Integrative Medicine Insights

Naturopathic Practice at North American Academic Institutions: Description of 300,483 Visits and Comparison to Conventional Primary Care

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ABSTRACT: This study collected patient visit data to explore similarities and differences between conventional and naturopathic primary care (PC). Administrative data from practice management software systems from the main teaching clinics of four of the eight accredited North American naturopathic academic institutions were abstracted into an integrated database containing five years (2006–2010) of visit, patient, laboratory, and prescribing data. Descriptive analyses of healthcare services were compared to the National Ambulatory Medical Care Survey (NAMCS). Over the five-year period, 300,483 patient visits to naturopathic doctors occurred at clinics, excluding visits at clinics operated by the schools in community settings. Patients were 69% female; mean age was 39 (SE 0.09). Older adults (>65) comprised 9% of the population and children (<16) comprised 8%. Comparing academic naturopathic clinics to national conventional PC (NAMCS), we found more patients paid out of pocket at naturopathic clinics (50 vs. 4%) and naturopathic clinics more frequently offered discounted care (26 vs. 0.3%). There was a 44% overlap in the most frequent 25 diagnoses for PC at conventional community clinics. Overall, these data suggest substantial similarities in care offered by academic naturopathic clinics, at which most Naturopathic Doctor (ND) students are trained, and by conventional PC practices.

KEYWORDS: naturopathy, naturopathic medicine, NAMCS, health services research

Introduction

Descriptions of current naturopathic medical practice are limited. There is an ongoing need to characterize the quantity and quality of care because naturopathic physicians may represent an underutilized public health resource in this present era of primary care (PC) shortages, spiraling healthcare costs, and increasing demand to provide patient-centered care.

With the implementation of the Affordable Care Act, the importance of PC as the foundation of US healthcare has been re-emphasized. However, there are two significant barriers to realizing this vision. First, there is a substantial shortage of PC providers (PCPs); it is estimated that an additional 60,000 PCPs will be needed to meet the needs of newly insured Americans. Second, there is an increasing recognition that characteristics of conventional PC are not meeting patient needs.[1] Brief visit length and poor communication style are commonly cited by patients as problematic,[2–5] and both are key elements in successful delivery of health promotion and disease prevention. It is estimated that Americans receive only half of recommended preventive care.[6] Naturopathic doctors spend more time with patients, offer patient-centered care, and are experts in health promotion.[7,8] Patients cite these phenomena as reasons why they seek care from naturopathic physicians.[5]

Naturopathic doctors are licensed in 18 US states and 4 Canadian provinces, the District of Columbia, and

Puerto Rico. The scope of licensed practice in most states is commensurate with PC. This is also the standard to which the naturopathic academic institutions prepare their medical students. In 2002, Cherkin et al surveyed a random sample of naturopaths, chiropractors, massage therapists, and acupuncturists in four different states, finding characteristics of care more similar to conventional PC than different.[9,10] The majority of visits for chronic conditions (75%), frequency of acute concerns (20%), and health supervision (5%) were also similar to conventional care. Care delivery in Washington state has been better studied than most because legislation mandating inclusion of all eligible providers has afforded better access to naturopathic medicine through existing insurance products. Non-discriminatory language similar to the Washington law is in the Affordable Care Act; however, it remains to be seen how it will be implemented. In 2006, Lafferty et al published a number of papers examining insurance claim databases regarding complementary and alternative medicine (CAM) practitioners in Washington state.[11–14] One analysis of these data found that patients using CAM services (inclusive of naturopathic medicine) had higher morbidity on average, yet paid less than patients of matched chronic disease burden not using CAM.[15] These data were updated by Hawk et al.[24] using 2007 National Health Interview Survey data with respect to CAM usage, including naturopathy. They also found that the population seeking CAM care had a high prevalence of chronic disease and health risk factors amenable to prevention and health promotion intervention, domains in which ND PCPs are expert. These reports, while intriguing, are limited as they either addressed the CAM field as a whole, with specifically little on naturopathic physicians, or addressed only small samples relating to naturopathic practice.

