The World Health Organization notes that diet is a major cause of the most common chronic diseases, including obesity, type 2 diabetes, cardiovascular disease (including hypertension and stroke), and certain cancers (World Health Organization, Food and Agriculture Organization of the United Nations [WHO], 2003). In the United States, preventable, diet-related diseases are responsible for 7 out of every 10 deaths (Kung, Hoyert, Xu, & Murphy, 2008). Treatment of chronic diseases consumes 75 percent of national health expenditures (Institute for Medicine, 2012). In Michigan, rates of heart disease, obesity, high cholesterol and hypertension exceed the U.S. median prevalence rates (Fussman, 2014).

Nutrition is a modifiable risk factor for primary and secondary disease prevention and treatment. Despite ample research linking food and health over many decades (de Lorgeril et al., 1999; Ornish et al., 1998; Knowler et al., 2002; Kushi et al., 2012), only 13 percent of medical office visits included counseling on diet or nutrition in 2010, while 75 percent of office visits included a prescription or prescription renewal for one or more medications (Center for Disease Control and Prevention [CDC], 2010). Among the top five classes of medications prescribed, three are for diet-related diseases: hypertension, hyperlipidemia, and type 2 diabetes. Recognizing the importance of nutrition interventions, *Healthy People 2020* - the federal government's framework for a healthier nation – includes a goal to increase diet and nutritional counseling related to cardiovascular disease, diabetes, hyperlipidemia or weight management in provider office visits. Furthermore, recent public policy developments support increased emphasis on nutrition in practice (DiMaria-Ghalili et al., 2013, p. 23). For example, the Patient Protection and Affordable Care Act of 2010 champions chronic disease prevention, and the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 has expanded the use of electronic medical records to track measures such as BMI and nutrition

counseling. Medicare, Medicaid and some private insurance now cover obesity screening and counseling (ibid).

It is important that primary care clinicians, including physicians and nurse practitioners (NPs) have the knowledge and skills to promote nutrition as an intervention for health promotion and disease management/treatment in practice. However physicians are not adequately prepared, as evidenced by the small number of medical schools offering substantive nutrition content (Adams, Butsch, & Kohlmeier, 2014). A survey of resident physicians found only 14 percent thought they could provide nutritional counseling (Vetter, Herring, Sood, Shah, & Kalet, 2008).

Nurse practitioners (NPs) are an expanding workforce of primary care providers (Pohl, Barksdale, & Werner, 2013; Valentine, 2014). A recent report shows that there are 5208 nurse practitioners providing care in Michigan, with another 1310 enrolled in graduate education programs to become nurse practitioners (American Association of Colleges of Nursing [AACN], 2014). Seven schools offer graduate preparation of primary care Adult-Gerontology Nurse Practitioners (AGNP) and eight offer graduate preparation of Family Nurse Practitioners (FNP). National surveys of nursing schools regarding nutrition preparation and competence were conducted in 1985 (Stotts, Englert, Crocker, Bennum, & Hoppe, 1987) and 1997 (Touger-Decker, Benedict-Barracato, & O'Sullivan-Maillet, 2001), and are now outdated. A gap in expertise was suggested in a 2011 survey of practicing NPs, in which nutrition was the number one topic of interest. Specifically, NPs identified a need for nutrition skills training for everyday clinical practice (DiMaria-Ghalili et al., 2014). In Michigan, preventable, diet-related chronic diseases are prevalent, and nurse practitioners need to be competent to provide nutritional counseling and to identify and intervene in nutritional issues.

Purpose

The purpose of this study was to describe how adult nutrition content is currently taught within adult-gerontology and family nurse practitioner programs in Michigan

Review of Literature

In the words of Florence Nightingale, "the most important office of the nurse, after she has taken care of the patient's air, is to take care to observe the effect of his food…" (Nightingale, 1859, pp 42-43). A historical review of nutrition education in nursing, from Nightingale's era through 1985, is provided by Englert, Crocker and Stotts (1985). The first nurses were instructed in food preparation and service. Content expanded in the early 1900s to include principles of nutrition and diet, taught in approximately 100 hours over three years (Hassenplug, 1960). The period from 1950-1970 saw a transition from separate nutrition courses totaling about 65 classroom hours, to content that was integrated into classes as a thread throughout programs, as nursing's focus became more holistic and other academic content requirements emerged. In 1956, many State Boards of Nursing dropped the requirement for a specific number of hours devoted to nutrition (Leitch, 1956) , though nutrition was (and continues to be) tested on licensure exams for registered nurses (DiMaria-Ghalili et al., 2013). Concurrently, the growth of the dietetics profession resulted in changes in nursing's responsibilities related to nutrition. In the 1970's, an era of specialty certification began, including parenteral and enteral nutrition support and, more recently, diabetes education, lipid management and bariatric care.

