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Nutrition Informatics: Information Technology Transition for Registered Dieticians

Arlanda Bell
University of Tennessee Health Science Center

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Nutrition Informatics:

Information Technology Transition for Registered Dieticians

Arlanda Bell

Masters Health Informatics and Information Management

University of Tennessee Health Science Center

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Abstract

The passing of the Health Information Technology for Economic and Clinical Health Act (HITECH) has created a growing push for healthcare organizations to no longer use paper based records and convert to an Electronic Health Record (EHR). Along with the adoption of an EHR comes a necessary change for ancillary services like nutrition and dietetic services because it affects patient care as well. In order to maintain a professional standard in patient healthcare as other health disciplines have done, the development of nutrition informatics model has become necessary. Nutrition informatics will prove to be a necessary addition to the developing field of healthcare informatics. The training of registered dieticians and nutrition technicians in using information technology along with their knowledge and expertise is what will improve data accuracy, patient care, and quality. The development of a standardized vocabulary will also attribute to the success of developing nutrition informatics along with the willingness to embrace and develop information technology skills necessary to navigate electronic applications and tools. Although skill levels and change obstacles will have to be accessed, the overall findings reveal that dieticians and nutritionist are not very knowledgeable in the area of nutrition informatics but are willing to embrace it through education and training.

Nutrition Informatics: Information Technology Transition for Registered Dieticians

Introduction

Informatics is concerned with information and ways to process and handle it by means of information technology such as computers and other electronic devices for rapid transfer, processing and analysis of large amounts of data, gathering, manipulating, storing, retrieving and classifying recorded information (AMIA, 2011).

Health informatics is a broad scientific field whose goal is to improve health by using the sciences and related technologies of health, information, and computing. Its domains include care delivery, communications, biomedical and clinical research, education, management, and policy (Hoggle, Michael, Houston, & Ayres, 2006).

The field of health informatics, alone, spans across many subspecialties and include:

> **Medical informatics.** Medical informatics is the integrative discipline that arises from the synergistic application of computational, informational, cognitive, organizational, and other sciences whose primary focus is the acquisition, storage, and use of information in the health/biomedical domain (Hoggle et al., 2006).

> **Pharmacy informatics.** Pharmacy informatics is the scientific field that focuses on medication-related data and knowledge within the continuum of healthcare systems - including its acquisition, storage, analysis, use and dissemination - in the delivery of optimal medication-related patient care and health outcomes (HIMSS, 2006).

Dental informatics. Dental Informatics is a specialization within Health Informatics, a multi-disciplinary field that seeks to improve health care through the application of Health Information Technology (HIT) and information science to health care delivery, health information management, health care administration, research, information gathering and synthesis, and knowledge sharing (American Dental Association, 2013).

Public Health Informatics. Public Health Informatics is the application of informatics in areas of public health, including surveillance, prevention, preparedness, and health promotion (AMIA, 2011).

One of the latest additions to the informatics field is nutrition informatics.

Nutrition Informatics. Nutrition informatics is the effective retrieval, organization, storage and optimum use of information, data and knowledge for food and nutrition related problem solving and decision making (ADA Nutrition Informatics Work Group, 2007).

Dietetics professionals realize that they must maintain standing as the field's experts in patient care. It is vital that a new discipline within the field of nutrition and dietetics emerge. It's logical for dietetics professionals to model the development of nutrition informatics on the existing health care informatics specialties (Hoggle et al., 2006).

As an example, nursing informatics facilitates the integration of data, information, and knowledge to support patients, nurses, and other providers in their decision-making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology (Hoggle et al., 2006). It is ethical for nutrition

informatics to follow suit along the same path as nursing informatics in order to stay current with technology in health care.

Statement of the Problem

It is logical that nutrition informatics push to the forefront in promoting quality nutrition care through the use of computers and information systems. Although nutrition informatics is certainly a specialty within the profession of dietetics, all dietetics professionals must develop at least a basic level of competency regarding information systems, data integration, and application so that they may continue to lead consumers and other health professionals in understanding nutrition research and available nutrition information (Hoggle et al., 2006).

Background of the Problem

Nutrition experts have used computers and electronic media since the early introduction of computer systems 4 decades ago. Once the availability of computer systems became widespread in the 1960s, dietetics professionals looked to the new tools to help decrease costs, eliminate task redundancy, and increase efficiency. The use of the "digital electronic computer" for nutrition tasks, although not widespread, was seen in almost every aspect of nutrition care before 1990.

Although initial use of applications and related technology occurred decades ago, the widespread implementation has not spread to today's nutrition care (Hoggle et al., 2006).

Purpose of Study

The purpose of this paper is to provide support that the development of nutrition informatics is in fact becoming a necessary factor in the practice of nutrition and dietetics. With the advancement of technology comes change. Registered dieticians (RD) are going to have to incorporate the use of information technology, and the use of the Electronic Health Record into their daily job activities to stay abreast of the ongoing changes in technology. Future change brings about the questions of, 1) are registered dieticians willing to go through training in order to develop their technological skills, and 2) whether or not RDs have the competency level to learn new advancements in information technology.

Significance of Study

With the growth of technology, dieticians have to become familiar with the world of informatics. They have to overcome any fear they may be facing with technology, and they have to be willing to go through necessary training to advance their skill level. The more familiar they are with the technological side of informatics, the more efficient their skills will become. The significance of this study is to explore whether dietetics professionals are qualified to lead the integration of nutrition and patient care using information systems.

Definition of Terms

American Dietetic Association (ADA) - now known as the Academy of Nutrition and Dietetics (Academy) is an organization of food and nutritional professionals committed to improving the nation's health and advancing the profession of dietetics (ADA. n.d.).

CPT (Current Procedural Terminology) - codes are numbers assigned to every task and service a medical practitioner may provide to a patient including medical, surgical and diagnostic services (Rouse, 2014).

Electronic Health Record (EHR) - A longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports (Maunder et al., 2014).

Evidence Analytics Library (EAL) - is a series of 40 systematic reviews and 18 evidence-based nutrition practice guidelines for the registered dietitian nutritionist and other members of the health care team (EAL, n.d.).

HL7 (**Health Level 7 Interoperability)** - is a set of standards, formats and definitions for exchanging and developing electronic health records (EHR) (Maunder et al., 2014).

Health Information Technology (HIT) – Health information technology (HIT) is the management of health information across computerized systems. It involves the secure exchange of health and other personal information among consumers and patients, providers and practitioners, and other entities, such as government agencies and insurance companies. HIT encompasses health systems integration, health information exchange, and the use of electronic health records (EHRs) (SAMHSA, 2014).

International Classification of Diseases, Clinical Modification (ICD-CM) - is used to code and classify morbidity data from the inpatient and outpatient records, physician offices, and most National Center for Health Statistics Survey (CDC, 2013).

International Dietetics and Nutritional Terminology (IDNT) – standardized language for the nutrition care process that identifies and labels a specific nutrition diagnosis (Ritter-Gooder & Lewis, 2010).

Meaningful Use (MU) – A set of criteria for EHR implementation and use specified in the Health Information Technology for Economic and Clinical Health Act provisions of ARRA that providers and organizations must meet in order to qualify for incentive funds (Charney, 2012).

Nutrition Care Process (NCP) - is designed to improve the consistency and quality of individualized care for patients/clients or groups and the predictability of the patient/client outcomes. It is not intended to standardize nutrition care for each patient/client, but to establish a standardized process for providing care (Nutrition care process, n.d.).

