

Homeopathy Use in the United States and Implications for Public Health: A Review

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Abstract

Homeopathy is used by just over 2% of the U.S. population, predominantly for respiratory, otorhinolaryngology, and musculoskeletal complaints. Individual users who see a homeopathic provider for care are more likely to perceive the therapy as helpful than those who do not; however, only 19% of users in the United States see a provider. The rest presumably rely upon over-the-counter products. Recent clinical trials highlight several areas in which homeopathy may play a role in improving public health, including infectious diseases, pain management, mental health, and cancer care. This review examines recent studies in these fields, studies assessing costs associated with homeopathic care, safety, and regulations in the United States. Data suggest the potential for public health benefit from homeopathy, especially for conditions such as upper respiratory infections and fibromyalgia.

Keywords

- ▶ homeopathy
- ▶ public health
- ▶ review
- ▶ respiratory tract infections
- ▶ fibromyalgia

Homeopathy Use in the United States

Similar to other developed countries, data on the use of homeopathy in the United States come from large, population-based surveys regarding the use of complementary and integrative therapies. In the United States, the Centers for Disease Control (CDC) and National Center for Health Statistics (NCHS) conduct an annual survey known as the National Health Interview Survey (NHIS) of the civilian, non-institutionalized population. This rigorous, in-person survey conducted by trained interviewers uses a complex sampling design to achieve population representation. Survey questions vary from year to year, include a variety of different health issues, and the data are used to help inform health policy. Every 5 years since 2002, this survey has included questions regarding Americans' use of complementary and integrative therapies. The most recently published data come from the 2012 survey and estimate that 2.2% of U.S. adults and 1.8% of children used homeopathy within the past year.^{1,2} Data on the use of homeopathy by adults and children in other developed coun-

tries have been reviewed with estimates ranging from approximately 2% (adults in the UK) to 27% (children in Germany).^{3,4}

Recently, we analyzed data from the 2012 NHIS survey of adults to better understand patterns and use of homeopathy in the United States.⁵ We found that U.S. adults who used homeopathy had demographic characteristics similar to other users of complementary and integrative medicine (CIM), but were even more likely than such users to be white, female, from 30 to 44 years of age, living in the western part of the United States, be married, have at least a high school education, and have a lower body mass index. Homeopathy users were more likely to use more CIM therapies than other CIM users who didn't use homeopathy and also used more of every kind of CIM therapy surveyed except for chiropractic and osteopathic manipulation. Of note, only 19% of homeopathy users surveyed had seen a practitioner for homeopathy. Thus, the majority of individuals using homeopathy in America are self-prescribing medicines available over-the-counter (OTC) with little or no professional guidance. This use likely reflects both individual and combination homeopathic medicines that are

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widely available for self-limited conditions (e.g., common cold, allergic rhinitis, muscle and joint pain). Among those who used homeopathy to address a health condition, the most common conditions targeted were respiratory and ear, nose, and throat complaints (18.5%); musculoskeletal complaints (12.3%); fatigue, sleep, stress, or chronic pain (7.7%); gastrointestinal conditions (5.0%); and neurologic conditions (3.4%). Notably, many of these diagnostic categories overlap with the top conditions for which U.S. physicians prescribe homeopathy to patients seeking homeopathic care (► **Table 1**).⁶

Among those using homeopathy to address a health condition, we also analyzed perceived helpfulness. Patient-reported outcomes (PROs) are increasingly being used to measure treatment effectiveness.⁷ Though not classical PROs, the NHIS survey collects data on perceived helpfulness of CIM therapies. We found that individuals who used homeopathy without seeing a practitioner were more likely to believe that it helped their health condition a great deal and that it was very important in maintaining health and well-being, than individuals who used dietary supplements but not homeopathy.⁵ Moreover, individuals who saw a practitioner for homeopathic treatment were even more likely than those who did not see a practitioner to believe that it was helpful. Although there are many possible reasons for these findings (e.g., selection bias, therapeutic effect of the clinical relationship,⁸ real benefit of the medicines used, and increased effectiveness of individualized homeopathic prescriptions), the differences in perceived effectiveness between these three groups of users are nonetheless striking and warrants further study.

Placing these data in the context of recent studies of homeopathy and current health care policy in the United States, it is worth asking what role, if any, homeopathy may play in public health, both in the United States and the world at large. The remainder of this review, though neither an attempt to be exhaustive nor systematic, highlights studies in four distinct areas relevant to public health that suggest further exploration: infectious diseases, pain conditions, mental health conditions, and cancer. Finally, it concludes discussing issues around health care costs, safety, and some current challenges to the field.

