and roles involving technology” (p. 12). The authors noted the breadth of roles across the sector, as well as within the context of individuals’ jobs. Focus group members commented on the changes in their roles, due in part to technological changes.

Dunikowski et al. (2013) surveyed United States health association libraries to gather details of their status, services, staffing, and technology. This was the most recent in a survey series conducted since 1980 by the Health Association Libraries Section of the Medical Library Association and its predecessors. Sixty organizations with a library responded. Nominated changes in the roles of these libraries and staff included an increase in the volume and complexity of services. In addition, non-traditional services represented 10% or more of library staff workload. A number of these areas involved technology-enabled information work, such as managing archives, publications and citation support, records management, website involvement, and metadata support.

McLaughlin, Spencer, Zeblisky, Liszczynskyj, and Laera (2018) surveyed 383 solo hospital librarians. Over two-thirds of the respondents worked in hospital systems and community hospitals; nearly half had 15 years’ experience or more working in a hospital setting, 75% worked full-time, and 84% held a master’s degree in library and information science. Duties covered internal library operations (such as literature and reference services, managing information resources, and teaching) as well as external links with clients and groups, for example, committee work in patient safety, research and ethics committees, and clinical education. While noting the depth and breadth of this workforce, the authors also drew attention to challenges, such as recognition of the librarian’s specialist contribution to the organization’s purpose (p. 132).

Benchmark Surveys

Recent benchmarking surveys of healthcare libraries also illustrated current services and staff characteristics. Benchmarking aims to enable libraries to compare their performance by gathering statistics from similar sites. The hospital libraries benchmarking study by Spencer, Mamo, and Billman (2019) obtained data from 180 North American respondents about services, client groups, funding, and activity. The libraries were predominantly small, with one or two staff, yet the majority offered a wide range of services, confirming the breadth of skills noted by McLaughlin et al. (2018). More than 80% held membership in their professional association. The authors recommended a large-scale longitudinal study of hospital libraries to obtain baseline data, so that benchmark surveys can be conducted regularly. This data would “be readily available for use with hospital administrators and for hospital library planning and advocacy” (p. 18).

Earlier, Ducas, Demczuk, and Macdonald (2015) benchmarked Canadian health libraries against the 2006 Canadian Health Libraries Association/Association des bibliothèques de la santé du Canada Standards for Libraries and Information Services in Canadian Healthcare Facilities. Almost one-third of the 168 responses noted shortcomings in staffing compared to the level set in the Standards. Respondents indicated increased activity in the past five years in user assistance services and literature searching. The authors suggested updating the Standards to reflect “the accelerated pace of transformation to health library practice” (p. 9).

Taken together, the earlier surveys show that the majority of health librarians had significant experience in this specialty. Increases in the volume and complexity of services in health libraries were observed, which were largely attributable to technological and environmental

changes in the industry. Of particular note is the rise of non-traditional services (whether library- or user-initiated) which may challenge the status quo and prompt the need for re-skilling or ongoing education.

Background on the Australian Health Library Workforce

Australian Library and Information Association's (ALIA) Health Libraries Australia (HLA) section has initiated substantial research into the characteristics of health library services and the health librarian workforce in the past 10 years (Blackwood & Bunting, 2016; Siemensma, Ritchie, & Lewis, 2017). This has been driven by the need to gain an informed picture of the make-up of the workforce—size, composition, education, work performed, and future training requirements. Noting the forecast introduction of e-health and similar technologies into the healthcare environment, Australian health library organizations also questioned the adequacy of existing education programs and ongoing training.

The findings of the workforce studies were detailed in two reports:

- the 2009-11 Health Librarianship Workforce and Education Research study (Hallam et al. 2011), and
- the 2014-15 Census of Australian Health Libraries and Health Librarians (Kammermann, 2016).

Comparisons between the two studies are not straightforward due to differences in target respondents and the variations in questions used in each instrument. Appendix A shows the aims and methods used in these two studies, and Appendix B lists the key findings in the studies.

