

Complementary Alternative Medicine for Children with Autism: A Physician Survey

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Abstract Previous studies suggest over half of children with autism are using complementary alternative medicine (CAM). In this study, physicians responded ($n = 539$, 19% response rate) to a survey regarding CAM use in children with autism. Physicians encouraged multi-vitamins (49%), essential fatty acids (25%), melatonin (25%) and probiotics (19%) and discouraged withholding immunizations (76%), chelation (61%), anti-infectives (57%), delaying immunizations (55%) and secretin (43%). Physicians encouraging CAM were more likely to desire CAM training, inquire about CAM use, be female, be younger, and report greater autism visits, autism education and CAM knowledge. Physicians were more likely to desire CAM training, inquire about CAM and view CAM as a challenge for children with autism compared to children with other neurodevelopmental and chronic/complex conditions.

Keywords Autism · Complementary alternative medicine

Introduction

Primary care physicians typically care for at least ten patients with autism (Dosreis et al. 2006). Surveys estimate that 52–95% of children with autism are being treated with complementary alternative medicine (CAM) therapies

(Harrington et al. 2006; Wong and Smith 2006; Hanson et al. 2007). CAM is used by an estimated 20–40% of healthy children seen in outpatient settings and over 30–70% of children with special health care needs (Kemper et al. 2008). Of the children with autism using CAM therapies, 50–70% are treated with biologically based therapies (Wong and Smith 2006; Hanson et al. 2007). This study sought to examine national primary care physicians' attitudes and practices regarding biological CAM use in children with autism.

Many CAM treatments have not yet been tested in clinical trials and need further research. Small trials, many with methodologic issues, have investigated the potential utility of vitamin supplements as part of autism treatment. For example, despite methodologic weaknesses, trials of B6 and magnesium have resulted in both negative results (Findling et al. 1997) and symptom improvements (Kuriyama et al. 2002; Mousain-Bosc et al. 2006). A study of vitamin C reported decreased stereotyped behavior but has not been replicated (Dolske et al. 1993). Additionally, reported abnormalities in methylation and oxidative stress improved with supplemental folic acid, betaine and B12 in one case series (James et al. 2004). However, the clinical application of such biomarkers is not established. Parents reported that 22–43% of children with autism were being treated with vitamin supplements (Green et al. 2006; Wong and Smith 2006; Hanson et al. 2007) and 1–29% with essential fatty acids (Green et al. 2006; Wong and Smith 2006). Small studies have identified differences in plasma omega-3 fatty acid levels in children with autism, (Vancassel et al. 2001; Sliwinski et al. 2006) although the clinical utility of such levels has not been established. A small study suggested behavioral improvements in perseveration and hyperactivity in children with autism given essential fatty acid supplementation (Amminger et al.

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2007). Melatonin is reportedly used by 11% (Green et al. 2006) of children with autism. Initial studies have shown melatonin to be a safe and effective sleep aid in children with autism (Garstang and Wallis 2006; Giannotti et al. 2006; Andersen et al. 2008). Of parents of children with autism, 21% reported that their children were being given probiotics (Green et al. 2006). Probiotics are often used for symptomatic treatment of the co-morbid gastrointestinal symptoms. Despite widespread use and anecdotal reports, no studies have evaluated probiotics specifically for the treatments of autism symptoms (Weber and Newmark 2007). Of parents, 23–50% report that their children with autism are being treated with modified diets (Green et al. 2006; Wong and Smith 2006; Hanson et al. 2007). Limited by methodological flaws, a single blind study of the gluten-free, casein-free diet suggested some behavior improvements (Knivsberg et al. 2002) while a double-blind study indicated no significant results, although some parents reported improvements (Elder et al. 2006). Approximately 8% of parents of children with autism report the use of antibiotics or other anti-infectives (Green et al. 2006) often intended to alter intestinal flora associated with behavioral improvements. While one study showed short-term improvements with Vancomycin (Sandler et al. 2000), antibiotic and antifungal treatments lack well designed studies to support their use (Levy and Hyman 2008).