Homeopathy and Infectious Diseases

A 2011 health technology assessment from Switzerland concluded, based on evidence from studies evaluating homeopathy in the context of upper respiratory tract infections (URTIs) and allergic rhinitis, that in terms of “real-world effectiveness,” homeopathy falls within the category of “effectiveness likely.”⁹ Since that time, several additional studies using homeopathic medicines to treat URTIs have been published. Though perhaps more nuisance than serious threat, URTIs account for 25 million visits to family physicians and 20 to 22 million days of absence from work and school in the United States each year.¹⁰ Thus, URTIs pose a significant cost to society. Approximately 28% of all annual OTC medication expenditures in the United States are for cold and flu treatments.¹¹ In addition, 55% of antibiotics prescribed in the United States in 1998 were for infections unlikely to have a bacterial etiology.¹² More recent data suggest this trend has not improved significantly.¹³ Antibiotic overprescribing and inappropriate prescribing is a serious issue, contributing to the development of antibiotic-resistant organisms, reduced clinical effectiveness, disruption of the gastrointestinal microbiome, and sometimes serious drug-related side effects.^{14–16} The American Institute of Homeopathy recently published an open letter calling for greater use of homeopathy to help reduce overuse and misuse of antibiotics.¹⁷

A recent observational study from France supports this possibility. The EPI3 cohort study analyzed 518 adults who presented to primary care for treatment of rhinopharyngitis symptoms.¹⁸ The analysis was divided into those individuals who saw conventional general practitioners (GPs), those who saw GPs who used a combination of conventional medicine and homeopathy, and those who saw GPs who were certified in homeopathy. Although the patient populations who saw these three types of physicians were different (those seeing homeopathic GPs were more likely to be females, had completed high school, and were non-smokers), after multivariable analysis adjusting for a variety of demographic factors, those who saw a homeopathic GP were significantly less likely to use an antibiotic or antipyretic with similar symptom resolution at 1-month follow-up. However, the authors also

Table 1 Most frequent conditions for which homeopathy is used in the United States by the general population and prescribed by physicians

General population, Dossett et al ⁵		Prescribing physicians, Jacobs et al ⁶	
Conditions	%	Conditions	%
Respiratory or ear/nose/throat	18.5	Asthma, otitis media, allergic rhinitis	11.8
Musculoskeletal	12.3	Arthritis	2.50
Fatigue, sleep problem, stress, or chronic pain	7.70		
Gastrointestinal	5.00		
Neurologic	3.40	Headache/migraine	3.20
Mental health	2.10	Depression and neurotic disorders	6.40
		Allergy (nonspecific)	2.80
		Dermatitis, eczema	2.60
		Hypertension	2.40

noted a nonsignificant trend for an increase in infections in this group, a finding which needs to be further explored.

A randomized controlled trial from the United States of a commercial homeopathic ear drop preparation also suggests that homeopathic medicines can reduce antibiotic use.¹⁹ In that study, 210 children aged 6 months to 11 years with acute otitis media in whom delayed antibiotic therapy was deemed appropriate were randomized to receive standard therapy or standard therapy plus the homeopathic ear drops. Those receiving the ear drops were less likely to fill the antibiotic prescription compared with standard therapy alone (26.9% vs. 41.2%, $p = 0.032$).

Several randomized controlled trials have examined different combination homeopathic products for URTIs. One multi-center study conducted in Germany and the Ukraine examined a combination of *Aconitum* D3, *Bryonia* D2, *Eupatorium perfoliatum* D1, *Gelsemium* D3, *Ipecacuana* D3, and *Phosphorus* D5 in 523 adults and children with acute URTIs.²⁰ Both the homeopathic group and the control group were permitted to use standard treatment, which consisted of on-demand paracetamol, ambroxol, and/or oxymetazoline. Their primary outcomes showed a significant increase in the percent of individuals who were fever free at day 4 (76.8% in the homeopathic group compared with 56.7% in the standard treatment group, $p < 0.001$) and in the percent of subjects with very mild or no symptoms by day 4 (17% in the homeopathic group compared with 7.5% in the standard treatment group, $p = 0.0012$). The average time to symptom alleviation was 6.6 days in the homeopathic group compared with 8.5 days in the standard treatment group. Compared with the homeopathic treatment group, the standard treatment group had increased symptom severity, increased use of standard on-demand therapies, slower resolution of fever, and slower resolution of nasal breathing impairment. A sub-analysis of pediatric subjects yielded similar findings.²¹