In 2006, Herman et al suggested that health services research (HSR) methods could address some of the issues associated with CAM research,[16] specifically the limited availability of up-to-date characteristics of care delivery. This sentiment has been echoed by others; in 2008, Coulter and Khorsan stated, "It would be difficult to exaggerate the importance of descriptive studies for CAM."[17] Most HSR examining conventional care delivery has employed large existing data repositories, a resource not as readily available for CAM research. In healthcare, these data sources and methods fall within the field of HSR and the increasingly important areas of clinical informatics and practice-based research.[18,19]

While large data repositories have not been broadly available for CAM, many naturopathic clinics use computerized practice management systems. As clinics expand participation in third party reimbursement systems and implement electronic medical record systems, datasets are increasingly available that provide opportunities for analysis. In this study, we sought to perform a comprehensive examination of visit-level data held by a group of naturopathic clinics using HSR methods to update published characterizations of naturopathic healthcare services.

Methods

This project involved collecting and integrating existing data from accredited naturopathic academic clinics in the US and Canada. These clinics are among the largest facilities providing naturopathic care, are fundamental in the preparation of NDs for clinical activity, have all implemented digitalized practice management systems, and are technologically prepared to contribute data. Given their size and infrastructure, the academic clinics provide a useful preliminary opportunity toward overall characterization of naturopathic care while also providing data for educational development. The three main objectives were to (1) develop an integrated database containing five years of naturopathic academic clinic visit, patient, laboratory, and prescribing data; (2) perform descriptive analyses characterizing healthcare utilization at the clinics during that time; and (3) compare these data to corresponding characteristics of conventional medicine using the National Ambulatory Medical Care Survey (NAMCS) dataset from the Centers for Disease Control and Prevention (CDC).

Naturopathic academic clinic data collection. At the time of the data collection, there were seven accredited schools of naturopathic medicine. Four of the seven schools participated in an onsite data collection process. These were Bastyr University in Seattle, WA (USA); National College of Natural Medicine (NCNM) in Portland, OR (USA); Southwest College of Naturopathic Medicine (SCNM) in Tempe, AZ (USA); and the Canadian College of Naturopathic Medicine (CCNM) in Toronto, ON (Canada). Institutional Review Board (IRB) approval was received from each school, and support from information technology departments and clinic management was provided during site visits. The overall approach was to create a data file from each clinic with a standard format, so that the datasets could be combined. The foundational unit of this file was the clinical visit, and all associated information available for that encounter was abstracted. Each of the schools also operated offsite clinic locations that were not captured in this data because of the heterogeneity of the many offsite record systems.

The Bastyr University clinic used Centricity Practice Management System (GE Healthcare, GE Healthcare IT, Princeton, NJ, USA) at the time of the data extraction in summer 2011. At NCNM, data were extracted from the Healthport Practice Management System (HealthPort, Columbia, SC, USA) that was in use at the same time. Bastyr and NCNM have since transitioned to Epic electronic medical records (EpicCare, Epic Systems, Verona, WI, USA). The SCNM academic clinic used two different software systems to manage patient visits during the five-year period of interest. From 2006 until June 2010, Lytec Practice Management System (McKesson Corporation, San Francisco, CA, USA) was used, with the adoption of Helios Electronic Medical Record System (American Medical Solutions, Phoenix, AZ, USA) thereafter. The data at CCNM were extracted from the

Microsoft Dynamics Retail Management System, in use since 2007. Thus, data were unavailable for 2006 and were treated as missing in the final dataset. All data were de-identified.

While the data structures and data elements differed between the schools, common elements were selected and structures reformatted so as to create a single harmonized file. Common data elements used were patient age and gender, diagnoses, procedures, dates of service, physician credentials, and method of payment. Other information available but not used for this project were financial and insurance details, laboratory and medicinary orders, and some laboratory outcomes. The Bastyr system was a relational database that was already formatted around the patient visit. The data extracted out of the systems at the other three clinics were financial transactions, along with various tables for code definitions. For these three clinics, transactions were selected that only occurred during actual visits and procedures, and diagnoses were summarized from these transactions. A single visit was summarized by patient, visit date, and attending physician for two of these three schools and by patient and visit date for the other school. If an insurance claim was filed, the payment type was classified as third-party insurance. Visit summary statistics were verified by clinic management at the four schools.

The methods for establishing the date of first visit for each patient varied between the schools. One clinic had a reliable date of first visit, therefore identifying a new patient, but the other three did not. For these three clinics, a three-year history of no visits was required to classify a visit as a patient new to the clinic. As five years of history was included in the downloaded data for two of those three clinics, we could only classify visits by new patients in the last two years of the time window at those clinics. Because of this limitation, new patient data were not fully available for the entire five-year tracking period.