Standardized Language - Standardized Language for the Nutrition Care Process is designed to facilitate communication, improve care, and close the gap in health care quality. The standardized language consists of terms describing all NCP steps; assessment, diagnosis, intervention, and monitoring and evaluation. Nutrition diagnostic terms were the first language identified using concept analysis, a critical first step in language development (CDC, 2013).

Systematized Nomenclature of Medicine (SNOMED) - is one of a suite of designated standards for use in U.S. Federal Government systems for the electronic exchange of clinical health information and is also a required standard in interoperability specifications of the U.S. Healthcare Information Technology Standards Panel (Torrey, 2016).

Chapter 2

Literature Review

The purpose of this chapter is to review literature relevant to the research purposes of this thesis. It pertains mostly to the competencies of individuals employed in the field of dietetics. Many competencies are evaluated in order to determine what level of training and education is needed in order to meet the demand for nutrition informatics skills.

The literature articles addressed were identified by searching free full text articles from CINAHL, Scopus, PubMed and internet articles. There were no limitations on the year of the articles used. The search terms used were: informatics, dietician, nutrition, nutrition informatics, Electronic Health Record (EHR), informatics education, informatics training, health information technology (HIT), nutrition care process (NCP), and evidence analytics library (EAL). Initially, the search method identified 223 articles. Two hundred of those articles did not meet the need of this review leaving 23 articles to review. Three of the articles contained surveys that were of use. There was one article that contained an actual study. Key concepts were used from some of the other articles.

Training and Education. With the big push to create EHRs and adhere to meaningful use measures, RDs can anticipate that new and existing jobs will demand informatics skills which leads to one of the biggest challenges facing RDs, education. There is a huge need for clinicians who have training and experience in clinical informatics. It's not enough to be a clinician who happens to like technology, or a computer person who happens to like the clinical side of things. Leadership has to begin to develop advanced training for people on both sides (Aase, 2010).

Enthusiasm is growing for nutrition-focused informatics courses, and significant grant training opportunities are provided via HITECH funding (Aase, 2010).

Partnering with an academic appears to be a useful strategy that dietitians might use to overcome the reported barrier of lack of skill (Miller, Thomas, & Miller, 2015).

Like any technology, informatics systems are only as effective as the people building and managing them. The better you understand workplace roles and systems, the better you can articulate needs and how technology could meet them. The more sophisticated nutrition informatics systems become, the more skilled with informatics RDs will need to be to manage them (Aase, 2010).

It would not be unusual to think that current students would be naturally technically inclined, but that is not the case. Their knowledge and practice of informatics is not as advanced as others expect. As technology and informatics continues to expand in the world of nutrition and dietetics, every registered dietitian nutritionist, dietetic intern and student needs to understand and utilize all areas of informatics. The creation of a more concrete technology curriculum for all undergraduate nutrition and dietetic students would be a leap in the right direction for the profession. The profession of dietetics is beginning to acknowledge the specialized area of nutrition informatics and its impact (Laurila, 2016).

Standardized Language. Standardized language for the key clinical judgments is needed to communicate, document, and evaluate the effectiveness of nutrition care. The adoption of a diagnostic language is an important and central element of documentation because it standardizes the terms used to name a patient's health problems or needs. This allows practitioners to communicate (document) treatment strategies and evaluate care effectively.

The medical profession developed the International Classification of Diseases (ICD) to make it possible to describe a patient's medical condition without confusion. Physicians also use Current Procedural Terminology (CPT) and the Systematized Nomenclature of Medicine (SNOMED) to code and document procedures and services they perform. These medical classification systems employ a language developed by medical professionals, and, in the years they have been available, they have been instrumental in providing the information necessary for reimbursement (Hakel-Smith & Lewis, 2004).

Nutrition Care Process and Model. The Nutrition Care Process and Model (NCPM) is a systematic problem-solving method that food and nutrition professionals use to think critically and make decisions that address practice-related problems. The NCPM contains four distinct but interrelated and connected steps: nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation (Writing Group of the Nutrition Care Process/Standardized Language, 2008a).

International Dietetics and Nutrition Terminology (IDNT). The IDNT was conceived as a controlled vocabulary, defined by the National Library of Medicine as a system of terms, involving definitions, hierarchical structure, and cross-references, used to index and retrieve a body of literature in a bibliographic, factual, or other database. It is designed to facilitate clear and consistent descriptions of the services RDs provide both within and outside the profession. This standardized language or controlled vocabulary is being developed to describe the unique functions of dietetics in nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation. Like other standardized languages, the IDNT is republished annually so that it can be revised based on validation studies and changes in practice

It is expected that the IDNT will have an important role in nutrition informatics. When the IDNT is integrated into computerized systems, and clinicians consistently and correctly enter data into electronic health records, terminology experts are able to identify and retrieve not only a given dietetics term, but can also be assured that the definition of the term will remain constant regardless of geographic or temporal differences (Writing Group of the Nutrition Care Process/Standardized Language, 2008b).

Survey 2008. The American Dietetic Association (ADA) web-based Survey conducted in 2008. The survey involved 11,223 (20.4%) ADA members. It contained 20 questions (E. J. Ayres & Hoggle, 2008). Nine out of the 20 questions were used specifically for purposes of this study only to determine the need for education and training among those who participated in the American Dietetic Association (ADA) Survey 2008.

Findings and Results.

Demographic Information. When asked their age almost half of the participants were between the age of 50-54 as shown in Figure 1. Ninety-six percent of those surveyed were of female gender. Eighty-six percent of members surveyed reported their race as Caucasian. The next highest race category was Asian at 4% (E. J. Ayres & Hoggle, 2008).

Education Level. The majority of respondents (46%) have a bachelor's degree. For total education demographics see Figure 2 (E. J. Ayres & Hoggle, 2008).

Area of Practice. When participants were asked to describe current area of practice, approximately 43% indicated that clinical nutrition was their primary area of practice. Informatics was identified as the primary area of practice by only 1% of participants. Students

represented 7% as either undergraduate student, supervised practice student or graduate student
(see Figure 3) (E. J. Ayres & Hoggle, 2008).

Access to Computers. In their primary work setting, 97.3% have access to a computer
somewhere in their workplace and 89.4 % have access to a computer at their own workstation.
The Internet is accessible in the primary work setting by 91.5% of respondents. Personal digital
assistants, or PDAs, are used by 19%. Of note were the 144 (1.3%) who had no access to a
computer or the Internet at their primary work setting. This finding was noted across all areas of
practice and as well as with students and interns (E. J. Ayres & Hoggle, 2008).

Technology Use. The majority of respondents use e-mail (97.8%) and the Web/Internet
(98.4%) on a regular basis (daily/weekly/monthly) to support their practice. Electronic document
management tools such as word processing, spreadsheets, and slides are used by 94% of
respondents, and 79% of respondents use electronic data analysis tools. By area of practice, 70%
of respondents in the clinical area use electronic clinical management tools (screening,
assessment, diet office management) and 57% use electronic health records for patient
information, lab results, or clinical documentation (E. J. Ayres & Hoggle, 2008).

Comfort of use with Technology. Rated as Beginner, Intermediate, Expert or Not Used.
Respondents indicated a high level of comfort with e-mail, Web/Internet, office applications, and
nutritional assessment applications. There were more beginners in the areas of statistical
analysis, graphics, spreadsheets, and webinars. Podcasts were used by 30% of respondents (E. J.
Ayres & Hoggle, 2008).