A randomized controlled study of a different combination OTC product in the United States compared a syrup containing *Allium cepa* 6 \times , *Hepar sulph* 12 \times , *Natrum muriaticum* 6 \times , *Phosphorus* 12 \times , *Pulsatilla* 6 \times , *Sulfur* 12 \times , and *Hydrastis* 6 \times to a placebo control syrup in children from 2 to 5 years.²² A total of 261 children were randomized and treated for 3 days. Although there was no difference in symptom diaries immediately after taking the product, the investigators did find significant improvement in a composite cold score at 12 and 24 hours in the homeopathy group compared with the placebo group; however, thereafter, improvements were similar in both the groups. Notably, the homeopathy group had a worse cough during 5 to 10 days of follow-up, which the authors speculated may have been rebound symptoms after stopping therapy.

A RCT from Brazil compared two different homeopathic preparations (a live influenza nosode 30dH or a complex of *Streptococcus*, *Staphylococcus*, and inactivated influenza virus, all 30dH) versus placebo in 600 children followed in the public health system in a mountainous region of the country.²³ Children were treated with the compounds twice daily for 30 days and then followed monthly over the course of a year by health agents. Approximately one-quarter of children were lost to follow-up across the board due to

changes in residency or acquisition of private insurance. Approximately two-thirds of children in all three groups remained healthy throughout the entire year. However, those children in the placebo group who became sick tended to have more total infections than the children treated with homeopathy. Of the children treated with homeopathy, they tended to get sick a month after treatment, whereas children treated with placebo were more likely to get sick 3 months after treatment and to have more infections overall.

A study from Spain compared a combination of *Agraphis nutans* 5CH and *Thuya occidentalis* 5CH daily plus *Kalium muriaticum* 9CH and *Arsenicum iodatum* 9CH twice daily to placebo in 97 children with otitis media with effusion for 3 months.²⁴ Children in both groups received aerosolized ambroxol and budesonide in saline for the first 20 days. There was no significant difference in the percent of patients cured by 90 days in the two groups (61.9% in the homeopathy group versus 56.6% in the placebo group, $p = 0.63$). However, the adverse event analysis was notable for only 3 URTIs in the homeopathy group versus 13 in the placebo group ($p = 0.009$).

Finally, an earlier review of homeopathic medicines for children with acute otitis media or URTIs found evidence that homeopathic treatment resulted in (1) faster resolution of symptoms than with conventional treatment (including antibiotics), (2) lower fill rates of watchful waiting antibiotic prescriptions, (3) fewer or less serious side effects, and (4) less parental sick time leave from work.²⁵

While URTIs and otitis media are the most frequently studied infectious conditions in the modern homeopathic research literature, reports from the nineteenth and early twentieth centuries suggest that homeopathy may have a role in treating and preventing more serious infections as well.²⁶ Dr André Saine reviewed this literature for case reports of mortality rates in pneumonia and has found that the mortality rate under homeopathic treatment was 3.4% compared with 24.4% with conventional treatment in the pre-antibiotic era and 13.7% in the modern era for community-acquired pneumonia.²⁷ Frass and colleagues have successfully used homeopathy combined with conventional medical care to treat sepsis in the ICU and found a significant improvement in survival at 180 days.²⁸ Work by Bracho and colleagues strongly suggests control of a leptospirosis outbreak in Cuba using a homeopathically prepared leptospirosis nosode.^{29,30}

Homeopathy for Pain

According to the National Institutes of Health (NIH), pain affects more Americans than diabetes, heart disease, and cancer combined.³¹ It is the most common reason Americans access the health care system and it is the leading cause of disability and a major contributor to health care costs. Pain manifests in a variety of different conditions and can be acute or chronic. Co-occurrence of depression or other mental health conditions can exacerbate pain and make it more difficult to treat. Several recent studies have examined the use of homeopathy to treat painful conditions.

The most studied chronic pain condition in the modern homeopathic research literature is fibromyalgia, a condition

characterized by multiple tender points on exam, fatigue, sleep difficulties, and cognitive complaints. A recent meta-analysis examined controlled clinical trials ($n = 5$ studies; total $N = 183$ subjects) of homeopathy to treat fibromyalgia and found significant improvements in tender point count, pain intensity, and fatigue compared with placebo.³² No improvement was seen in scores on the McGill pain scale or depression (only two trials for each).