For visits with more than one payment method, analyses were performed using only one method of classification, which was selected based on an a priori defined hierarchy: insurance payments first, then discounted payment, and cash payment finally. This hierarchy was derived from the CDC documentation for the NAMCS data: NAMCS micro-data file documentation for the years 2006–2010.

National ambulatory health care survey (NAMCS). Survey data collected by the CDC were used for comparisons to allopathic medical office visit characteristics. Survey data were based on a sample of visits to non-federally employed office-based physicians who are primarily engaged in direct patient care. The same time period of 2006–2010 was used. Three subsets of these files were used for comparisons. These included PC physicians, PC physicians working in community health centers (CHCs), and any physician reporting the use of CAM practices as determined by a "Yes" answer to a survey item (#96). For visits with more than one payment method, only one was selected using the hierarchy defined by the CDC described in the documentation mentioned above.

The ND summaries in this report are actual counts of the downloaded clinic data, and the NAMCS summaries are the weighted survey values, sampled to represent national population numbers. For this reason, standard errors are included for the NAMCS data only. Additionally, patient level data are not reported by NAMCS; therefore, comparisons on characteristics (Table 2) are for visit-level data only, and Table 1 contains patient-level data for only naturopathic clinics.

Data analysis. All data analyses were performed using SAS version 9.2 (SAS Institute, Inc., Cary, NC, USA). Summary statistics were computed for each of the four academic clinics and for five years of longitudinal data where available. Comparisons were made at both the visit and patient levels. Descriptive characteristics included patient age and gender distributions, payment source distributions, and diagnoses. Where appropriate, data were compared to the NAMCS data using two-sample t-test and chi-square methods.

Results

Patient characteristics. During the five-year period between 2006 and 2010, 52,129 patients were seen in the four clinics, although not all clinics had data for the full five-year period (see Table 1). In 2010 alone, 17,141 patients were seen at all four clinics combined. New patients comprised 53.3% of the total patients seen in 2010. Trends over time, shown in Table 3, revealed new patients comprised between 53 and 59% for each year between 2006 and 2010.

Table 1. Characteristics of the patient population at naturopathic academic clinics.

		TOTAL 2006–2010*	2010
Patients seen by NDs^	N	52,129	17,141
New patients+	N	n/a	9131
Female (%)	%	56.70%	57.85%
Male (%)	%	25.28%	23.31%
Sex unknown (%)+	%	18.01%	18.84%
Age (years)+	Mean (SE)	39.19 (0.09)	40.29 (0.15)
	Median	36	37
Age 0–15 years	Mean (SE)	6.52 (0.078)	6.72 (0.141)
	%	7.77%	6.77%
Age 16–34 years	Mean (SE)	27.26 (0.033)	27.61 (0.055)
	%	38.29%	37.91%
Age 35–64 years	Mean (SE)	48.27 (0.061)	48.69 (0.108)
	%	45.27%	45.35%
Age 65+ years	Mean (SE)	73.72 (0.133)	73.08 (0.192)
	%	8.67%	9.97%

Notes: *Data from one clinic were only available from mid-2007–2010. ^Data are exclusive of healthcare services delivered by other types of healthcare providers at the clinics, eg, acupuncture, nutrition, psychology. +Based on an incomplete dataset

Table 2. Comparison of visits to 4 naturopathic academic clinics vs. conventional primary care clinics nationally.