Other CAM treatments have important potential risks or have been refuted by evidence. Families of children with autism have reported concerns that immunizations played a role in their child's autism (Harrington et al. 2006; Mercer et al. 2006). Epidemiological studies have failed to confirm a link between immunizations and autism (Institute of Medicine 2004) and delaying or withholding immunizations could increase the risk of vaccine-preventable diseases. In other surveys, 7% of parents reported using chelation for their children with autism (Green et al. 2006). The role of heavy metals in the etiology of autism is not supported by current epidemiologic data but there remains some controversy regarding the possibility of small subgroups of the population at genetic risk for neurotoxicity mediated by the presence of mercury or other toxins (Kern and Jones 2006). Physicians familiar with the use of chelating agents for lead poisoning are aware that, without proper monitoring, chelation may lead to serious side effects including death (Brown et al. 2006). Only 0–9% of parents reported using secretin for children with autism (Green et al. 2006; Wong and Smith 2006; Hanson et al. 2007). Reviews of over 15 randomized controlled trials conclude that secretin is not effective for the treatment of autism symptoms (Williams et al. 2005; Sturme 2005 #111).

Providing comprehensive care for children with autism who are being treated with CAM may be challenging for

the physician. Physicians caring for children rarely discuss complementary alternative medicine (CAM) therapies with patients and their families (Kemper and O'Connor 2004; Wong and Smith 2006; Sawni and Thomas 2007) and often report a desire for improved CAM knowledge (Cuzzolin et al. 2003; Kemper and O'Connor 2004). CAM use for children with autism may be challenging due to a lack of: clinical trials demonstrating efficacy, safety information, physician education and clinical infrastructure. The clinical use of CAM requires critical evaluation of the available evidence and potential risks for the child or family (Cohen and Eisenberg 2002). In some cases, physicians may feel that a CAM treatment is not in the best interest of the child (American Academy of Pediatrics 2001) or have concerns about potential side effects (Kemper and O'Connor 2004). To provide a medical home for children, physicians have been encouraged to critically and cautiously evaluate CAM and respectfully collaborate with families in the care of their patients (American Academy of Pediatrics 2001; Myers and Johnson 2007). Yet, caring for children who are being treated with CAM therapies that the practitioner does not recommend may present systemic challenges.

Parents of children with autism also reported challenges with CAM. Parents of children with autism rated their primary physician's knowledge of CAM as lower compared to parents of children with physical disabilities and mental retardation (Liptak et al. 2006). Parents of children with autism reported often believing CAM would improve their child's health and well-being (Liptak et al. 2006; Wong and Smith 2006; Hanson et al. 2007) and 50–76% described biologically based therapies as "helpful" for their child (Wong and Smith 2006; Hanson et al. 2007). Despite such parental endorsement, clinical evidence for CAM therapies is often lacking.

Physician opinions and practices regarding CAM therapies for autism have not been studied and could inform physician education needs and identify supports a primary care provider interested in provision of CAM services might require. Primary care physicians are the first point of contact in the medical home and they frequently care for children with autism. Because of the high rate of CAM use among children with autism, we hypothesized that physicians would be more likely to ask about CAM use and desire more CAM training when caring for children with autism compared to our two comparison groups: children with other neurodevelopmental conditions and chronic/complex medical conditions. Because of the lack of evidence regarding many forms of CAM and because parents of children with autism rated physician CAM knowledge as low, we hypothesized that physicians may perceive CAM as a challenge or "barrier to care" for children with autism.

Methods

Study Sample

We drew a national random sample of 15,000 physicians from the American Medical Association (AMA) Masterfile, the most comprehensive physician listing of all licensed physicians in the United States, including both AMA members and nonmembers. The sample included allopathic and osteopathic physicians in office-based, direct patient care whose board certification and self-described primary specialty was pediatrics or family medicine. We excluded physicians with a sub-board or secondary specialty, and those who were greater than 70 years of age, resident physicians, or practicing at military or federal facilities. From the original sample of 15,000 physicians, the survey was sent to a random sample of 3,100 physicians (75% pediatricians and 25% family medicine physicians). Approximately three-fourths of office visits by patients less than age 18 are with pediatricians and approximately one-fourth are with family physicians (Care 2004). Medical Marketing Service, Inc., a contracted vendor, obtained the email and mailing addresses of participants through publisher/association data that is updated monthly. The University of Minnesota Institutional Review Board approved the study.