Data from the 2014-15 census was extrapolated to develop the estimate that there were approximately 1,250 people in the Australian health library workforce: 760 health librarians,

290 library technicians, and 200 non-library-qualified staff. Both studies found the workforce was predominantly female, aged 40 years or older, and worked in the government health sector. At least one-third were eligible to, or intended to, retire within five years. The 2011 study found 70% of respondents had a bachelor's degree or graduate diploma/certificate in library studies; fewer than 15% had a higher degree. However, this study also found a high interest in professional development, with 75% of respondents having undertaken 11 hours or more of continuing educational activities in the past year. This study also found that more than 80% of individual respondents used technology and systems to manage information, and expected that this competency requirement would increase in the future. In the 2016 research, more than 40% of the library services were providing some form of technology-related support services to their clients, including digital repositories, digitization services, and internet and intranet development or management. In addition, implementation of new software or growth in electronic resources and services were the most frequently mentioned service changes in the previous year.

In the wider health information occupations, HWA had recommended that data collection processes should be improved. The stakeholder groups mobilized to host a National Health Information Workforce Summit in 2016, with representation by professional bodies for health information managers, health informaticians, health librarians, clinical coders, and health service managers. The Summit's Action Plan recommended action to develop and conduct an Australian Health Information Workforce Census (Butler-Henderson et al., 2017). This was implemented in May 2018.

Aims

This study seeks to understand the current Australian health library workforce, using data from the 2018 Australian Health Information

Workforce Census. Characteristics such as age structure, education and experience, employment, professional affiliations, and future work intentions are examined to establish the areas of workforce changes when compared with earlier Australian health library workforce research. The study also aims to examine the nature of competency domains and job functions that may suggest a shift towards a specialized digital health information capability.

Methods

Census Details

The Health Information Workforce Census project aims to “quantify and qualify the Australian health information workforce (HIW), specifically to delineate and count the workforce, consider the future configuration of workforce, identify health information workforce shortfalls, as well as current health information training and career pathways” (Butler-Henderson & Gray, 2018a, para. 5).

The Census is a collaborative research project being conducted with human research ethics approval by the University of Tasmania and the University of Melbourne, who are jointly responsible for the design and operation of the census. The University researchers are advised by a management group of stakeholder organization representatives: the Australian Digital Health Agency, ALIA Health Libraries Australia, Australasian College of Health Informatics, Health Informatics Society of Australia, Health Information Management Association of Australia, and the Victorian Government Department of Health and Human Services (Butler-Henderson & Gray, 2018a).

The Census tool was developed between 2016 and 2018 by a multi-professional expert panel (Butler-Henderson et al., 2017). It comprised approximately 160 questions on data elements such as demographics, education, employment, competence domains, functions, certification, professional development, and intentions for

future work in the health information workforce. Elements were designed with the aim of staying relevant over at least 15 years. The intention is to conduct the Australian census every two years, and international partners are being sought to run it in other countries. The Census planning included provision for respondents to register for the longitudinal study, thus enabling linking of those individuals’ data from one census to the next.

The initial census was conducted online across Australia in May 2018, with a paper census available on request. Publicity was distributed in electronic media via a dedicated website (Butler-Henderson & Gray, 2018a), social media channels, and electronic mail lists for the target professions. For example, the professional group HLA’s endorsement for the census was evident in its promotional messages: health librarians were invited to complete the census through announcements in the *HLA Newsletter*, messages on the mail list *ALIAHealth*, and on HLA’s three social media sites.

The Census invited voluntary participation from individuals who self-identified as part of the health information workforce. They were defined as those who “work in a role where the primary function is related to developing, maintaining, or governing the systems for the management of health data, health information or health knowledge . . . for/with an organisation that operates in Australia . . . and your role relates to the Australian operations, and relates to the health sector” (Butler-Henderson & Gray, 2018a, para. 6).

Health Librarian Data in the Census Responses

Our project to examine the Census’ health librarian data was approved by the University of Melbourne General Practice Human Ethics Advisory Group (#1853443.1) in February 2019. The Census privacy statement and the Data Management and Access policy have been followed in this project.

Summary results for the full response set were published in late 2018 (Butler-Henderson & Gray 2018b). There were 1,597 usable census responses in total. Within that dataset, three criteria were used to identify respondents in the Health Librarian occupational group:

1. *Health Librarian* was chosen as the occupational group from the list provided; or
2. the job title included the word: [librar*] or
3. the respondent held a qualification that included the word [librar*] in the title.

These criteria will include *health library technicians* (the para-professional occupation) as well as health librarians.