		2006–2010				2010			
		NATUROPATHIC	NAMCS PC^	NAMCS CHC^	NAMCS CAM^	NATUROPATHIC	NAMCS PC	NAMCS CHC	NAMCS CAM
Total visits+	N	300,483	2,828,019,080	112,259,640	30,753,907	67,772	560,294,990	19,833,544	7,295,865
Private insurance*	% (SE)	23.91	56.56 (1.085)	12.69 (1.876)	46.41 (2.35)	23.37	55.19 (1.756)	12.77 (2.156)	50.14 (2.279)
Discounted / no charge	% (SE)	25.97	0.32 (0.051)	3.33 (0.698)	0.33 (0.2)	24.99	0.43 (0.150)	2.86 (1.320)	0.72 (0.702)
Full cash / self pay	% (SE)	50.11	4.02 (0.274)	12.62 (1.809)	11.92 (2.79)	51.64	3.37 (0.481)	16.31 (3.405)	8.14 (1.820)
Medicare	% (SE)	0	17.26 (0.716)	13.66 (1.630)	20.35 (1.72)	0	17.90 (1.094)	10.67 (1.432)	24.80 (1.114)
Medicaid	% (SE)	0	15.83 (0.723)	45.14 (2.29)	13.67 (1.584)	0	17.25 (1.296)	44.74(5.371)	8.05 (2.091)
Other payment methods	% (SE)	0	6.00 (0.426)	12.55 (1.772)	7.32 (1.52)	0	5.86 (0.911)	12.65 (5.217)	8.15 (0.928)
Female**	% (SE)	71.42	61.63 (0.433)	61.89 (1.074)	60.52 (1.489)	71.54	60.68 (0.956)	58.14 (1.961)	59.80 (2.268)
Male	% (SE)	28.26	38.37 (0.433)	38.10 (1.074)	39.48 (1.489)	27.9	39.32 (0.956)	41.85 (1.961)	40.20 (2.268)
Age (years)**	Mean (SE)	42.02 (0.035)	38.84 (0.484)	35.50 (1.057)	43.97 (1.96)	42.67 (0.075)	38.05 (0.780)	33.08 (2.110)	50.09 (1.054)
	Median	39	39	36	47	40	38	32	49
Age 0–15 years	Mean (SE)	6.91 (0.047)	5.22 (0.067)	4.55 (0.208)	6.06 (0.185)	7.25 (0.099)	5.37 (0.151)	4.76 (0.302)	10.12 (N/A)
	% (SE)	3.75	24.89 (0.732)	25.39 (1.889)	18.52 (3.919)	3.74	25.66 (1.333)	29.09 (3.880)	6.84 (1.246)
Age 16–34 years	Mean (SE)	27.68 (0.012)	25.26 (0.081)	25.27 (0.150)	25.94 (0.435)	27.7 (0.026)	25.29 (0.173)	24.80 (0.380)	25.08 (0.393)
	% (SE)	37.63	19.37 (0.52)	22.19 (1.451)	13.49 (0.971)	37.28	20.14 (0.975)	23.01 (2.084)	14.91 (1.516)
Age 35–64 years	Mean (SE)	48.65 (0.025)	49.67 (0.127)	49.50 (0.366)	49.45 (0.278)	49.13 (0.053)	49.84 (0.225)	49.89 (0.411)	48.71 (0.329)
	% (SE)	47.45	36.55 (0.471)	40.76 (1.653)	45.64 (2.875)	46.3	36.35 (0.987)	38.98 (3.419)	49.52 (2.581)
Age 65+ years	Mean% (SE)	74.00 (0.050)	75.53 (0.118)	73.44 (0.652)	75.06 (0.348)	73.53 (0.087)	75.46 (0.218)	73.40 (0.433)	74.97 (0.327)
	%	11.17	19.19 (0.640)	11.65 (1.158)	22.35 (1.671)	12.69	17.84 (0.975)	8.92 (1.405)	28.74 (2.331)

Notes: +For naturopathic visits data from one clinic was only available for part of 2007 and all of 2008–2010, and NAMCS visits are weighted frequencies. *Only one payment method was selected from each visit based on specified hierarchies, even if multiple methods were used; one clinic had missing 2010 payment methods, so those visits (n = 12,172) were not included in this table. **Based on incomplete dataset.
Abbreviations: ^PC = Primary Care, CHC = Community Health Center, CAM = Complementary and Alternative Medicine used or referred on visit.

Patient demographics from the three clinics with non-missing data for gender showed a distribution of 69% female and 31% male. The average patient was 39 years of age; median age was 36 years. Almost half (45%) of the patients seen at the clinics were between the ages of 35 and 64. The youngest and oldest categories (0–15 and 65+ years) represented about 7 and 9% of the population, respectively. The remaining age category (16–34 years) comprised 38% of the population. This age group would contain most students at these schools as all clinics offered some form of student patient discount. The age distribution was stable over the five-year period.

Visit characteristics. Table 2 summarizes visit-level data. There were a total of 300,483 visits to naturopathic doctors at these four clinics during the period of 2006–2010.