In 1965, the first NP program was established. In 1987, a comprehensive survey of nutrition in U.S. undergraduate and graduate nursing programs was published (Stotts et al., 1987). At that time, only half of responding baccalaureate programs required at least one course on nutrition, and less than half of graduate programs had "significant nutritional components" (a

term not defined in the survey). A 1997 nutrition education survey across healthcare professions found that 89% of responding NP program directors (n=102) thought that graduates were able to provide nutrition assessment, counseling and referral, though the discussion suggested a follow-up evaluation of graduates is needed for verification (Touger-Decker et al., 2001). The number of clock hours of nutrition education in nurse practitioner programs in 1997, the most recent year that this information appears to be available, is described in Table 1.

There are very few recent studies on nutrition in graduate education or of nutrition expertise among practicing NPs in the U.S. Bonnel (2003) described data she collected from 80 gerontological, adult or family NPs. She found that NPs indicated that nutrition content was important and should be part of the graduate school curriculum; however, it was largely missing from their educational programs. Reflecting an earlier era, her survey questions focused on education to assess for and address issues related to under-nutrition. More recently, Sabol et al. (2012) examined education on nutrition in relation to obesity prevention and treatment in adult primary care NP programs, and found the need for such content to be great, but found no data on its inclusion within curricula.

Many publications have addressed the need to increase nutrition knowledge among physicians. Reviewing the progress of medicine to bridge a significant nutrition educational gap may be informative for nursing efforts. Beginning in 1998, recommendations from the Institute of Medicine to increase the emphasis on nutrition led to a congressional mandate, which resulted in the creation of the Nutrition Academic Award (NAA) (DiMaria-Ghalili et al, 2013). Rolling 5-year grants were awarded to 21 medical schools to formally integrate nutrition into their curricula. The NAA tag line was “Advancing nutrition, medical education, and clinical practice.” When funding ceased in 2005, some of the funded schools continued their efforts, and a few

others have incorporated NAA materials. However, the national program did not spread to all or even a majority of medical schools, as was hoped (ibid). A survey of the 2012/2013 academic year found that the number of medical schools offering a minimum of 25 hours of nutrition instruction, as recommended by the National Research Council (1985), has fallen, with most (86/121, 71 percent) of the schools that participated in the survey providing less than half of the recommended number of hours (Adams, Butsch, & Kohlmeier, unpublished data). None of the medical schools that participated in the NAA program are in Michigan.

The competencies from the American Association of Colleges of Nursing (2010), (developed in collaboration with the National Organization for Nurse Practitioner Faculties and the Hartford Institute for Geriatric Nursing) for adult-gerontology primary care nurse practitioners that relate directly or indirectly to nutrition have been identified by Kris-Etherton et al, (2014, p. 1160S):

- Obtains a relevant health history
- Performs and accurately documents a pertinent, comprehensive, and focused physical examination
- Assesses health promotion needs with the use of age, sex, and culturally appropriate standardized assessment instruments or processes in relation to nutrition
- Differentiates between normal and abnormal changes associated with development and aging
- Assesses individuals with complex health issues and comorbidities

- Orders, performs, and supervises laboratory diagnostic testing and clinical procedures, and interprets results in relation to the individual's age, sex, and health status
- Prescribes and monitors the effect of therapies such as…nutrition therapy
- Coordinates comprehensive care in and across settings.

Nutrition-related competencies for family nurse practitioner programs (Population-Focused Nurse Practitioner Competencies Task Force, 2013) are very similar to those listed for adult-gerontology education. From the perspective of nutrition for health promotion, disease prevention and treatment, they are very broad. Little is known about how these competencies are implemented in the education of adult-gerontology and family nurse practitioners.