Barriers of Not Using Technology. Sixty-four percent of respondents had no personal
barriers to using technology. Other responses included that dietitians have not needed to use

technology (14%), there is not enough time to learn technology (14%), the employer does not require the use of technology (14%), and there is no training available (12%). Seven percent felt too inexperienced to use technology. Of the 1,054 students responding to the survey, 14% responded that they have not needed to learn to use information technology. Of the 347 dietetic interns, 12% responded that they have not needed to learn to use information technology (E. J. Ayres & Hoggle, 2008).

ADA Standardized Language. Thirty-two percent of respondents acknowledged that they were familiar with ADA's standardized language initiative. Of note, 41% answered "no" and another 26% skipped this question (E. J. Ayres & Hoggle, 2008).

ADA Support for Use of Information Technology. The majority of respondents indicated the need for additional educational resources to support the use of information technology, specifically journal articles and reference materials as well as professional development sessions on technology and nutrition informatics. Standards of practice for nutrition informatics were endorsed by 65%, and 46% indicated the need for certification in nutrition informatics. However, there were "not sure" responses for both of these items (24% and 34%, respectively) indicating a lack of consensus and/or understanding of specific outcomes at this time (E. J. Ayres & Hoggle, 2008).

Survey 2011. The Academy of Nutrition and Dietetics (aka ADA) completed an online Nutrition Informatics Survey in February of 2011. A total of 3,342 individuals responded to the survey (Elaine J. Ayres & Hoggle, 2012).

This survey builds on the first Nutrition Informatics Survey completed in 2008, and has enabled the Academy to begin a longitudinal analysis of member trends in the use of technology,

information management, and the use of the Nutrition Care Process and the International

Dietetics and Nutrition Terminology (Elaine J. Ayres & Hoggle, 2012).

The 2011 Nutrition Informatics Survey demonstrates that members of the Academy are

adopting and using technology and beginning to reap the benefits of improved information

access and management. An increasing number of Academy members now practice full-time in

the area of biomedical and/or nutrition informatics (Elaine J. Ayres & Hoggle, 2012).

Findings and Results.

Demographic Information. Forty-nine percent of respondents were 50 years or older

and 6% of respondents were under 25 years of age. The majority of respondents (96%) indicated

that they were female. Racial categories were based on the US Census. The majority of

respondents were white (86%), with Asian the next highest category (4%) (Elaine J. Ayres &

Hoggle, 2012).

Area of Practice. Nearly half of respondents (43%) indicated that clinical nutrition was

their key practice area. All areas of practice were represented in the respondent pool: community

(14%), food and nutrition management (9%), consultation and business (9%), education (8%),

and research (3%). Informatics was identified as a key practice area by 1.4% of participants (note

that this was not offered as a possible area of practice in the 2008 survey). Students comprised

7% of the respondent pool. Practitioners (excluding students) were asked to identify their

primary practice setting. Over one quarter of respondents worked in an in-patient acute care

facility (28%). The ambulatory care practice setting (either stand-alone or affiliated with an acute

care facility) was selected by 18% of respondents. Other primary practice settings reflect the

diverse nature of the profession: health care, business, consulting, research, and education (Elaine J. Ayres & Hoggle, 2012).

Access to Electronic Data. A new question in the 2011 survey related to the level of experience with retrieving and using electronic data. On a scale of one to five, where one was "no experience" and five was "highly experienced," the average response was 3.77 and the median was 4.0 as shown in Figure 1. (Elaine J. Ayres & Hoggle, 2012).

Data and Technology Use. Two questions, which related directly to the definition of nutrition informatics, were added to the 2011 survey: use of data and technology to problem solve and use of data and technology to make decisions. Questions were asked on a scale of "one (strongly disagree)" to "five (strongly agree)." Most respondents agreed with the statement: "I use data and technology available to me to problem solve." The average response was 4.17 and the median was 5.0. Figure 2 displays the distribution of responses related to problem solving. Many respondents also agreed with the statement: "I use data and technology available to me for decision making." The average response was 4.03 and the median response was 4.0. Figure 3 displays the distribution of responses related to decision making (Elaine J. Ayres & Hoggle, 2012).

Comfort of use with Technology. Respondents were asked to rate their expertise with 29 different types of technology and computer applications such as graphics software, nutrition assessment software, podcasts, social media, and webinars. Potential responses included "no experience," "beginner (I need lots of support)," "intermediate (I can handle most tasks)," and "expert (my colleagues come to me for help)." Compared to 2008, more respondents reported being expert users in 2011. Most respondents identified themselves as expert users of word processing and the Web/Internet. Table 1 summarizes the top 10 areas of expertise for both 2008

and 2011. Word processing and using the Internet remain the top two categories. The biggest

change in level of expertise was with webinars. In 2008, 9% of respondents identified themselves

as experts. In 2011, 24% of respondents identified themselves as experts. Over half of

respondents (55%) classified themselves as intermediate users of webinars (Elaine J. Ayres &

Hoggle, 2012).

Barriers and Benefits of Information Technology. A majority of respondents felt there

were no barriers to using information technology for their practice or for their educational needs.

For those citing barriers, these included training issues (19%), lack of employer support (15%),

equipment issues (13%), or personal preference (5%). Most respondents selected improved

access to research and education materials as a benefit. Of note, in 2008, 57% of respondents felt

information technology improved patient safety/quality of care. In 2011, 43.8% selected this

item as a benefit. Likewise, in 2008, 79.5% of respondents felt reduction/prevention of medical

errors was a benefit (Elaine J. Ayres & Hoggle, 2012).

ADA Support for Use of Information Technology. Respondents were provided with

seven alternative options for how the Academy could support the use of information technology

in the daily activities of members. Most respondents (94%) indicated they wanted the Academy

to provide assistance in at least one of the options. This finding was consistent with the same

question posed in 2008. The top area for involvement was professional development on nutrition

informatics (81%) followed by reference materials on nutrition informatics (80%). An EHR

Training and Practice Application was selected by 63% of respondents and a certification in

nutrition informatics was noted by 45% of respondents (Elaine J. Ayres & Hoggle, 2012.

ADA Standardized Language. In 2011, 54% of respondents indicated that they were

familiar with the International Dietetics Nutrition Terminology (IDNT). In 2008, 44% indicated

that they were familiar with the IDNT. For respondents who indicated that they were familiar

with the IDNT, a follow-on question was asked: "which elements of the IDNT are you using at

your primary worksite?" Figure 4 results indicate significant adoption of the IDNT since 2008.

Respondents, who were familiar with the IDNT, were then asked about the level of integration of

Academy standards into the EHR at their organization. Potential responses ranged from

beginning to think about building an EHR to using an EHR with structured data entry including

the NCP (Nutritional Care Process) and the IDNT with structured data entry for the IDNT. The

most frequent response to this question was: "My organization uses an EHR with nutrition-

related functions but does not include the NCP or IDNT" (Elaine J. Ayres & Hoggle, 2012).

Australian Survey 2013 & U.S. Comparison. A survey adapted from the 2011

Academy of Nutrition and Dietetics (Academy) was utilized and circulated electronically to

Dietitians Association of Australia (DAA) members in 2013. The survey encompassed 25

questions on computer access and use, data sources, experience using HIT, organizational

involvement and perceived barriers and benefits to HIT. Descriptive statistics, independent t-

tests, chi-square tests and z-tests were computed to investigate and compare responses from the

2013 Australian and 2011 Academy surveys.

Findings and Results.