The method of payment for these visits was divided into six categories. It was possible for more than one payment method to be used for a visit, but only one was selected for categorization in this report. For 2010, there were no medicare or medicaid payments at ND clinics; fewer private insurance payments than NAMCS PC and NAMCS CAM (24 vs. 57 vs. 46%) but more than NAMCS CHC (24 vs. 13%); more discounted/no charge payments than NAMCS PC, NAMCS CHC, and NAMCS CAM (26 vs. 0.3 vs. 3.3 vs. 33%); and more full cash/self-pay payments than NAMCS PC, NAMCS CHC, and NAMCS CAM (50 vs. 4 vs. 13 vs. 12%). These differences were all statistically significant (Chi square; all $P < 0.0001$). Comparing the whole five-year period to 2010 only, the ND visit payment distribution increased slightly in full cash/self-pay, NAMCS PC saw a small shift from private insurance to medicaid, and both NAMCS CHC and NAMCS CAM saw a slightly larger shift from medicare to full cash/self-pay.

Chi-square testing comparing ND visits to NAMCS PC visits showed a significantly higher proportion of female visits at the ND clinics (71 vs. 62%, $P < 0.0001$). Gender proportion results differed slightly between the five-year period and 2010 only, during which slightly more males made visits to clinics classified by NAMCS as PC.

NAMCS PC, CHC, and CAM all had a larger proportion of pediatric visits than the ND clinics (25 vs. 25 vs. 19 vs. 4%); geriatric visit proportions were larger for NAMCS PC and CAM (19 vs. 22 vs. 12 vs. 11%). NAMCS PC, CHC, and CAM visit proportions for the 16–34-year age group were less than ND visits (19 vs. 22 vs. 13 vs. 38%) and those for the 35–64-year age group (37 vs. 41 vs. 46 vs. 47%). Statistically significant differences were found using a two-sample t-test for average age between ND and overall NAMCS primary ($P < 0.0001$).

Diagnosis summaries. Table 3 compares the top 25 diagnoses seen at three of the ND clinics to NAMCS PC, NAMCS community health PC (CHC), and NAMCS visits using CAM (CAM). Only the primary International Classification of Disease (ICD-9) code was used in the case of multiple diagnoses for a visit.

In Table 3, diagnoses with an asterisk were held in common among the most frequent 25 ICD diagnoses between the two data sources with a 32% overlap. Of interest, 4 of the top 6 NAMCS PC diagnoses are found in the top 25 ND diagnoses, but only 1 of the top 6 ND diagnoses is found in the NAMCS list. These top 25 diagnoses represent 45% of the total NAMCS visits and 40% of the total ND visits. The NAMCS visits saw more routine examinations and infectious conditions, whereas the ND visits saw more chronic conditions, especially musculoskeletal pain and fatigue.

When compared to NAMCS CHC PC, there was a 44% overlap with NDs in the top 25 diagnoses. These top 25 diagnoses represent 47% of the total NAMCS visits and 40% of the total ND visits.

As was seen with NAMCS PC, NAMCS CAM also has a 32% overlap of the top 25 categories, with 4 of the top 6 NAMCS CAM categories found in the ND visits, but only 2 of the top 6 ND categories found in the NAMCS top 25. In this comparison, these top 25 diagnoses represent 40% of the total visits for both categories. The NAMCS CAM visits are dominated by pain and musculoskeletal complaints.

Figure 1. compares diagnostic classification categories between ND, NAMCS PC, NAMCS CHC, and NAMCS visits using or referring to CAM for the period between 2006 and 2010. The top diagnosis category among the ND clinics was musculoskeletal issues, which was also the top category for NAMCS CAM, but not for NAMCS PC and CHC. The next two ND categories, general symptoms and ill-defined conditions (fatigue, malaise) and digestive disorders, were higher for ND visits than for any of the NAMCS groups, as was the mental disorder (anxiety, depression) category. The health services category (routine exams) was more similar between ND and NAMCS CAM than the other two NAMCS groups, and endocrine and metabolic diseases were similar between ND and NAMCS PC/CHC but not between ND and NAMCS CAM.

Discussion

Characteristics of care delivery at naturopathic academic clinics are consistent with conventional PC in some domains and differ in others. For example, naturopathic academic clinics saw a higher percentage of women than conventional PC clinics, but this percentage was similar to the gender visit percentages reported by Boon et al[20] and Cherkin et al.[10] Overall, female visits account for at least two thirds of the visit volume for any PC profession.