Survey Instrument and Administration

A group of clinical experts developed a survey instrument consisting of 35 items regarding: demographics (10), medical recommendations for specific CAM recommendations (12), desire for autism training (2), CAM knowledge (1), whether physicians inquire as to patient CAM use (1) and barriers to care (9). The CAM treatment list was developed using previous literature (Levy et al. 2003; Harrington et al. 2006; Wong and Smith 2006) and consensus from clinicians. The instrument consisted of multiple-choice questions and Likert scales of agreement. Response categories ranged from one, representing “poor, never, or strongly disagree,” to seven, representing “excellent, always, or strongly agree,” depending on the item. Physicians identified “barriers that I experience when caring for children with autism in my practice” from a list of potential barriers. Autism included all Autism Spectrum Disorders such as PDD-NOS and Asperger Syndrome. Comparison groups of children with chronic/complex medical conditions and neurodevelopmental conditions were chosen because physicians have expressed challenges with education and providing care for these groups (Sneed et al. 2000; American Academy of Pediatrics 2005; Grant et al. 2007). Examples of chronic/complex medical conditions given were congenital heart disease, chronic

asthma, early cystic fibrosis, and diabetes. Examples of neurodevelopmental conditions given were hypoxic ischemic encephalopathy, cerebral palsy, mental retardation, and ADHD. The instrument was pilot-tested on a convenience sample of 15 pediatricians and family medicine physicians and revised to ensure clarity and ease of administration. The survey took approximately 10 min to complete. The survey is available upon request to the author. The survey was sent via email three separate times each a month apart (April, May and June 2007). The chance to win a \$200 Amazon gift certificate was provided as an incentive. These emails were followed by a mailed survey sent once in October, 2007. The emails and mailing were accompanied by a letter explaining the purpose of the study and contact information for the first author.

Data Analysis

Demographic variables were compared for respondents and non-respondents with the chi-square statistic for proportions and Student's *t*-tests for means. Frequencies of CAM recommendations for patients with autism were calculated. Physicians were divided into two groups: those who encouraged at least one CAM therapy and those who did not encourage any CAM therapies (CAM was defined as all therapies in Table 2). Characteristics were compared between those who did and did not encourage CAM with the chi-square statistic for proportions and Student's *t*-test for means. Mean scores (1–7) were calculated for Likert items regarding physician desire for additional training and inquiring about CAM use and *t*-tests were used to compare mean scores between all three conditions. Frequencies of reported barriers to care were calculated and McNemar's test was used to compare frequencies between autism and the comparison groups. All analyses were conducted using SAS version 9.1 (SAS Inc., Cary, NC).

Results

Demographics

Responses totaled 539 (346 email and 193 mailing) from 2,801 eligible physicians (accounting for undeliverable mail and email) yielding a 19% response rate. Ninety percent of respondents were pediatricians. Respondents were more likely to be pediatricians rather than family physicians, have an MD degree rather than a DO degree, be older, and have more years from residency training than non-respondents, as seen in Table 1. Respondents and non-respondents did not differ significantly on gender. Study respondents reported an average of 37 visits with patients with autism per year, 98 with neurodevelopmental

Table 1 Demographic characteristics of physician respondents and non-respondents

Demographic characteristics	Respondents (<i>n</i> = 539)	Non-respondents (<i>n</i> = 2,461)	<i>p</i>
Pediatrician, <i>n</i> (%), (SD) (versus family physician)	449 (89.8, 1.3)	1,796 (72.5, 0.9)	<0.001
Medical doctor, <i>n</i> (%), (SD) (versus doctor of osteopathic medicine)	468 (93.4, 1.1)	2,215 (90.4, 0.6)	0.037
Male, <i>n</i> (%), (SD)	237 (50.3, 2.2)	1,255 (50.7, 1.0)	0.865
Age, years, mean (SD)	47 (8.9)	45 (18.9)	<0.001
Years post residency, mean (SD)	15 (8.8)	13 (9.1)	<0.001

conditions, and 145 with chronic/complex conditions. Overall, 167 (13%) reported having a close friend or relative with autism. Respondents indicated that they had obtained specific autism training in the following settings: medical school (37%, *n* = 199), residency (57%, *n* = 309) and continuing medical education (70%, *n* = 377).