Eligible responses were extracted from the census database into a Microsoft Excel spreadsheet and imported into IBM® SPSS v25.0 for analysis. Descriptive statistical analysis focused on employment and role characteristics, on markers of professional identity (educational background, continuing professional development, and professional memberships), and on intention to remain in the workforce. Deductive thematic analysis focused on job functions; for this purpose, we used a recognized health librarians' competency framework as our guide to categorize free text responses (ALIA, 2018).

There were 238 responses (14.4% of the total usable census responses) which met the above criteria and were included in our analysis. The figures are stated as headcount, not full-time equivalents. All survey questions were optional, thus responses to some questions do not total 238. Specific response numbers and rates are included where relevant.

When compared with the 1,200 headcount estimated from the 219 institutional responses to the 2014-15 census, the 2018 figure represents approximately 20%-25% of the earlier response

numbers. In the 2009-11 study there were 161 responses. These figures suggest some consistency in response rates for the voluntary survey method.

Results

The health librarian occupational group is a mature-age and largely female group. The average age was 54 years (range 28-72 years). In detail, 81.0% of this group is 45 years or older; there was a significant association between those who identified in the health librarian occupational group and being aged 45 years and older ($\chi^2(1) = 67.613, p < 0.001$). A majority of respondents (65.0%) had worked in health information roles for more than 10 years, confirming the experienced and mature nature of this workforce. Table 1 shows the demographic features of the health librarian group and the full HIW group who responded to the Census.

Employment and organizational characteristics for the occupational group Health Librarians and for the full HIW census group are summarized in Table 2.

Respondents were invited to select the areas of competence they require to perform their health information work, using the five domains that underlie the Certified Health Informatician Australasia competencies framework (Health Informatics Society of Australia, 2013). Multiple selections were possible. The results emphasize the dominance of technological and data science competencies in the census respondents' view of the subject domains they need to work effectively. Answers were as follows:

- Information & Communications Technologies: 72.6%
- Data & Information Science: 61.4%
- Health & Biomedical Science: 53.6%
- Human & Social Science: 49.75%
- Management Science: 46.8%

Table 1
Demographic Characteristics

	Health Librarians (<i>n</i> = 238)	All HIW (<i>n</i> = 1,597)
Average age (years)	53.98	45.03
Median	50-59	50-59
Range	28-72	20-70s
Aged 45+	81.0%	52.0%
Aged 60+	34.0%	14.0%
Gender		
Female	88.2%	78.1%
Male	11.3%	21.6%
Other/not answered	0.5%	0.3%
Citizenship		
Australian citizen	97.5%	92.7%
Other resident	2.5%	7.3%
Born in Australia	79.0%	74.5%
Identified as Aboriginal or Torres Strait Islander	< 5.0%	< 5.0%
Participation limited by disability or health condition	4.0%	3.4%

Table 2
Employment and Organizational Characteristics

Employment Characteristic (HL <i>n</i> / HIW <i>n</i>)	Responses	Health Librarians		All HIW	
		Number	Percentage	Number	Percentage
Time since qualification (223/1370)	Average	21 years		15 years	
	Range	1-47 years		0-55 years	
	<5 years	15	6.7%	247	18.0%
	5-9 years	28	12.6%	252	18.4%
	10-19 years	68	30.5%	422	30.8%
	20-29 years	57	25.6%	288	21.0%
	30-39 years	39	17.5%	129	9.4%
	40+ yrs	16	7.2%	32	2.3%
Major employment group (212/1142)	Manager	45	21.2%	413	36.2%
	Professional	141	66.5%	558	48.8%
	Clerical or admin	16	7.5%	167	14.7%
	Technician or trade	10	4.7%	5	0.4%
Organization status (206/1106)	Public	170	82.5%	801	72.4%
	Private	14	6.8%	187	16.9%
	Public-private partnership	5	2.4%	33	3.0%
	Not for profit	17	8.3%	85	7.7%
	Hospital	120	58.3%	701	63.4%

Organization type (206/1109)	Educational facility	37	18.0%	23	2.1%
	State health department	19	9.2%	96	8.7%
	Local health service	11	5.3%	117	10.6%
	Other public institution	7	3.4%	169	15.3%
	Other private	< 5	< 3.0%	< 5	< 0.5%
Employment status (206)	Permanent	194	94.2%	Not given	82.1%
	Contract	7	3.4%	Not given	14.7%
	Casual	5	2.4%	Not given	1.8%
	Actively seeking HI work	19	8.8%	Not given	15.1%
Hours worked (206)	Average paid hours per week	28.6 hrs		32.6 hrs	

One question sought respondents' view of their broad work category—seven occupational categories available were Manager, Professional, Clerical, Technician, Sales, Labourer or Community Worker. Of those who replied, 66.5% chose professional, 21.2% chose manager, 7.5% chose clerical or administrative, and 4.7% chose the technical category.