In 2009, the CDC reported a visit frequency of less than two visits per person per year for PC physicians. In the same year, the ND clinics saw just more than four visits per person per year, suggesting more face-to-face time between naturopathic doctors and patients. The data for the CDC calculation were derived from civilian non-institutionalized population census numbers while calculations of ND utilization used the clinic patient populations, so comparisons should be

Table 3. NAMCS primary care, community health and CAM comparison to naturopathy of 25 most common diagnoses (ICD9 codes) in 2006–2010.

NATUROPATHIC ACADEMIC CLINICS TOP 25 DIAGNOSES			NAMCS CAM TOP 25 DIAGNOSES			NAMCS PRIMARY CARE TOP 25 DIAGNOSES			NAMCS CHC PC TOP 25 DIAGNOSES		
ICD9	ICD9 DESCRIPTION	% TOTAL VISITS	ICD9	ICD9 DESCRIPTION	% TOTAL VISITS	ICD9	ICD9 DESCRIPTION	% TOTAL VISITS	ICD9	ICD9 DESCRIPTION	% TOTAL VISITS
780.79	Other malaise and fatigue	6.26%	723.1*	Pain, neck	5.71%	V202	Routine infant or child health check	7.27%	V20.2	Routine infant or child health check	8.37%
564	Constipation	3.52%	724.2*	Pain, low back	4.21%	401.9+	Unspecified essential hypertension	5.92%	401.9^	Unspecified essential hypertension	6.80%
724.2*+^	Pain, low back	2.76%	V20.2	Routine infant or child health check	3.84%	V22.1	Supervision of other normal pregnancy	3.31%	250.00^	Diabetes mellitus without mention of complication	5.69%
723.1*	Pain, neck	2.41%	729.1*	Fibromyalgia	2.74%	465.9+	Acute upper respiratory infections of unspecified site	3.19%	465.9^	Acute upper respiratory infections of unspecified site	3.56%
42	Human immunodeficiency virus [HIV]	2.17%	401.9*	Unspecified essential hypertension	1.69%	250.00+	Diabetes mellitus without mention of complication	2.93%	V22.1	Supervision of other normal pregnancy	2.44%
300^	Anxiety state, unspecified	1.96%	799.9	Unspecified viral infection	1.43%	V72.31+	Routine gynecological examination	2.68%	V70.0	Routine general medical examination a…	2.23%
244.9^	Unspecified hypothyroidism	1.90%	847.2	Sprains and strains of lumbar	1.37%	V70.0	Routine general medical examination at health care facility	2.41%	V72.31^	Routine Gyn exam	1.53%
729.1*	Fibromyalgia	1.89%	311*	Depressive disorder, not elsewhere classified	1.32%	382.9	Unspecified otitis media	1.75%	493.9	Asthma, unspecified without mention o…	1.49%
465.9*+^	Acute upper respiratory infections of unspecified site	1.62%	473.9	Unspecified sinusitis (chronic)	1.30%	462	Acute pharyngitis	1.66%	382.9	Unspecified otitis media	1.25%
780.52	Insomnia	1.20%	847	Sprains and strains of neck	1.30%	473.9	Unspecified sinusitis (chronic)	1.64%	V58.89	Other specified aftercare	1.18%
789+^	Abdominal pain, unspecified site	1.15%	724.6	Disorders of sacrum	1.25%	272.4	Other and unspecified hyperlipidemia	1.31%	724.5	Backache, unspecified	1.04%
401.9*+^	Unspecified essential hypertension	1.13%	477.9	Allergic rhinitis cause unspecified	1.22%	490	Bronchitis, not specified as acute or chronic	1.12%	311^	Depressive disorder, not elsewhere classified	1.03%
311*+^	Depressive disorder, not elsewhere classified	1.05%	726.12	Bicipital tenosynovitis	1.22%	477.9	Allergic rhinitis cause unspecified	1.10%	724.2^	Pain, low back	0.98%
250.00*+^	Diabetes mellitus without mention of complication	1.00%	739.9	Nonallopathic lesions, abdomen and other	1.10%	493.9	Asthma, unspecified, unspecified status	0.98%	462	Acute pharyngitis	0.92%
784*	Headache	1.00%	724.3	Sciatia	1.07%	599.0	Urinary tract infection, site not specified	0.87%	599	Urinary tract infection, site not spe…	0.87%
627.2	Menopause	0.97%	414	Coronary atherosclerosis of unspecifi…	1.02%	V58.89	Other specified aftercare	0.79%	789^	Abdominal pain, unspecified site	0.84%
V72.31+^	Routine Gyn exam	0.91%	737.3	Scoliosis [and kyphoscoliosis], idiop…	1.01%	724.2+	Pain, low back	0.75%	244.9^	Unspecified hypothyroidism	0.83%