Demographic Information. There was a significant difference in the gender of Australian

and Academy respondents (P < 0.05);10 however, females represented the majority of both the Australian

(94%) and Academy respondents (96%). There was a significant difference in the Academy respondent

age distribution, with the majority (49%) greater than 50 years10 compared with only 15% of Australian

respondents (P < 0.05) and the majority (30%) of Australian respondents being in the 25–29 years'

category. (see Table 1) (Maunder et al., 2015)

Area of Practice. All DAA defined practice areas were represented, and while there was a significant difference to the Academy in many practice areas, the majority of respondents represented the practice area of clinical nutrition for Australia (41%) and the Academy (43%) (P > 0.05). Australian responses were received from all states and territories and this was representative of DAA membership (P > 0.05) (Maunder et al., 2015).

Access to Computers. When Australian dietitians were asked how they accessed electronic data. Within the workplace, 83% had access to a dedicated computer, 34% to a shared workstation, 31% to a mobile device and 5% to a smart board. For educational purposes, 97% had a dedicated computer (88% personally owned and 8% University provided), 45% accessed a mobile device, 25% a shared workstation and only 2% utilized a smart board (Maunder et al., 2015).

Access to Electronic Data. Ninety-eight percent of Australian and 97% of Academy respondents reported having access to electronic data in their workplace or to support their educational pursuits. Access was evenly reported across the practice areas. Similar responses to the Academy were also reported when Australian dietitians were asked how they accessed electronic data. Within the workplace, 83% had access to a dedicated computer, 34% to a shared workstation, 31% to a mobile device and 5% to a smart board. For educational purposes, 97% had a dedicated computer (88% personally owned and 8% University provided), 45% accessed a mobile device, 25% a shared workstation and only 2% utilized a smart board (Maunder et al., 2015).

Data and Technology Use. Eighty-one per cent of Australian respondents reported a high level of experience retrieving and accessing electronic data. The greatest percentage of a high-level experience rating was reported by respondents working in informatics (100%)

followed by education (90%). Only 1% of respondents classified themselves as having low levels of experience with access and retrieval of electronic data. The Australian participants reported significantly higher experience retrieving and accessing electronic data than the Academy respondents10 (P < 0.05) (Maunder et al., 2015).

Comfort of Use with Technology. The ratings related to comfort levels were very similar between the Australian and Academy12 responses, with eight of the top 10 expert ratings the same, including word processing (53%, 46%), slide presentations (45%, 34%) and web/Internet (39%, 37%), respectively. Respondents rated themselves as a beginner for statistical analysis (32%), using web authoring tools (23%), creating pod casts (21%) and using graphics (21%) (Maunder et al., 2015).

Barriers and Benefits. No barriers to using technology was reported by 37% of Australian and significantly more (55%) Academy respondents (P < 0.01). Of the Australian respondents reporting no barriers, 80% were from the practice area of informatics, 60% from the food industry and 50% from research. In addition, there were 26–30% of Australian responses reporting barriers of training, employer issues and technology equipment issues (Maunder et al., 2015).

Educational Support. Ninety-eight per cent of Australian and 97% of Academy respondents reported having access to electronic data in their workplace or to support their educational pursuits (Maunder et al., 2015).

Chapter 3

Analysis and Discussion

Limitations

Although the field of health informatics is broad, the new addition of nutrition informatics continues to evolve. Surveys conducted by the ADA have been limited to two, 2008 and 2011. There is still work being done on making nutrition a part of the EHR, and development of HL7 health IT standards that contain nutrition are in the process. Even though there have been a few surveys conducted, additional studies are needed in order to evaluate competency levels of nutritionist and dieticians in the field of informatics. Currently, there are few informatics experts in the field of nutrition informatics. The experts that currently exist are the same authors of several articles and that is the primary reason you will see those same names repeatedly cited throughout the literature review.

Discussion and Analysis

Surveys performed in 2008 and 2011 by the ADA reveal that the dietetics profession is beginning to have more use for technology, they have become more comfortable with its daily usage, and agree that the use of information technology can assist with decision making and problem solving. While area of specialty was not measured in the 2008 survey, the 2011 survey revealed that 1.4% of the participants acknowledged that nutrition informatics was their practice area.

Australia's survey results in 2013 was similar to the U.S. survey results in 2011. Both surveys reported similarities of high levels of comfort with the use of technology, and they both recognized that the use of information technology proves to have benefits.

Chapter 4

Conclusions and Recommendations

Summary of Findings

Summaries convey that there is a need for training and education in the field of nutrition informatics. Participants had heard of informatics, but didn't know exactly how it pertained to the everyday use in the dietetics field. The extent of the use of technology for them is the daily use of email and internet. The ADA is willing to provide support and training for members.

Conclusions

Overall, this literature review agreed that there is a lack of knowledge, education and training among dieticians where nutrition informatics is involved. In the assessment of area of practice (2008 survey), informatics was identified by only 1% of participants which indicates that informatics is not well understood among dieticians.

Registered dieticians showed that there is willingness to learn more about nutrition informatics. Forty-six percent of the respondents have a bachelors degree. When observing level of education, the higher the education, the more exposure they had to technology. This is an indication that they posses the competency level to further their knowledge of information technology.

With the clinical knowledge RDs possess and the skill level for informatics that they will acquire, nutrition informatics systems are going to be a success.

Recommendations

Recommendations for future studies is to find out exactly how much of the funds American Reinvestment and Recovery Act (ARRA) has allocated toward training for current health care workers. There may be funds that can be requested to offset the financial burden of training dieticians in information technology and the nutrition informatics field.

Another recommendation would be an exploration of educational institutions requiring nutrition informatics competencies as a part of their dietetics curriculum. Current graduates entering into the field of dietetics are going to have to already have a working knowledge of informatics and exposure to information technology as a job requirement.

A certification in nutritional informatics should become a requirement of all who work in the field of dietetics. They would then be able to wear the title of Nutrition Informatics Registered Dieticians, "N I R D".