Furthermore, nutrition science continues to evolve. For example, a plant-based dietary pattern has emerged as an effective method for prevention and treatment of nutrition-related chronic diseases (Barnard et al., 2009; Kushi, Doyle & McCullough, 2012; USDA & HHS, 2010; WHO, 2003). With growing epidemics of these conditions, this is a critical time to confirm that nurse practitioners are adequately prepared with knowledge and skills for nutrition assessment, education, counseling and referral.

Conceptual Framework

DiMaria-Ghalili et al. (2013) identified the Hartford Geriatric Nursing Initiative (HGNI) as a model to effectively build "nutrition capacity" in educational institutions and ultimately, into practice, both within the nursing profession and across healthcare disciplines. The goal of the ongoing HGNI is to prepare nurses to provide quality care to the aging population, in a manner that has succeeded in building partnerships to exert transformative change (McBride et al., 2011). Within its first decade, the HGNI has produced 129 doctoral scholars and 87 post doc

fellows; published more than 1100 articles and obtained $72 million in new research funding. Its educational resources have been widely adopted.

> The keys to success of the HGNI model are the following: established need (e.g., nursing leaders recognized the need for all nurses to demonstrate competence in gerontological nursing because of the aging of the American population); buy-in from key stakeholders (professional associations); funding to build capacity (Hartford Foundation); development of gerontological nursing competencies for undergraduate and graduate programs; coordinated approach to building capacity (Hartford Centers and national coordinating center); and high-quality education and practice resources (e.g., www.ConsultGeriRN.org) (Dimaria-Ghalili et al., 2013)

The HGNI model provides an effective and inspiring roadmap for developing the topic of nutrition education within nursing education. A survey of NP programs in Michigan will contribute to the first steps of establishing this state's need and gaining buy-in from key stakeholders (schools of nursing); and providing knowledge of nutrition-related competencies used by Michigan's NP programs. The state-based approach to sampling could then be replicated across states to gain local buy-in, foster local networking by nutrition champions, and identify thought-leaders within each state.

Research Questions

1. How is nutrition taught in Michigan's AGNP and FNP nurse practitioner programs?
2. How many hours are devoted to nutrition instruction, and how has that changed from the last reported survey of NP programs (1997)?
3. What are the qualifications of instructors of nutrition?
4. What nutrition competencies are graduates expected to meet?

5. What percent of programs include content on plant-based nutrition?
6. Who are recognized leaders in nutrition education for nursing education?

Methods and Sample

A total population sample of all AGNP and FNP programs in Michigan that are accredited by the American Association of Colleges of Nursing (AACN) and/or the National League for Nursing(NLN) was included. A total of 15 primary care NP programs at 11 universities in Michigan were identified through the AACN (http://www.aacn.nche.edu/) and NLN (http://www.nln.org/) websites, including 7 AGNP and 8 FNP programs. FNPs are the most common advanced practice nursing specialty, and their scope of practice includes the adult-gerontology population. Educational tract offerings of these programs may include Master of Science in Nursing (or with nursing major), post-Baccalaureate Doctor of Nursing Practice and post Master of Science of Nursing Certificate. The number of students enrolled in each program was reported to gauge impact of the current nutrition curricula on future health care providers.

Survey development

A 21-item, self-administered, Web-based survey (Table 2) was developed for NP program administrators, examining required vs. elective content, competencies, topics, teaching methodologies, and faculty preparation. A secondary purpose, inspired by the Harford Model, asked program leaders to identify individuals and programs that excel in preparing students to address nutrition in clinical practice.

Question format included yes/no, check-off boxes, and short answer, with space provided at the end for additional comments. Questions were inspired by the most recent National Academy of Science survey of medical schools on nutrition education (Adams et al., 2014) and resources on the NAA website, specifically, Columbia University's College of Physicians and

Surgeons Nutrition Curriculum Competencies (Columbia University, Nutrition Curriculum website, n.d.), the comprehensive survey of nutrition in nursing programs (Stotts, Englert, Crocker, et al., 1987) and a smaller study on perceptions of nutrition education adequacy among health professional training, including nurse practitioners (Touger-Decker et al., 2001.) Among the list of choices for the competencies that are expected of graduates, was, "Apply knowledge of principles of good nutrition to maintenance and improvement of own health." which was inspired by the number one objective identified in a 1960 NLN publication on nutrition instruction in schools of nursing. (Joint Committee of the Maryland League for Nursing and the Maryland Dietetic Association [Joint Committee], 1960)