The census asked for role title details. Respondents gave an array of more than 65 position titles. Five position titles were given in almost half the responses: Librarian, Library Manager, Library Technician, Senior Librarian, and Medical Librarian. In the wide span of other role titles provided, twelve newer titles were listed that reflect the digital or electronic environment, including Data Officer, Digital Content Coordinator, E-health Facilitator, Electronic Resources Librarian, Electronic Services or E-Services Librarian, Health Information Coordinator, Knowledge Services Advisor (or Manager), Library and Literacy Project Officer, Systems Educator, and Systems Support Librarian. Other specialist role titles include: Consumer Health Information Coordinator, (Medical or Senior) Research Librarian, Research Information Specialist.

Respondents were invited to state the top five functions they performed in their health

librarian role. Analysis of the 849 responses showed continuing emphasis on direct user assistance, education, and information literacy. Management of services, resources, and online systems were also well-represented, as shown in Table 3.

The Census asked about performance of unpaid or voluntary work. There were 205 responses; 14.0% of these respondents said they undertook unpaid or voluntary tasks. Examples included board or committee roles (9.0%); writing, publishing, or reviewing (6.5%); event management (5.0%); and mentoring or advising (3.5%). Respondents stated they worked an average five unpaid hours per week (range 0-21 hours).

Educational Background

As noted above, in Australia there has been no specialty health librarian or health information professional qualification offered by educational bodies. The census question asked: "What is the highest formal educational qualification you have ATTAINED that you believe is relevant to your health information work?" Respondents in the health librarian group stated a range of qualifications and course titles. More than a third (36.7%) hold a graduate certificate or graduate diploma (with underlying bachelor

Table 3

Job Functions Categorized According to HLA Health Librarian Competency Areas

ALIA HLA Competencies for Health Librarians	2018 Census: Named Functions Performed	Number (Percentage) <i>n</i> = 849
C2 Reference & research	Assist clients seeking information Search information resources Perform systematic review tasks	137 (16.1%) 74 (8.7%) 14 (1.6%) Total = 26.4%
C3 Resources	Manage information resources Arrange document supply Acquire information resources	89 (10.4%) 57 (6.7%) 42 (4.9%) Total = 22.0%
C4 Leadership & management	Manage the information service Advocate, promote information service	113 (13.3%) 36 (4.2%) Total = 17.5%
C5 Digital, e-health, technology & systems	Maintain IT systems Perform data management tasks	82 (9.6%) 7 (0.8%) Total = 10.4%
C6 Health literacy & teaching	Provide education and training	135 (15.9%)
C7 Health research	Participate in research team	51 (6.0%)
	Unable to categorize	12 (1.4%)

degree); 27.35% hold a bachelor degree; 15.4% have a certificate or diploma; 12.0% hold a master's degree; and 3.8% have a doctorate. Consistent with the age profile of the health librarian group, the average time since completion of the highest award was 21 years (range 1-47 years). In contrast, the overall HIW participant cohort had on average completed their health information qualification 15 years earlier.

Continuing Professional Development

The 86% of health librarian respondents who indicated they had undertaken some form of professional development in the past year nominated 380 activities undertaken. Work-based learning (35.0%), professional association activities (30.7%), and self-directed learning (27.8%) were popular, while 6.3% of respondents

had completed a formal educational program. Fourteen percent of respondents had not participated in any further learning in the previous year. In a subsequent question on future learning intentions, 83 participants (42.0% of responses) said they intended to undertake further learning or professional development about health information, 57 (28.8%) were unsure, and the remaining 58 (30.0%) chose "Not applicable."

Professional Membership and Certification

Two-thirds of the health librarian group held a membership in one or more professional associations; 91.0% were members of the HLA section in the ALIA, while 7.6% were members of the Victorian state-based body (Health Libraries Inc.) and 3.8% were in the Health Information Management Association of

Australia. The trend is not as strong for the whole census cohort, where 44.5% stated that they do not hold any membership in a professional or industry association.