Code	Diagnosis	%	Code	Diagnosis	%	Code	Diagnosis	%	Code	Diagnosis	%
719.41	Pain in joint, shoulder region	0.90%	462	Acute pharyngitis	0.97%	311+	Depressive disorder, not elsewhere classified	0.74%	272.4	Other and unspecified hyperlipidemia	0.80%
724.1	Pain in thoracic spine	0.90%	724.5	Backache, unspecified	0.93%	692.9+	Contact dermatitis and other eczema, due to unspecified cause	0.72%	692.9^	Contact dermatitis and other eczema, due to unspecified cause	0.75%
719.46^	Pain in joint, lower leg	0.88%	382.9	Unspecified otitis media	0.91%	530.81	Esophageal reflux	0.69%	477.9	Allergic rhinitis cause unspecified	0.74%
692.9*+^	Contact dermatitis and other eczema, due to unspecified cause	0.87%	465.9*	Acute upper respiratory infections of unspecified site	0.91%	461.9	Acute sinusitis, unspecified	0.67%	346.9	Migraine, unspecified without mention...	0.74%
245.2	Chronic lymphocytic thyroiditis	0.86%	490	Bronchitis, not specified as acute or...	0.87%	799.9	Unspecified viral infection	0.61%	300^	Anxiety state, unspecified	0.73%
v74.1	Screening examination for pulmonary tuberculosis	0.81%	784*	Headache	0.81%	466.0	Acute bronchitis	0.60%	-9	Blank diagnosis	0.72%
719.45	Pain in joint, pelvic region and thigh	0.79%	692.9*	Contact dermatitis and other eczema, due to unspecified cause	0.80%	034.0	Streptococcal sore throat	0.60%	719.46^	Pain in joint, lower leg	0.71%
984	Lead	0.77%	V70.0	Routine general medical examination a...	0.80%	789.00+	Abdominal pain, unspecified site	0.59%	473.9	Unspecified sinusitis (chronic)	0.65%

Notes: *These diagnoses are also found in the top 25 NAMCS CAM visits. +These diagnoses are also found in the top 25 NAMCS PC visits. ^These diagnoses are also found in the top 25 NAMCS CHC PC visits.

made cautiously. Naturopathic care saw a smaller proportion of pediatric patients compared to conventional PC. Previous reports of naturopathic practice patterns showed a higher percentage of pediatric visits (10–12%), but not as high as conventional PC.[10,20] The proportion of geriatric patients was similar between naturopathic healthcare and conventional PC delivered at CHCs, but less than overall conventional PC.

Percentages of visits by new patients (not seen for at least three years) at the naturopathic academic clinics were almost twice as high as new patient percentages reported by Boon et al in 2004 and Cherkin et al in 2002, and higher than new patient visit rates in the NAMCS data. It could be that patients new to naturopathic medicine are using academic clinics as an access point to naturopathic medicine because of their lower visit fees, as compared to private practice naturopathic physicians. It could also be that some patients are accessing the naturopathic academic clinics for low-cost episodic care rather than seeking to "establish care." Indeed, ICD-9 data suggest a higher proportion of symptomatic diagnoses at naturopathic clinics. It may be that naturopathic academic clinics are serving an unrecognized (and significant) role as part of public health safety net care for the uninsured. Conversely, it is unknown what, if any, proportion of patients seen initially at academic clinics then transition to the more individualized care found in a private practice setting. Retention rates could also be related to logistical issues such as student turnover on shifts making consistent follow-up difficult in this environment.

Self-pay rates at the naturopathic academic clinics were much higher than conventional PC, reported in NAMCS, and naturopathic data, reported by Boon et al in 2004. There were also much higher rates of discounted visits at these clinics. This adds support to the idea regarding the role of academic clinics in providing safety net care for the uninsured. This is supported by lower self-pay rates seen at the naturopathic academic clinics in Washington state, where insurance coverage is mandated for all classes of providers. The lack of medicare coverage for PC services delivered by naturopathic doctors could explain differences in proportions of visits by the geriatric population.