Questions for the survey were formatted using an electronic survey software package (Qualtrix®, LLC, Provo, UT, www.qualtrics.com), which allows for participant self-administration and investigator management. The project was reviewed and approved by the Madonna University Institutional Review Board. As described in the cover letter that accompanied the survey, completion of the questionnaire indicated consent to participate. The survey form was piloted by one NP program director and one faculty member to determine ease of administration and clarity. The time to complete the pilot survey averaged 9 minutes.

Survey Dissemination, Data Collection and Analysis

The survey and a cover letter were emailed to the program chairs at each of the seven AGNP and eight FNP programs in Michigan. A secure link allowed the participants to respond electronically. A follow-up reminder was sent twice, at four day intervals. Data were collected over a period of nine days in March, 2015. Data from the survey were analyzed using descriptive statistics generated by the Qualtrics® software.

Results

Six surveys, representing 9 of the 15 programs in Michigan, were returned. Three responders had both AGNP and FNP, two have FNP and 1 had only AGNP. Of the respondents, 5 were program directors and 1 was a faculty member. Five of the respondents were are at programs that offer MSN (or Master of Science with a nursing major) and Post-MSN Certificates; two offered post-BSN Doctor of Nursing Practice (DNP) degrees. The current number of first-year students enrolled in the four responding AGNP programs was 3, 14, 17 and 75 students; enrollment in the five responding FNP programs was 22, 24, 26, 36 and 117students Thus, 334 NP students are currently being educated within responding programs.

None of the programs reported offering a graduate-level nutrition course. All of the programs offer content on nutrition, integrated into Advanced Health Assessment (50%), Health Promotion (67%) and/or Disease Management (100%) courses. Table 1 describes the number of hours of nutrition instruction provided. The majority of respondents (83%) indicated that nutrition content is taught using didactic presentation and case study analyses. A clinical or practicum learning experience was offered by 50%, while 33% required students to conduct a nutrition/dietary habits/dietary analysis self-assessment, and 50% required a patient assessment. One offered an interdisciplinary learning experience. Under "other, please describe," one respondent wrote that they require a class assignment that includes an experiential learning experience.

Credentials of the faculty members who taught the integrated nutrition content included Nurse Practitioner (60%), Nurse PhD or DNP (80%), with one respondent adding the comment that their PhD-prepared faculty person studied Women's Health with cognate courses in nutrition as part of doctoral program. Of the faculty teaching nutrition content, 80% are, at a minimum, Master's prepared nurses. None of the responding programs offer instruction by Registered

Dietitians, or specialty-certified nurses in diabetes (neither Certified Diabetes educator/CDE, or Board-Certified in Advanced Diabetes Management/BC-ADM) or health education (Certified Health Education Specialist/CHES), or any other specialty certification related to nutrition.

Respondents were asked to list which competencies related to nutrition are expected of program graduates. Responses are reported in Table 3. Regarding nutrition content, 83% of responding programs included nutrition assessment and nutrition counseling for disease treatment, while 67% included nutrition counseling for disease prevention; nutrition counseling and nutrition referral. None of the programs included nutrition biochemistry. Only one of the responding programs included content on a plant-based dietary pattern as an effective method for prevention and treatment of nutrition-related chronic diseases.

The majority (83%) of respondents indicated that they did not think that the amount of nutrition instruction was sufficient. None of the responders identified a nursing "nutrition champion" or a school of nursing that excels at nutrition education. Two respondents provided comments in the optional "additional comments for the survey author" question: "We include a NP-oriented text on Nutrition as part of our program book requirements" and "This (survey) has brought up an interesting point to our program."

Discussion

This survey on Adult-Gerontology Nutrition Content within Primary Care Advanced Practice Nursing Programs in Michigan was designed to describe nutrition education within a locally representative sample of AGNP and FNP programs. The survey reports information that has not been recently and, in some cases, ever assessed. Findings indicated that nutrition content was integrated into courses, primarily Disease Management, and, in some schools, Advanced Health Assessment and Health Promotion. None of the programs require a separate course on

nutrition; nor do they offer an elective option. While many of the responding universities may offer graduate nutrition education programs where nutrition electives are likely available, the NP curriculum does not often include room for electives.