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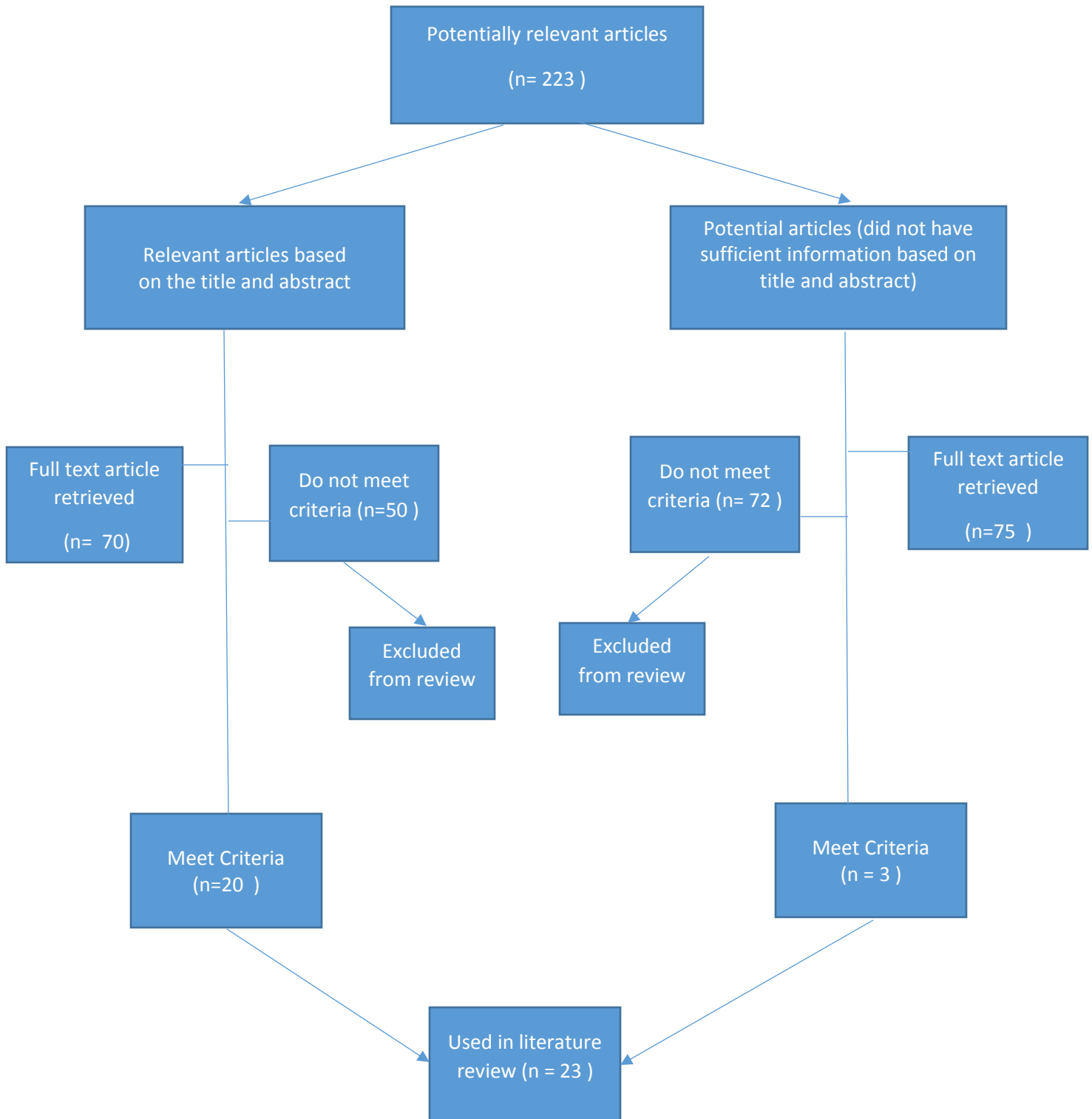
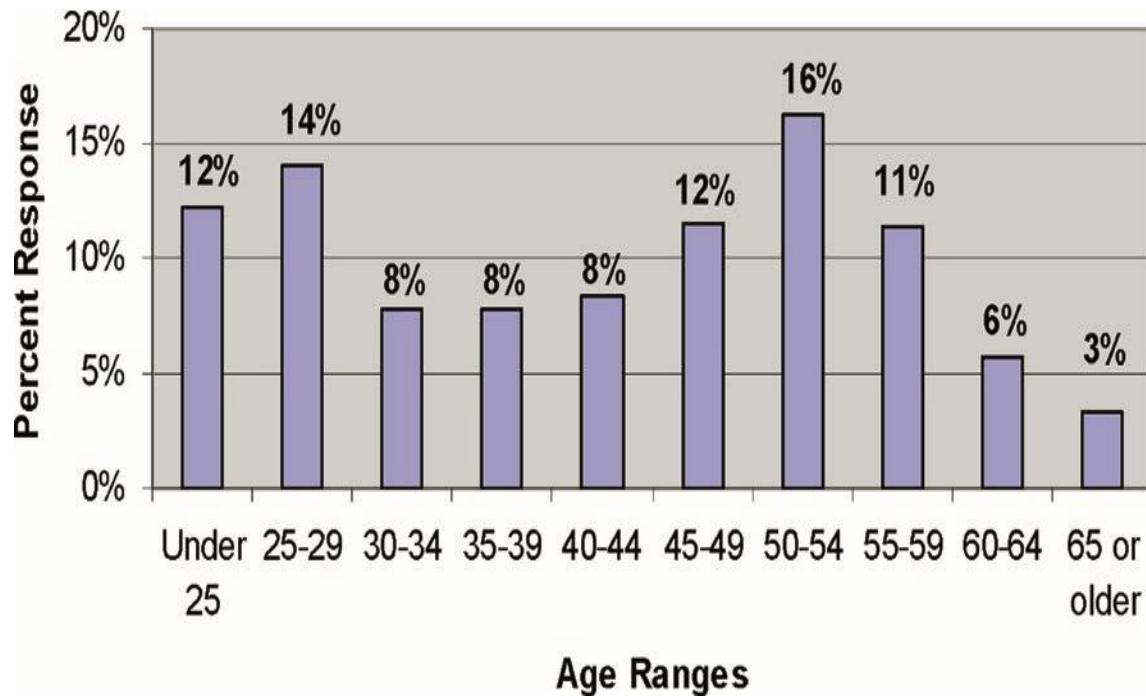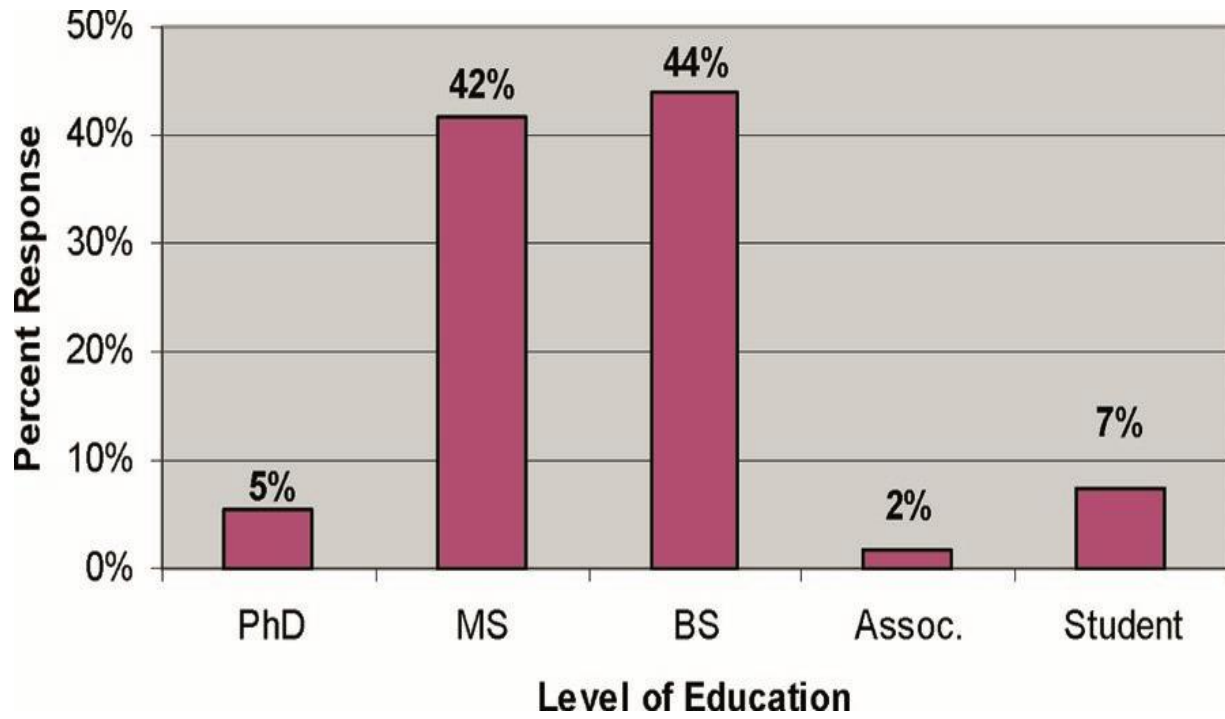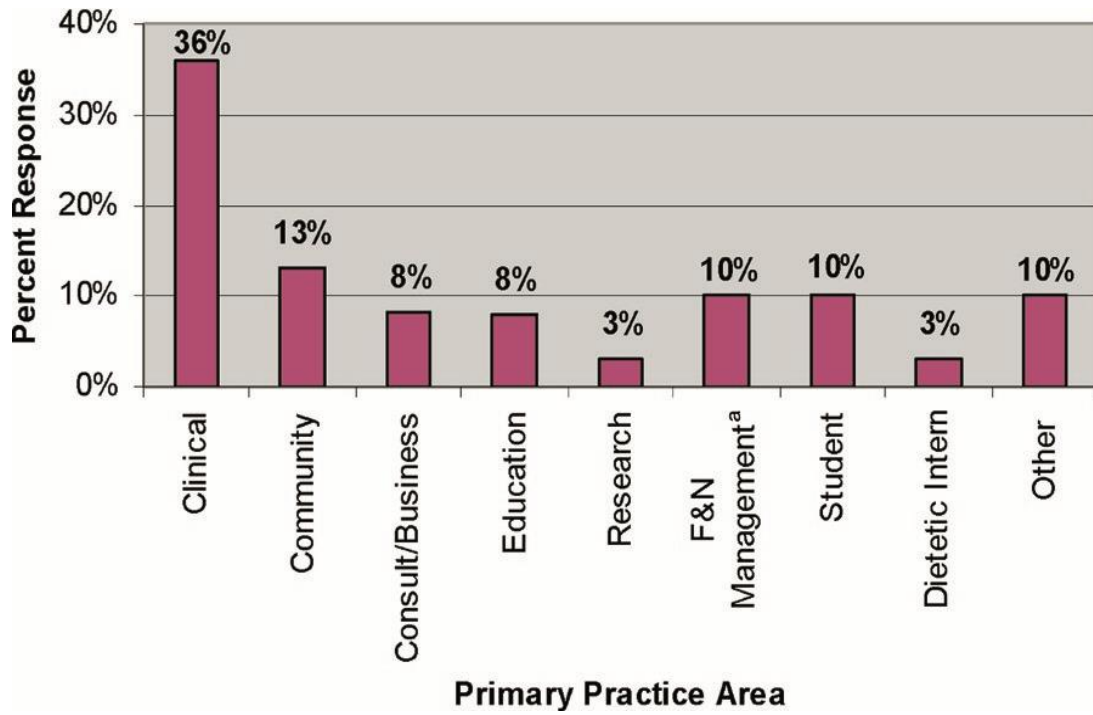Flowchart of the results from the Literature Review