However, maintenance of a health information certification is far less common. Certification in health information areas is available from a number of professional associations (e.g., ALIA) to recognize practitioners who voluntarily complete the association's professional development or continuing education program cycle. Only one quarter of the respondents held a certification; of these, 91.0% were Certified Practitioners with the ALIA Health Librarian specialty. The remainder held either a Certified Health Informatician Australasia award, or a health information management certification.

Future Work Intentions

Of the 198 health librarian respondents who answered the question "How many more years do you intend to remain in the paid health information workforce in Australia?" 34.8% said they will leave within five years. In contrast, only 16.9% of the respondents from the full HIW group plan to leave within five years (see Table 4).

Table 4
Intention to Remain in the Workforce

	Health Librarians Number (Percentage) <i>n</i> = 198	All HIW Number (Percentage) <i>n</i> = 1,041
Will remain more than 5 years	95 (48.0%)	719 (69.1%)
Will leave within 5 years	69 (34.8%)	176 (16.9%)
Unsure	34 (17.2%)	146 (14.0%)

The Census also asked about post-work or post-retirement involvement in the health

information area. Forty-three respondents (21.7%) planned to continue in an unpaid or volunteer capacity; the envisaged median duration in this capacity was 6-10 years.

Discussion

This description of the Australian health library workforce is consistent in many ways with results of earlier studies in 2009-11 and 2014-15. The older age structure (average age 54 years, and 32.4% aged 60-69 years), length of experience in this work, and time since obtaining formal qualifications are largely unchanged. In comparison, the average age of the entire Australian health workforce in 2017 was 43.6 years. Just over 20% of the Census respondents were born overseas. In contrast one-third of respondents at the full Australian 2016 population census said they were born overseas (Australian Bureau of Statistics, 2016). The health library workforce does not reflect the diversity of the broad Australian population. Future advocacy and educational and recruitment efforts will need to address this shortcoming, as has been recognised for the wider Australian library workforce (ALIA, 2019).

Responses on intent to continue in the paid health information workforce illustrate the challenge to planners and professional bodies representing the health librarian specialty. More than one-third (*n* = 69, 34.8%) of respondents plan to leave within five years. This is a much higher planned departure rate than the 16.9% for all Census respondents. It is consistent with the figure of 36% of qualified library staff found in the 2014-15 Census to be eligible to retire within five years (Kammermann, 2016, p. 37). It is not clear if the foreshadowed "net loss" (p. 3) predicted by Kammermann has eventuated. The health library sector will need to re-assess how to respond to and plan for the potential departure of up to one-third of the current workforce by 2023. Continuing efforts to demonstrate the value that health librarians

contribute to the parent organizations may help to combat job redundancies and library closures.

On average, health librarians attained their highest qualification 21 years earlier. Active participation in continuing professional development and interest in upskilling reflect an awareness that the health care environment is changing, and health information workers need to reassess and refresh their knowledge, skills, and services to match. Recent active research and advocacy by HLA has resulted in the introduction of a professional development pathway and certified practitioner award that recognizes ongoing self-directed learning. The association has partnered with education providers to jointly develop educational courses, ranging from single-day workshops through to a masters-level semester-length subject, to enable new entrants and current health library professionals to gain a specialist qualification in this area.

Another professional identity marker — association membership — is also reasonably strong, with two-thirds of the health librarian group holding a membership in a professional or industry association. Although a national professional development scheme with a health specialist certification structure exists, the absence of a required licence to practice or a national registration scheme confirms the difficulty of establishing and retaining a clear identity in the changing workforce.

An examination of the role titles provided by respondents indicates both continuity and change. There is a high frequency of traditional titles such as librarian, library manager, and medical librarian. However, the uptake of digital or e-health labels in existing roles points to a broadening of the health information work field, consistent with the predicted changes in the wider health setting. Role titles that include data, digital, e-health, electronic, information coordinator, knowledge, literacy, and systems suggest a recognition of change in the nature of

information sources and the skills required to work with them.

The change in work focus is also evident in the areas of competence nominated by respondents as essential to perform their current health information role. Information and communications technology and data science competencies were selected by 61.4%-72.6% of the participants, while other domains — health science, social science, and management — were chosen by approximately 50% of respondents. This response is more pronounced than the results for the entire census cohort; those were more evenly spread (43.6%-65.4%) across the five areas of competence.