The instructional methods for nutrition content were primarily didactic and case study analyses. Educational best-practices would recommend more experiential learning, especially mentored patient counseling and education opportunities. Patient-and self- assessments are underutilized. None of the programs offer nutritional content instruction by faculty with degrees or registration in dietetics; which may or may not be adequate. Only 67 percent of the responding programs reported that initiating a referral to a dietitian was an expected competency. Exposing students to dietetics experts and providing instruction on when and how to refer patients to a dietitian would promote interprofessional care that would likely improve patient outcomes. Exposure of NP students to faculty holding certification in diabetes management or education would also be worthwhile, as nutrition is a key focus of these credentials.

There was widespread incorporation of six suggested competencies related to nutrition as reported in Table 3. The AGNP and FNP education competencies are quite broad, and schools lack more specific direction on this important topic. Consensus is needed within nursing and between the healthcare professions on competencies related to nutrition. While all of the responding schools reported that nutrition content is incorporated into Disease Management, only 50% reported that students were expected to educate medically compromised patients about diet adequacy, or answer frequently asked questions about nutrition. Emerging science on plant-based nutrition was taught within only one of responding schools. None of the responders identified nursing nutrition “champions” or “thought leaders,” or schools that excel at nutrition

education. The Hartford Geriatric Nursing Initiative model suggests that identifying and promoting role models would help to build nutrition capacity by identifying thought-leaders.

If accurate, the survey suggests that the number of hours on graduate-level nutrition education in responding Michigan NP programs is much lower than the average number of hours dedicated to nutrition among a representative sample of all NP programs reported by Touger-Decker in 1997. Over this period of time, other topics added to NP curricula may have limited time devoted to nutrition content. Limited time vs. an increasing academic load creates a likely barrier to expanding graduate-level nutrition education; however, the shift of NP education to the DNP degree may allow for content expansion including nutrition education. Creative options are needed. The Hartford Geriatric Nursing Model demonstrates that material can successfully be added to curricula when high quality, no-cost resources, such as computer-based modules, are made available.

Is the 25-30 hours of nutrition education recommended for medical students a reasonable benchmark for AGNP/FNP students? Perhaps not, as a certain number of hours in nutrition is already likely included in undergraduate nursing curricula, since nutrition topics remain tested topics on the NCLEX-RN exam. This is an area for additional research, as it is not known how many undergraduate nursing programs continue to offer a required course on nutrition, or how effectively nutrition is integrated into undergraduate education, nor is it known how effectively NPs carry forward undergraduate nutrition education into NP clinical practice. It is clear that hours devoted to nutrition instruction have decreased in NP curricula and additional research on the knowledge, skills and attitudes of practicing NPs is needed to assess the impact of this reduction.

Limitations

Selection bias may have impacted the results, as responders may be those who have concerns about nutrition in their programs. The survey was conducted over a relatively short period of time and close to a school break, which may have also influenced the number of surveys returned. Regarding the number of hours on nutrition content at responding programs in Michigan, the only available data for comparison are the averages from a 1997 national survey, which may or may not may or may not accurately reflect how number of hours has changed. Additional nurse practitioner programs that provide primary care, such as pediatrics and women's health were not surveyed. Fear of creating an overly burdensome survey limited the number and type of questions. Future surveys might ask for the exact number of hours of nutrition education provided instead of a range; confidence in graduates' level of mastery of competencies; what texts, clinical nutrition guidelines and research reports are required/recommended readings; and how do survey responders think that nutrition education could be improved. An important aspect of nutrition counseling in the primary care setting is related to behavior change. Future surveys should ascertain if behavior change counseling is taught as part of nutrition content. Additional research is needed to describe NP nutrition education within each state, and on the national level, to identify nursing nutrition leaders, centers of nutritional educational excellence, and to describe the nutrition knowledge, skills and attitudes of graduates of AGNP and FNP programs at graduation and when they are in practice.