CAM Recommendations

Over half of responding physicians encouraged and over half of physicians discouraged at least one form of CAM. As shown in Table 2, CAM modalities most frequently encouraged by physicians were: multi-vitamins (49%), essential fatty acids (25%), melatonin (25%), and probiotics (19%). CAM treatments most commonly “accepted if families were already using them” were: gluten-free, casein-free diet (66%), elimination of sugar, preservatives and additives (63%), probiotics (59%), and essential fatty acids (57%). The most commonly discouraged CAM therapies were: delaying immunizations (may include withholding) (76%), chelation (61%), anti-infectives (57%), delaying immunizations while still completing them all (55%) and secretin (43%). Physicians reported that they were not knowledgeable enough to make recommendations

about secretin (39%), vitamin B12 (33%), chelation (26%) and melatonin (22%).

Characteristics of Physicians Encouraging CAM

As seen in Table 3, physicians who encouraged at least one form of CAM (59%) were more likely to desire further CAM training, inquire about patient CAM use, report greater CAM knowledge, report receiving previous autism education in medical school, residency and continuing medical education, be female, report a greater number of autism patient visits and be younger compared to those who did not encourage any CAM. Physicians encouraging and not encouraging CAM did not differ on the following characteristics: having a friend or relative with autism, degree, specialty and number of years beyond residency.

Desire for Training and Asking Patients About CAM

Physicians, in Table 4, reported a significantly greater desire for both CAM and primary care training for children with autism compared to those with neurodevelopmental conditions and chronic/complex conditions. Physicians

Table 2 Physician medical recommendations regarding specific CAM treatments for patients with autism

CAM treatment	Physicians discouraging (<i>n</i> = 539)	Physicians accepting if family already using (<i>n</i> = 539)	Physicians encouraging (<i>n</i> = 539)	Physicians not knowledgeable enough to make recommendation (<i>n</i> = 539)
Multi-vitamins (%)	5	41	49	5
Essential fatty acids (%)	5	57	25	12
Melatonin (%)	14	39	25	22
Probiotics (%)	6	59	19	16
Eliminate sugar or preservatives (%)	15	63	12	10
Anti-infectives (%)	57	20	7	16
Gluten-free, casein-free diet (%)	13	66	6	15
Methylcobalamin B12 (%)	13	51	3	33
Delay vaccines (still complete) (%)	55	39	3	3
Alter vaccines (may withhold) (%)	67	28	2	3
Chelation (%)	61	12	0	26
Secretin (%)	43	18	0	39

Table 3 Characteristics of physicians encouraging and not encouraging CAM for patients with autism