Figure 1.

(E. J. Ayres & Hoggle, 2008)

Figure 2.

(E. J. Ayres & Hoggle, 2008)

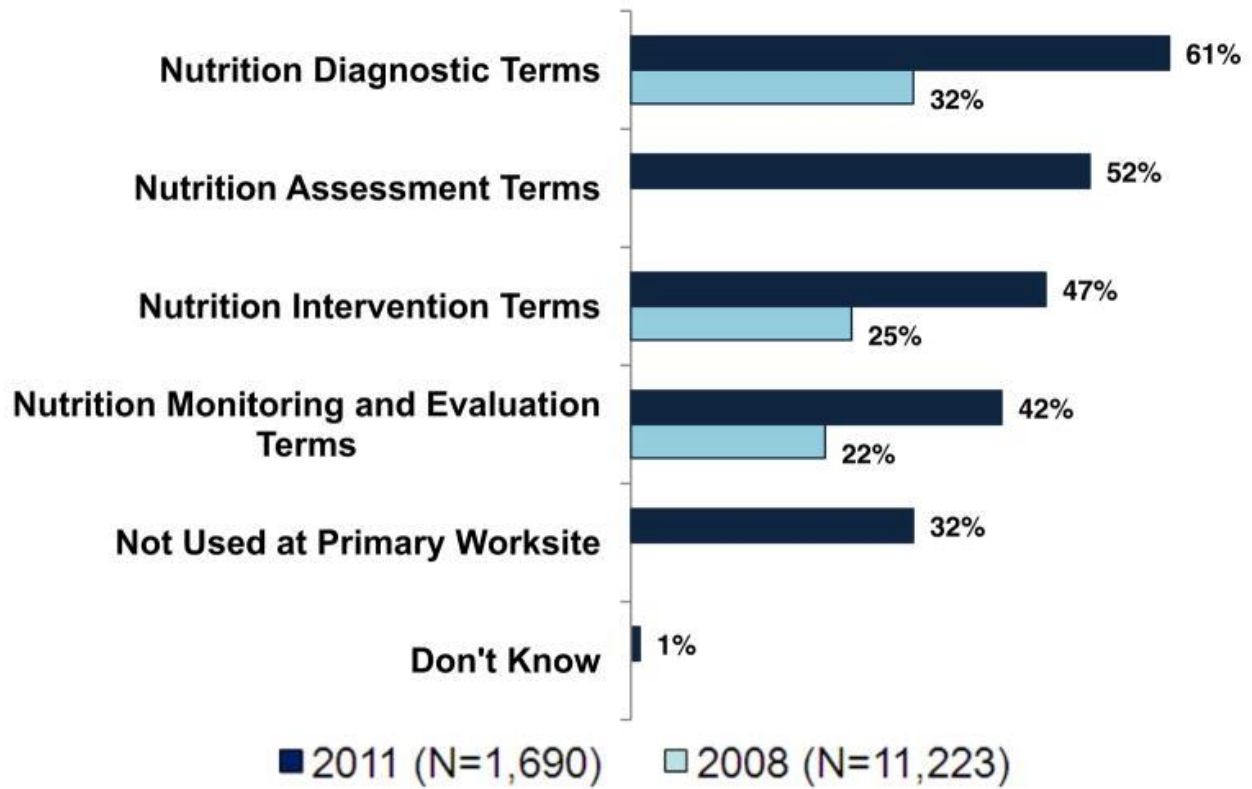Figure 3.

(E. J. Ayres & Hoggle, 2008)

Figure 4.