In another perspective on competencies, the health library job functions that were most frequently mentioned in 2018 corresponded with the areas nominated as “most likely to increase” in the 2009-11 research, namely *Reference and research, Resources, health literacy and teaching*, and — to a lesser extent — *Digital, e-health, technology and systems*. In addition, *Leadership and management* was ranked highly in the 2018 responses, perhaps indicating that health librarians are taking on management roles currently where this was not widespread ten years earlier.

These changes in areas of competence are generally consistent with findings across the broader Australian health information workforce, as reported by Gray et al. (2019). There is not a readily recognisable specialization in the health workforce that is understood as being the “logical” profession to manage and govern digital health.

The Outlook

Since “Health librarian” is not a recognized profession in the Australian and New Zealand Standard Classification of Occupations (ANZCO), positions for health librarians or health information professional roles do not

have formal educational or certification requirements in the Australian workforce.

With this lack of standardization, there is potential for newly created or updated health information roles to overlook or dismiss the existing health librarian capabilities. Examples can be found in current technology forecasting literature, agency roadmaps, and emerging literature. The article extract from Adler-Milstein, Nong, and Friedman (2019) illustrates this point:

The current state of knowledge management in healthcare delivery organizations relies on an outdated biomedical library model, and only a small number of organizations have developed enterprise-scale knowledge management approaches that “push” knowledge in computable form to frontline decisions. (p. 1)

The authors highlight the dynamic nature of health-related knowledge, and state that the “pull” model of the traditional library struggles to cope with the need to integrate knowledge into clinical practice. It is claimed that “a relatively small number of organizations” have adopted knowledge management infrastructure that enables evidence-based advice to be pushed to decision makers (p. 3). The article cites a 2006 example of work at a large United States health system to implement a scalable clinical decision support system (CDSS). However, there are many more recent cases where health librarians have enabled provision of health information resources at the point of care as part of a CDSS, for example, as described by Fowler et al. (2014) and by Ma et al. (2018). Examples illustrating the application of librarians’ knowledge management expertise in the CDSS are also available: Frakes et al. (2017) described practice at Vanderbilt University Medical Center creating evidence summaries and linking knowledge briefs to specific decision scenarios, while Wright et al. (2009) outlined the role of librarians

in managing metadata in health knowledge systems.

Our analysis of the census data is hampered by the absence of a 2018 baseline figure for all health library positions. As expected in a census aimed at individual respondents, questions were not asked about the total number of positions in the organization’s library or information service, nor about job vacancy rates. The 2014-15 Census sent to health library managers found a job vacancy rate of 9.6%. In the current census 19 respondents in the workforce indicated they were actively seeking work. Each year brings anecdotal news of a small number of health libraries closing or merging within larger organizations, or reducing their staff quotas, with some health information services extending their boundaries by incorporating neighbouring districts. It would be useful to update the headcount and full-time equivalent numbers at regular intervals, as well as the count of health information services. A similar recommendation was made by Spencer et al. (2019, p. 18) for United States hospital libraries.

More generalized data from the Australian Labour Market Employment Projections to 2023 predicts the “Librarian” occupational group will rise 6.4% from the current 15,400 figure to 16,400. This growth is modest when compared with the category “Information and Organisation Professionals” which is predicted to increase by 16.1%, from 164,200 to 190,000 positions. It would be useful to know whether health information professionals are included in this latter estimate, and if so, how they are defined. This indicates that role and role title are significant in analyses of future outlook.

Finally, the results of the Census’ implementation in New Zealand, with more than 450 responses, provides an opportunity in the future to undertake an inter-country comparison of results (Day & Grainger, 2019).

Limitations

A key limitation in this study is that it relied on respondents' self-selection to participate in the Census. Any voluntary survey or instrument raises a similar issue of potential bias in the sample who respond. In the case of the Health Information Workforce Census, extensive efforts were made to reach the desired groups using electronic communication channels, in the lead-up to the 1 May 2018 start date, and throughout the month that the online Census was available.

The selection criteria used to extract the health library staff group from the full dataset of Census responses were perhaps too inflexible. It is possible that eligible respondents did not select the occupational group "Health Librarian" and did not have a role or a qualification that included the word *librar**. However, the resulting set of 238 responses appears to be consistent with earlier Australian health library staff surveys.