Implications for Practice

This survey lays the foundation for a continuing exploration of nutrition education in nurse practitioner education. Educators are encouraged to consider strategies to increase the quality and quantity of nutrition-focused educational experiences in graduate nursing education. Program graduates who do not feel adequately prepared to assess and counsel patients are

encouraged to seek out continuing education opportunities. Nutrition thought leaders are encouraged to develop high quality nutrition education materials for wide-scale dissemination to NP programs to assure that the NPs of tomorrow are prepared to meet the *Healthy People 2020* goal of increasing the number of primary care office visits that include nutritional counseling for those living with chronic diseases.

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Table 1: Number of Clock Hours of Nutrition Education in Nurse Practitioner Programs

	1997[a]		2015	
Hours	National NP Survey (n=102)		Michigan NP Survey (n=6)	
	n	%	n	%
<10	16	15	4	67
10-19	46	45	2	33
20-29	19	19	0	0
30-39	10	10	0	0
40-49+	10	10	0	0

[a] Touger-Decker, R., Benedict-Barracato, J. M., & O'Sullivan-Maillet, J. (2001). Nutrition education in health professions programs: a survey of dental, physician assistant, nurse practitioner, and nurse midwifery programs. *Journal of the American Dietetic Association*, *101*(1), 63-69.

Table 2: Survey of Adult-Gerontology Nutrition Education within Primary Care Advanced Practice Nursing Programs in Michigan

1. Please describe your position in your program:
2. Please describe your college or university's program offerings:
3. Please describe the enrollment in your program

If students have access to a Master's-level nutrition course, please complete questions 4 through 10. If not, please go to Question 11.

4. Nutrition Course Name _____
5. Number of credit hours:___
6. Required or an elective?
7. Methodology(s) used to teach nutrition content:
8. What are the credentials of the faculty member(s) involved in the course?
9. Please check topics included in the course content:
10. A plant-based (vegan or vegetarian) dietary pattern has emerged as an effective method for prevention and treatment of nutrition-related chronic diseases. Does this course include the topic of plant-based nutrition?

Questions 11-15 ask how nutrition content is INTEGRATED into the curriculum.

11. Which of the following core courses contain content on nutrition?
12. What methodology(s) are used to teach integrated nutrition content?
13. Please describe the nutrition education content that is integrated into the NP curriculum:
14. A plant-based (vegan or vegetarian) dietary pattern, has emerged as an effective method for prevention and treatment of nutrition-related chronic diseases. Is content on plant-based pattern included within the integrated model of nutrition education?
15. What are the credentials of the faculty member(s) who teach nutrition content?

ADDITIONAL QUESTIONS ON NUTRITION EDUCATION:

16. Please check off and/or describe expected competencies related to nutrition for program graduates:
17. Please indicate the total number of clock hours of nutrition education:
18. Do you think that the amount of instruction on nutrition is sufficient? Comments:
19. Please identify one or more nursing "nutrition champion(s)" or "nutrition thought leader(s)" in your program: (Contact information)_____
20. Please identify one or more nursing "nutrition champion(s)" or "nutrition thought leader(s)" elsewhere in the U.S. (Contact information) _____.

21. Please identify one or more schools of nursing anywhere in the U.S. that excels at nutrition education: _____

OPTIONAL:

22. Additional comments for the survey author:

23. If you would like to receive a summary report of this survey, please provide your email address. Please note, your email address will not be shared with anyone.

Table 3: What Is Taught? Nutrition-Related Competencies Identified by Responding Schools (n=6)(Provided in order of frequency from most to least)

Competency	#	%
Explain the role of nutrition in optimizing health throughout the lifecycle.	6	100
Explain the role of nutrition in the prevention, etiology, progression and treatment of disease.	5	83
Apply knowledge of principles of good nutrition to maintenance and improvement of own health.	5	83
Explain the types of foods allowed or not allowed on modified diets.	5	83
Perform nutrition assessment based on physical findings and laboratory results.	5	83
Provide counseling related to behavior change.	5	83
Obtain and interpret a complete dietary history from a patient.	4	67
Initiate referral to a dietitian, community dietary education program or other nutrition-related resources.	4	67
Educate healthy and medically-compromised patients about diet adequacy.	3	50
Answer frequently asked questions about nutrition.	3	50
Evaluate “fad” diets and popularized dietary recommendations.	1	17
Prescribe and monitor the effect of nutrition therapy.	0	0
Other (Please describe)	0	0