Figure 4. Respondent use of International Dietetics and Nutrition Terminology (IDNT) terms in the Academy of Nutrition and Dietetics 2008 and 2011 Nutrition Informatics Member Survey. Note that nutrition assessment terms were not included in the 2008 survey.
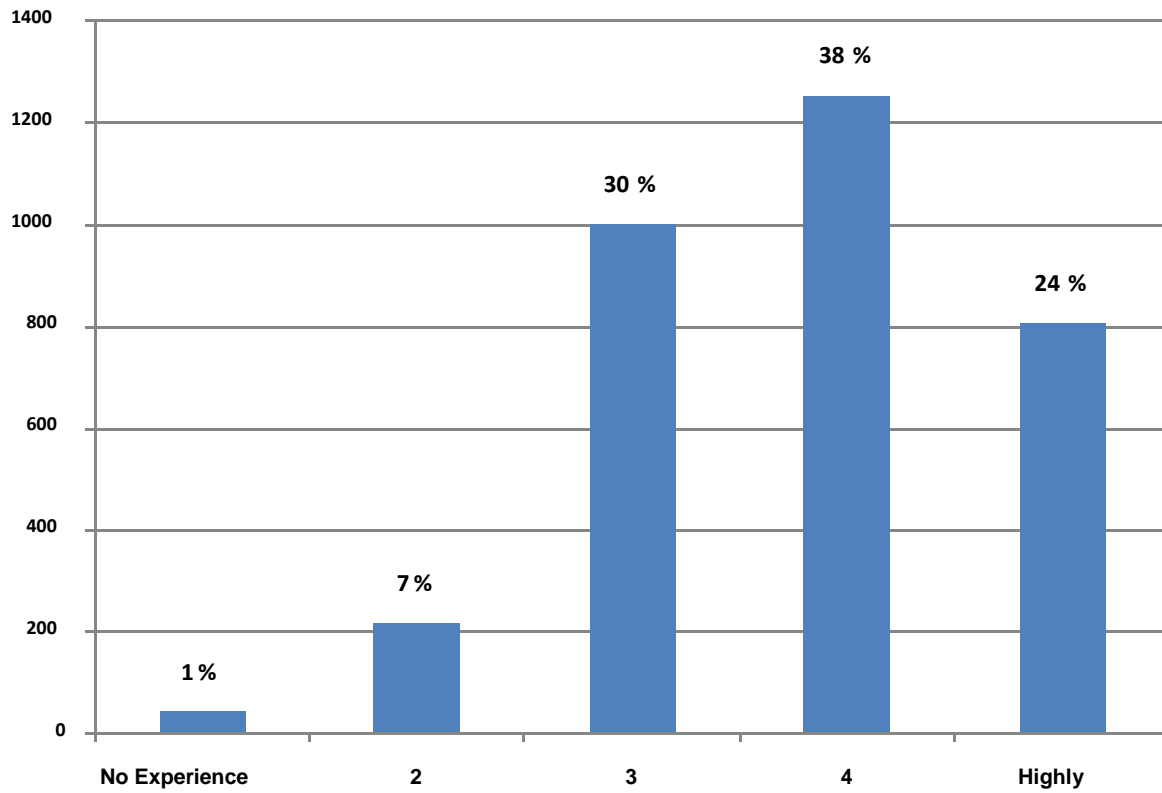
(E. J. Ayres & Hoggle, 2008)

Figure 5.

Figure 5. Level of experience with retrieving and using electronic data (includes practitioners and students) from the Academy of Nutrition and Dietetics 2011 Nutrition Informatics Member Survey. On a scale of one to five, the average response was 3.77 and the median response was 4.0.

(Elaine J. Ayres & Hoggle, 2012)
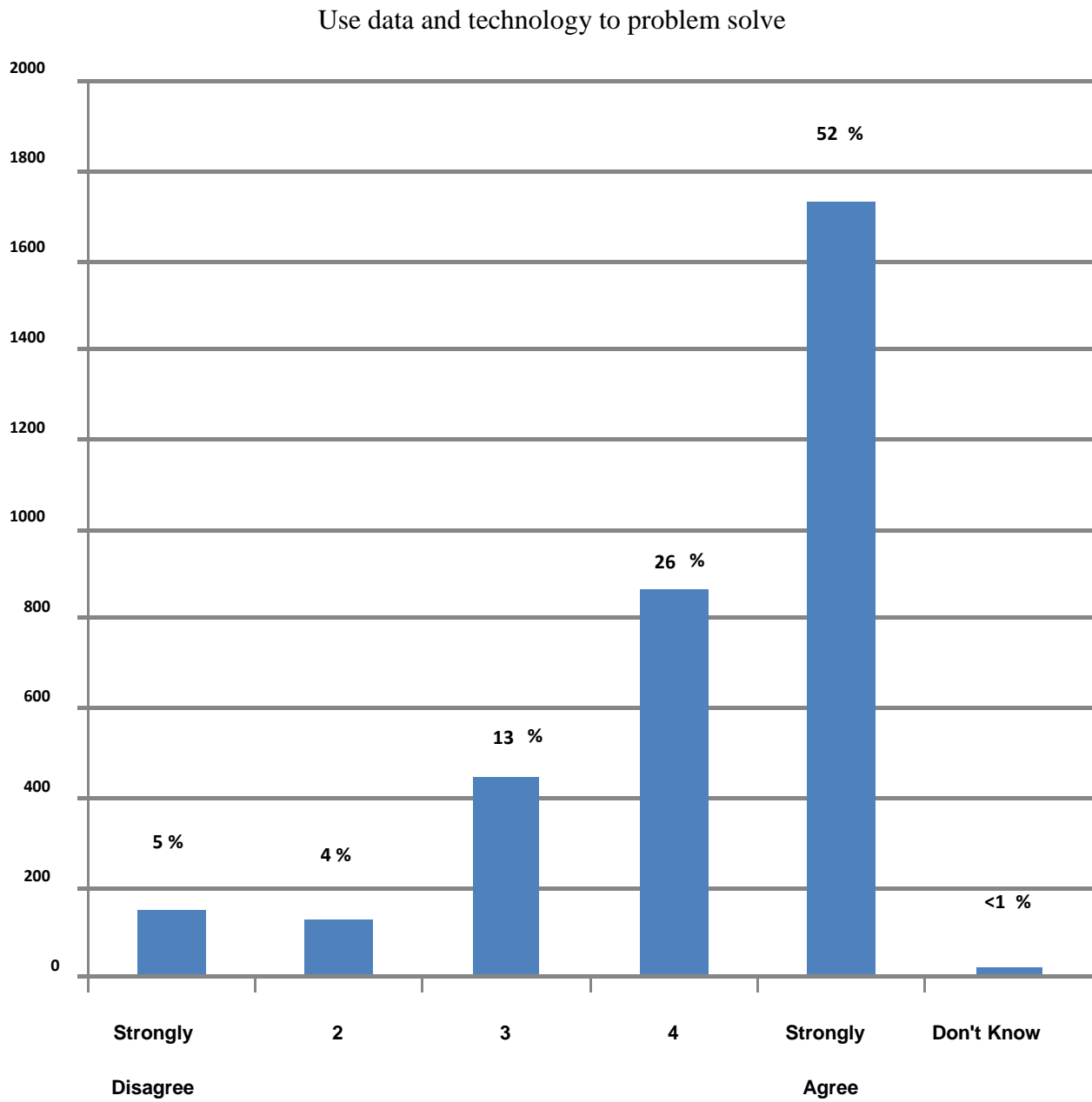
Figure 6.

Figure 6. Responses for the question "I use data and technology available to me to problem solve" from the Academy of Nutrition and Dietetics 2011 Nutrition Informatics Member Survey. On a scale of one to five, the average response was 4.17 and the median response was 5.0.

(Elaine J. Ayres & Hoggle, 2012)

Figure 7.