Comparisons in the conditions and diseases seen in naturopathic PC demonstrate patterns of care both consistent with conventional PC and niches unique to naturopathic medicine. The most frequent diagnoses seen in these naturopathic academic clinics were consistent with previous research in naturopathic practice patterns suggesting an emphasis on chronic disease.[9,10,20] ND visits had a higher proportion for complaints of the musculoskeletal and digestive systems. Also, ill-defined symptoms (fatigue and malaise) and mental disorders were more common. There was a 32–44% overlap in the top 25 conditions between the ND clinics and the 3 NAMCS categories, with 3–4 of the top 5 NAMCS categories found in the ND top 25. This could indicate that NDs are not only functioning as PCPs but also addressing unmet medical needs. The holistic orientation of NDs, in which changes in diet
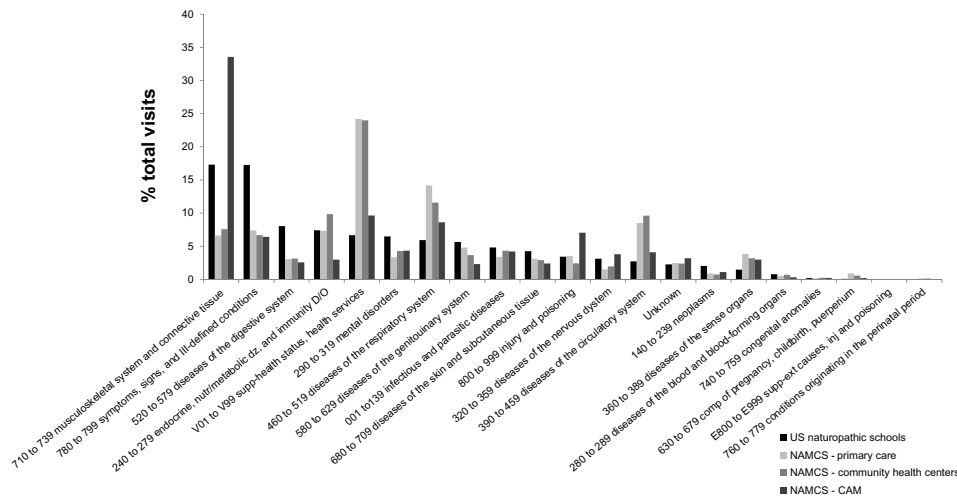
Figure 1. Diagnosis category comparison, 2006–2010.

and physical activity are routinely employed as interventions, may be more appropriate for the top ND complaints of fatigue, musculoskeletal pain, and digestive complaints. Indeed, trial data suggest positive outcomes in these domains.[21–23] Our results also suggest that the training environments for naturopathic students provide exposure to the breadth of conditions PC doctors must address in any setting. Overall, ND diagnostic patterns were more consistent with PC conventional practitioners who work in CHCs than with the other two categories. Also, there was more variety in diagnoses given by NDs than either of the conventional PC categories.

One limitation of this study was the use of financial systems, as opposed to prospective outcomes registries, for medical reporting. This created difficulty in counting true visits, although numbers were verified by clinic management at all four schools. Some data, such as age, gender, new patient dates, and diagnosis codes, were incomplete. A limitation in interpreting the relevance of these data to naturopathic education is that they were derived from the primary academic clinic only. For example, Bastyr Center for Natural Health in Seattle, WA operates 14 clinical sites and NCNM operates 20 clinical sites in addition to their main clinics for which data are reported here. Each of these clinics have recently converted to electronic health records (EHR) which, in future studies, will address these limitations as well as provide more clinically relevant data.

Characterization of the role of naturopathic doctors, including their roles as part of the PC workforce, can be investigated using existing data from naturopathic clinics. Naturopathic medicine, as delivered in four of the academic training clinics, demonstrates similarities to conventional care, in particular CHC-based PC. Naturopathic care differs in that greater diagnostic diversity is represented. The results of these descriptive analyses are prerequisites to conversations with stakeholders, policy makers, and other health professionals about the future role of naturopathic medicine within the larger healthcare setting.

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Author Contributions

CC conceived the study. SC, EO, CC, and DAH designed the experiments. SC analyzed the data. SC wrote the first draft of the manuscript. SC, EO, and CC contributed to the writing of the manuscript. SC, EO, CC, and DAH agreed with manuscript results and conclusions. SC, EO, and CC jointly developed the structure and arguments for the paper. EO, CC, and DAH made critical revisions and approved the final version. All authors reviewed and approved the final manuscript.

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