Characteristic	Physicians not encouraging any form of CAM	Physicians encouraging ≥ 1 form of CAM	<i>p</i> value
Total, <i>n</i> (%)	221 (41.1)	317 (58.9)	–
Do you desire more complementary alternative medicine training for patients with autism? 1 = not at all, 7 = very much, mean (SD)	4.48 (1.96)	5.18 (1.70)	<.001
I ask pediatric patients and their families if they are using complementary and alternative medicine therapies, even when they don't bring it up: 1 = never, 7 = always, mean (SD)	3.31 (1.69)	3.78 (1.52)	.002
My knowledge of and access to information about complementary alternative medicine for pediatric patients is: 1 = poor, 7 = excellent, mean (SD)	3.27 (1.53)	3.62 (1.49)	.015
Received medical school autism training			
Yes (%)	34.2	65.8	.012
No (%)	45.1	54.9	
Received residency autism training			
Yes (%)	33.1	66.9	<.001
No (%)	51.7	48.3	
Received continuing medical education autism training			
Yes (%)	33.0	67.0	<.001
No (%)	59.9	40.1	
Friend or relative with autism			
Yes (%)	31.9	68.1	.444
No (%)	35.4	64.6	
Female (%)	27.8	72.2	.002
Male (%)	41.3	58.7	
Medical doctor (%)	35.2	64.8	.275
Doctor of osteopathy (%)	25.8	74.2	
Pediatrician (%)	33.3	66.7	.099
Family practice physician (%)	45.6	54.4	
Autism patient visits per year, mean visits (SD)	25.56 (30.91)	40.26 (56.51)	<.001
Age, mean years (SD)	47.44 (9.53)	45.50 (9.26)	.034
Years beyond residency, mean years (SD)	15.36 (10.12)	14.89 (9.25)	.624

Complementary alternative medicine (CAM)

Table 4 Physicians' mean responses to items regarding primary care for patients with autism, neurodevelopmental, and chronic/complex conditions

Item	Autism (reference group) (n = 539)	Neurodevelopmental conditions (n = 539)	Chronic and complex conditions (n = 539)
Do you desire more primary care training for these pediatric patients? mean (SD)	5.82 (1.34)	5.60 (1.41)*	5.47 (1.49)*
Do you desire more complementary alternative medicine training for these patients? mean (SD)	4.94 (1.82)	4.84 (1.81)*	4.81 (1.81)*
Do you ask about complementary alternative medicine use? mean (SD)	3.61 (1.59)	3.32 (1.55)*	3.25 (1.54)*

* *p* < 0.001 compared to autism reference group

All items on a 1–7 scale: 1 = never, 7 = always

were significantly more likely to ask families of children with autism whether they were using CAM compared to families of children in the comparison groups. When asked

about general CAM knowledge for all pediatric patients, the mean rating was 3.56 (SD 1.47) on a scale from 1 (poor) to 7 (excellent).

Table 5 Physician reported barriers to providing primary care for patients with autism, neurodevelopmental, and chronic/complex conditions

Barrier	Reporting barrier for autism (reference group) (<i>n</i> = 539)	Reporting barrier for neurodevelopmental (<i>n</i> = 539)	Reporting barrier for chronic and complex (<i>n</i> = 539)
Family is skeptical of traditional medicine (%)	43	23*	25*
Family is skeptical of immunizations (%)	66	22*	12*
Patient's frequent use of complementary alternative medicine (%)	48	19*	10*

* $p < 0.001$ compared to autism reference group

Barriers to Care

As seen in Table 5, physicians were more likely to encounter the following barriers to care when caring for patients with autism compared to patients with neurodevelopmental conditions and chronic/complex conditions: CAM use and skepticism regarding traditional medicine and immunizations.

Discussion

While previous parent surveys indicate that a majority of children with autism are being treated with CAM, this is the first study to explore primary care physician CAM recommendations, attitudes and practices for children with autism. While our results cannot imply that physicians are endorsing a wider CAM agenda, they do suggest that a subset of physicians are addressing CAM for children with autism. These physicians are discussing CAM and incorporating some forms of biological CAM into their care of children with autism while, also, discouraging other forms of CAM. Physicians encouraging at least one form of CAM in our survey reported greater overall attention to CAM; they were more likely to ask their patients about CAM use, report greater CAM knowledge and a greater desire for further CAM education. They also reported increased dealings with autism: more autism patients and previous autism education. Females and those who were younger were more likely to encourage CAM, similar to other studies where female and younger physicians more frequently studied, used and prescribed CAM (Easthope et al. 2000; Graham-Pole 2001; Kurtz et al. 2003).