This form of selection criteria has also been used to extract other occupational groups from the full Census dataset, such as health informatics (Butler-Henderson et al., 2019). Its wider application suggests that the method is a best fit for this purpose. Nonetheless, given these limitations, the findings should be regarded as indicative.

Conclusion

The 2018 Census for the Health Information Workforce has provided up-to-date evidence on the current status of the health librarian workforce in Australia. While it has confirmed the demographic and employment trends in the two earlier studies of health librarians undertaken since 2009, it has also revealed elements suggesting a stronger digital health information focus in both role titles and in the work being performed.

Analysis of role functions and perceived competency requirements obtained in this

census will assist with future role development and specification of the knowledge, skills, and attributes that new entrants will require. Ideally this can be presented cohesively with similar requirements data for the other health information occupational groups captured in the census. These would be persuasive in advocacy with the Australian Digital Health Agency about its Workforce and Education program, currently aimed at upskilling clinical staff only.

There is merit in sharing these results with health information and health library professional bodies internationally, noting that the Australian census tool is designed to be replicable in other countries. These strategies will assist in translating this research into workforce reform and support improved patient safety.

Note about Data Access/Availability of the Census Data

Access to the de-identified census data will only be approved for non-commercial purposes (e.g., research). Please review the Data Management and Access Policy at https://www.utas.edu.au/_data/assets/pdf_file/0003/1090776/Data-Management-and-Access-Policy-v1_0.pdf.

The Data Access Application link is at <https://redcap.utas.edu.au/surveys/?s=8Y9RH44KKR>.

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Appendix A

Table 5

Aims and Methods Used in the 2011 and 2016 Workforce Studies

	Health Librarianship Workforce and Education Research Study (Hallam et al., 2011)	Census of Australian Health Libraries and Health Librarians (Kammermann, 2016)
Date	2011	2016
Aim	Determine future requirements for the Australian health library workforce, and develop education framework for these needs.	Obtain data on characteristics of Australian health library and information services (LIS), and composition of their workforce.
Target	Individual Australian health library and information practitioners. (Managers surveyed separately.)	Managers of health LIS, and known individual health librarians working outside traditional libraries.
Data collection method	Online survey available late February to early March 2010.	Census link sent to named managers and individuals; data collected October 2014 to February 2015.
Number of responses	161	219 responses, representing 328 health library services.
Response rate	Not stated	81%

Appendix B

Table 6
Major Findings in the 2011 and 2016 Studies

	Health Librarianship Workforce and Education Research Study (Hallam et al., 2011)	Census of Australian Health Libraries and Health Librarians (Kammermann, 2016)
<i>Demographic characteristics</i>		
Age	66% aged 40 +: 32% aged 41-50 yrs 34% aged 51-60 yrs 8% aged 61+ years	Not stated in detail. 36% of services had one or more staff aged 60 or more.
Gender	Female 86% Male 14%	60% of services had 90% or more female staff.
New graduates (qualified in past 5 years)	12% of respondents	18.2% of services had 1 or more new graduates on staff.
Retirement prospects	27% intend to leave sector within 5 years	36% of services had one or more staff eligible to retire within 5 years.
<i>Employment characteristics</i>		
Area of health sector	Hospitals 53% Govt dept 14% University 14% Research body 2% Other 17%	Hospitals 43% University 17% Community org 14% Professional college 3% Other 23%
Sector status	Public 82% Not for profit 11% Private 8% Other 4% No response 5%	Public 60% Not for profit 20% Private 14%
Geographic location	71% in capital city 25% in regional areas	75% in capital city 30% in regional areas
<i>Education and professional characteristics</i>		
Highest formal educational award	PhD 2% Master's 11% Grad certificate or diploma 40% Honor's 6% Bachelor's 32%	Topic was not included in census.
Had undertaken PD in past year	75% had undertaken 11 or more hours of PD in the past year.	Topic was not included in census.
<i>Technology services and competencies</i>		
Currently use technology and systems	81% of individual respondents 67% of institutional respondents	42% of LIS services provided technology-related support services to users. 30% managed digital repositories. 21% offered a digitization service.

		Around one-quarter provided internet or intranet management and/or support.
Predicted future use of technology and systems	82% of individual respondents 69% of institutional respondents	Topic was not included in survey.
Service changes in past year	Topic was not included in survey.	Most frequently mentioned change (by 45 of 136 LIS) was implementation of new software or growth in electronic resources and services.