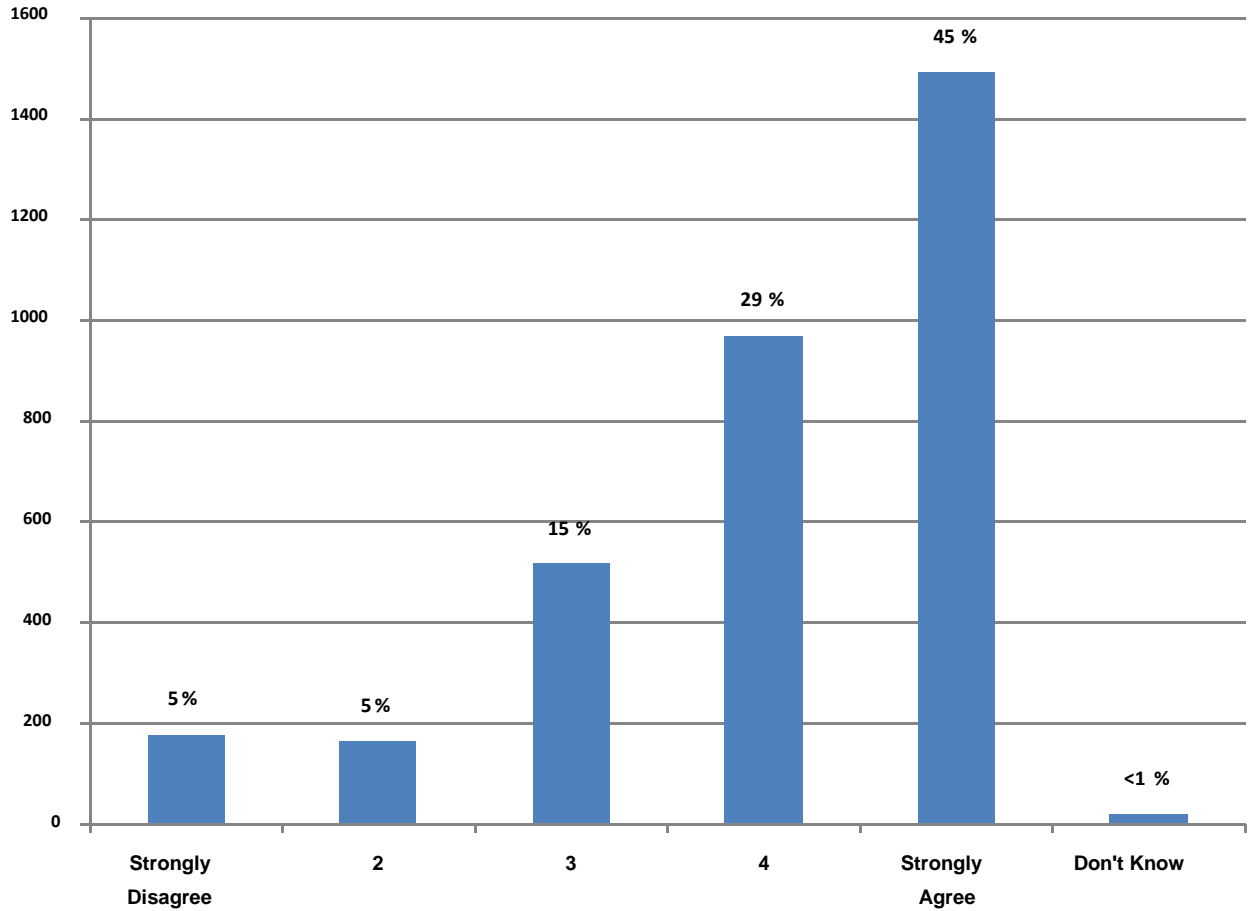Use data and technology available to me for decision making

Figure 7

Responses for the question "I use data and technology available to me for decision making" from the Academy of Nutrition and Dietetics 2011 Nutrition Informatics Member Survey. On a scale of one to five, the average response was 4.03 and the median response was 4.0.

(Elaine J. Ayres & Hoggle, 2012)

Table 1 Demographic characteristics of Australian respondents

	Australian dietitians 2013 (n = 747)	Academy dietitians 2011 (n = 3342)	P-value
Gender (%)			
Female	94%	96%	<0.05
Male	5%	2%	<0.05
Prefer not to answer	1%	1%	>0.05
Age (%)			
Under 25 years	10%	6%	<0.05
25–29	30%	11%	<0.05
30–34	16%	9%	<0.05
35–39	11%	6%	<0.05
40–44	11%	8%	<0.05
45–49	6%	10%	<0.05
50–54	7%	17%	<0.05
55–59	4%	19%	<0.05
60–64	2%	9%	<0.05
65 years or older	1%	3%	<0.05
I prefer not to answer	1%	1%	>0.05
Practice area (%)			
Clinical nutrition	41%	43%	>0.05
Community and public health	17%	14%	<0.05
Consultation and business/private practice	12%	9%	<0.05
Education	3%	8%	<0.05
Research	6%	3%	<0.05
Food service	3%	NA	NA
Food industry	2%	NA	NA
Informatics	1%	1%	>0.05
Dietetic student	3%	7%	<0.05
Mixed practice (regularly undertaking 3 + areas of work)	8%	NA	NA
Food and nutrition management	NA	9%	NA
Retired	0%	NA	NA
Do not work in nutrition and/or dietetics	1%	NA	NA
Other	3%	7%	<0.05

*z-test used to determine significance of differences (P < 0.05 = significant).
NA, not available.

Table 1 Demographic characteristics of Australian respondents Australian dietitians 2013 Academy dietitians 2011 (n = 747) (n = 3342) P-value Gender (%) Female 94% 96% 0.05 Age (%) Under 25 years 10% 6% 0.05 Practice area (%) Clinical nutrition 41% 43% >0.05 Community and public health 17% 14% 0.05 Dietetic student 3% 7%

(Elaine J. Ayres & Hoggle, 2012)

Table 2 Data accessed electronically by Australian and Academy respondents

	Australian dietitians 2013 (n = 747)	Academy dietitians 2011 (n = 3342)	P-value*
Continuing professional education	95.9%	78.0%	0.000
Evidence-based library	94.3%	78.4%	0.000
Professional journals	94.0%	77.3%	0.000
Patient educational materials	88.6%	81.5%	0.514
Nutrient database	87.1%	81.1%	0.804
Recipes/menus	84.3%	75.8%	0.069
Standards of practice	81.0%	66.8%	0.000
Drug data/information	79.8%	70.7%	0.060
Lay literature	80.2%	73.1%	0.621
Patient data from other professionals	76.5%	66.8%	0.031
Schedules	76.0%	60.7%	0.000
Data/information from patients and clients	73.0%	NA	NA
Work load statistics	72.7%	42.4%	0.000
Social media (i.e. social networking sites, blogs)	66.2%	58.8%	0.162
Standardised Terminology (i.e. IDNT)	65.2%	59.0%	0.365
Diet manual/nutrition care manual	58.2%	NA	NA
Project management	56.5%	NA	NA
Purchasing	43.1%	NA	NA
Billing	35.1%	31.5%	0.494
Budget	34.4%	28.5%	0.061
Textbooks	29.1%	24.8%	0.172
Inventory	22.5%	NA	NA
Sales	17.1%	NA	NA

*χ^2 test used to determine significance of differences ($P < 0.01$ = significant because of the increased risk of a type 1 error with multiple testing).

IDNT, International Dietetic and Nutrition Terminology; NA, not available.

(Elaine J. Ayres & Hoggle, 2012)

Table 3.

The top 10 areas of "expert" users in the Academy of Nutrition and Dietetics 2008 and 2011 Nutrition Informatics Member Surveys[1]

Areas of expertise	Percent–2008	Percent–2011
Word processing	41	45.8
Web/Internet	33	36.5
Slide presentations	27	34
Nutrition assessment	23.7	33.2
Nutrition screening	22.4	30.7
Nutrition histories	20.7	29.8
Nutrient analysis	20.4	25.9
Webinars	8.9	23.7
Patient management	17.5	23.1
Care plans	14.6	21.5

[1] Respondents were asked to rate their own proficiency. The biggest change from 2008 to 2011 was in proficiency with webinars.

(Elaine J. Ayres & Hoggle, 2012)