Primary care providers reported integrating some CAM modalities that may be supported by emerging evidence but need further research. Almost all of primary care providers in this survey reported encouraging or accepting the use of multivitamins for children with autism. Studies of vitamins in autism are lacking. The side effects of vitamins vary and the questionnaire did not distinguish between vitamin type (except vitamin B12) or dosage. A quarter of physicians in this survey recommended essential fatty acids and

melatonin and many accepted their use. Small studies suggest that essential fatty acids may be effective for particular autism symptoms and melatonin may be useful for sleep issues, but larger clinical trials are needed. Nineteen percent of physicians in this study recommended probiotics while over half accepted their use. Studies have not evaluated probiotics for autism symptoms, however, this survey did not determine whether probiotics were used to treat autism or co-morbid gastrointestinal symptoms. A small number of physicians in our study encouraged modified diets, yet over half of physicians accepted modified diets when a family was already using them. Many children with autism are being treated with modified diets (Green et al. 2006; Wong and Smith 2006; Hanson et al. 2007). While clinical trials of modified diets are lacking, studies have found no nutritional differences in children consuming a gluten and casein free diet (Cornish 2002). Apart from the physician's recommendation, physicians must ensure that children using gluten and casein free diets obtain adequate protein, calcium and vitamin D (Levy and Hyman 2008).

The subset of physicians responding to our survey also reported actively discouraging some forms of CAM for children with autism. The majority of physicians in the survey discouraged withholding or delaying immunizations, which could increase the risk for vaccine-preventable diseases. The majority discouraged chelation which carries potential serious side effects (Brown et al. 2006). Many physicians also discouraged secretin which has been found to be ineffective for the treatment of autism symptoms.

It is important to note that ~10–40% of physicians "accepted" a family's use of CAM modalities that carry potential risks or are refuted by evidence: altering or delaying vaccines, chelation or secretin. Additionally, over a quarter reported lacking the knowledge to comment on chelation or secretin. Further research is needed to explore specific CAM knowledge and the responses and complex roles of physicians working with children whose treatments are directed by their parents or healers outside of the physician's established collaborators.

CAM use and family skepticism about traditional medicine and immunizations were viewed as "barriers to care" for children with autism. Physicians must attend to

the medicolegal and ethical concerns specific to CAM use (Kemper et al. 2008). In a previous study of pediatricians, 75% reported concerns about the potential side effects of CAM (Kemper and O'Connor 2004). Furthermore, system changes and novel reimbursement models may be necessary before CAM can be effectively integrated into the primary care setting (Goldman 2008). Tension may arise when parents treat their children with CAM therapies discouraged by a physician. Family skepticism may originate from a history of divergent views between conventional practice and family observations regarding CAM for children with autism (Silverman and Brosco 2007). The time, understanding of the issues and patience necessary to address such family concerns may be challenging for the busy primary physician. An American Academy of Pediatrics 2001 technical report encourages pediatricians to provide family-centered care while always fulfilling their ethical responsibility to put the welfare of the child first (American Academy of Pediatrics 2001).

In light the high prevalence rate of CAM use in autism (52–95%) (Harrington et al. 2006; Wong and Smith 2006; Hanson et al. 2007), all physicians should inquire about CAM use regardless of whether the family brings it up. No previous studies have asked physicians how often they inquire about CAM use specifically for children with autism. It is encouraging that physicians in our survey were most likely to ask about CAM use in children with autism. Although 56% of parents of children with autism in a previous survey wanted to consult their physician for advice regarding CAM, parents reported many reasons that kept them from disclosing CAM use: physician would not approve, physician's limited CAM knowledge, physician did not ask the patient about CAM and feeling it was "not necessary" (Wong and Smith 2006). Previous studies have shown that, while 96% of surveyed pediatricians believed their general pediatric patients were using CAM, only 20–37% asked their patients about CAM (Kemper and O'Connor 2004; Sawni and Thomas 2007). Furthermore, although primary care physicians are often the first-point-of-contact, they reported being less likely to ask their patients about CAM compared to specialists (Fountain-Polley et al. 2007).

In addition to asking patients about CAM use, physicians can address CAM use through education. Physicians responding to our survey desired further CAM education specifically for children with autism. Over a quarter of physicians reported that they were not knowledgeable enough to make recommendations regarding vitamin B12, chelation and secretin. This is important as chelation carries risks and secretin has clear evidence refuting its usefulness. Parents of children with autism in previous studies rated their physicians' knowledge of CAM as worse compared to parents of children with physical disabilities

and mental retardation (Liptak et al. 2006). Furthermore, parents of children with autism reported that recommendations for CAM use were more likely to come from family and friends (35%) than health professionals (23%) (Wong and Smith 2006). While our survey results are specific to autism, they are similar to a national survey of pediatricians where only 5% of physicians felt very knowledgeable" about CAM and more than 80% desired further CAM education for all pediatric patients (Kemper and O'Connor 2004). It is noteworthy that physicians who reported encouraging CAM were also more likely to report previous autism training and greater CAM knowledge. Further study is needed to determine which types of education correlate to various specific CAM recommendations. Recent significant growth in academic pediatric integrative medicine programs and new initiatives to systematically distribute CAM information (Kemper et al. 2008) will likely influence CAM education. Ideally, physicians with high-quality CAM knowledge can assist families in understanding both the potential risks and benefits of CAM treatments (American Academy of Pediatrics 2001).

Addressing CAM is a vital component of providing coordinated and comprehensive medical home care for children with autism. In national surveys, children with autism were less likely to report medical home care compared to children with other special health care needs (Brachlow et al. 2007; Kogan et al. 2008). However, children with autism who had medical homes reported improved access to care and fewer unmet needs, family financial issues and time burdens (Kogan et al. 2008). As physicians increase their knowledge base around CAM, ask their patients about CAM, and as we further explore the current barriers around managing CAM in general medical practices, primary care for children with autism will become more comprehensive, coordinated and family-centered.

It is important to note limitations in this study. The survey response-rate was low, but comparable to some other recently published physician surveys ranging from 19.5 to 28.4% (Koshnick et al. 2007; Overland et al. 2008; Wilson et al. 2008). In a recent study, traditional random samples using the American Medical Association (AMA) Physician Masterfile yielded response rates of 29–43% (Crane et al. 2008). Financial incentives and endorsements increase physician survey response rates (VanGeest et al. 2007). This study did not include individual financial incentives, but rather offered a chance to win one larger financial incentive. The cover letter for our survey documented University affiliation, but was not endorsed by another organized medical group. Additionally, mailed physician surveys yield higher response rates compared to web-based approaches (VanGeest et al. 2007). Our study used a combination of these two approaches. Despite

studies showing that the differences between physician respondents and non-respondents are typically smaller than anticipated (VanGeest et al. 2007), responder bias is a potential study limitation. Physicians interested in autism and/or CAM may have been more likely to respond. However, the mean rating of general CAM knowledge was 3.56 on a 1–7 scale, suggesting that, overall, the subset of respondents perceived their CAM knowledge as “average.” Our analysis combined very different CAM modalities. While our study lacked sufficient power to compare subgroups of CAM use, further studies should explore sub-groups of CAM treatments (for example, “benign” and “potentially dangerous”). The study’s small sample size did not provide the statistical power to subdivide the CAM treatments or to conduct multivariate adjusted analyses. This study’s results provide initial data from a limited subset of responders that necessitates replication and further exploration.

Conclusion

In summary, this study describes the attitudes and practices of primary care physicians regarding the use of CAM for children with autism. In addition to the clear need for further research examining the safety and efficacy of CAM therapies, physicians need access to balanced education that will inform their own recommendations for specific CAM therapies and adequate information to care for families who elect their use. The development of a standard of care, informed by evidence, for children with autism should include evaluation of CAM therapies. One half to three quarters of families of children with autism pursue CAM interventions, so physicians must ask about their use in the context of routine primary care. These results indicate that primary care providers are more likely to ask families of children with autism about CAM use compared to families of children with other chronic conditions. This survey suggests that primary care providers who responded to the survey are integrating some CAM interventions into their practices. With increased interest in CAM on the part of the consumer and the provider, asking all patients about CAM, an infrastructure to monitor CAM use and the development of CAM education are important goals.

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