Teixeira and colleagues in Brazil studied the effect of ascending potencies of homeopathically prepared estrogen on endometriosis-associated pelvic pain in 50 women with deeply infiltrating lesions on imaging and who had been refractory to conventional therapy for at least a year.³³ Women received potentized 17- β -estradiol or placebo, three drops twice daily for 24 weeks. In the homeopathy group, a12CH potency was given during the first 8 weeks, then 18CH was given for the next 8 weeks, and finally 24 CH was given for the last 8 weeks. Potentized estrogen was significantly more effective than placebo for reducing endometriosis-associated pelvic pain ($p < 0.001$) as well as depression measured by the Beck Depression Inventory ($p < 0.001$).

Homeopathy has also shown promise for the treatment of pediatric migraine headaches with reduced frequency and severity of headaches and less time off from school.³⁴ An analysis of the EPI3 cohort also demonstrated that homeopathy decreased the use of non-steroidal anti-inflammatory drugs (NSAIDs) and other analgesics, including narcotics, in patients with chronic musculoskeletal disorders.³⁵ Both individualized homeopathy and combination products have shown benefit in reducing chronic low back pain.^{36,37}

Homeopathy and Mental Health

Data from the 2015 National Survey on Drug Use and Health reveal that the prevalence of any mental illness among U.S. adults is 17.9% (excludes developmental and substance use disorders).³⁸ The lifetime prevalence of any mood disorder in the United States is 20.8% and any anxiety disorder is 28.8%. Poorly treated mental health disorders result in large costs to society in terms of lost productivity, worsening of physical health issues, and increased utilization of the health care system.

Observational data from the EPI3 cohort study in France examined outcomes for 710 patients with anxiety or depression and presenting to homeopathic GPs, conventional GPs, or GPs with a mixed practice.³⁹ Compared with the other two groups, patients presenting to homeopathic GPs were less likely to have a Hospital Anxiety and Depression Scale (HADS) score > 12 , a history of suicide attempts, primary insomnia, and were more likely to have fewer co-morbidities and visits to their GP. After adjusting for baseline differences using multivariable modeling, patients seeing homeopathic GPs for treatment of an anxiety or depressive disorder were more likely to have clinical improvement at 1 year (OR: 1.70, 95% CI: 1.00–2.87) and were less likely to be using a psychotropic drug (Odds ratio [OR]: 0.29, 95% confidence interval [CI]: 0.19–0.44) compared with patients seeing a conventional GP. This clinical improvement despite reduction in the use of psychotropic

drugs is notable given the number of side effects and adverse effects associated with these medications.

This same group also analyzed patients presenting for the evaluation of sleep complaints ($n = 346$) and found a similar rate of symptom improvement in all three groups. However, those using homeopathy were less likely to be using psychotropic drugs at 1 year (OR: 0.25, 95% CI: 0.14–0.42) compared with those seeing a conventional GP.⁴⁰

Women in the peri-menopause period are at increased risk of developing depression.⁴¹ A recent study from Mexico compared individualized homeopathy to fluoxetine to placebo in 133 peri- and post-menopausal women with moderate-to-severe depression and who were not currently taking psychiatric medications or engaged in psychotherapy.⁴² After 6 weeks of treatment, individuals in both the homeopathy and fluoxetine groups had a significant decrease in depression compared with the placebo group (homeopathy group, number needed to treat [NNT] = 2, fluoxetine group NNT = 3). However, only individuals in the homeopathy group had an improvement in their menopause symptoms compared with the placebo group ($p = 0.002$).

Homeopathy and Cancer

Approximately 40% of men and women in the United States will be diagnosed with cancer at some point during their lifetime.⁴³ The most common types are breast cancer, lung and bronchus cancer, prostate cancer, colon and rectal cancer, bladder cancer, melanoma, non-Hodgkin's lymphoma, and thyroid cancer. In 2016, an estimated 1.7 million new cases of cancer will be diagnosed and 596,000 people will die in the United States. Total costs of cancer care in the United States were \$125 billion in 2010 and are projected to be \$156 billion by 2020. Recent data suggest that homeopathy may play a role in improving quality of life and symptom management in patients with cancer and possibly improve survival.

Most cases of breast cancer in post-menopausal women are hormone receptor positive and these women are typically prescribed an aromatase inhibitor as part of their adjuvant treatment. However, these medications often cause joint pain, which is a frequent cause for discontinuation of therapy. Karp and colleagues studied the effect of *Ruta graveolens* 5CH and *Rhus toxicodendron* 9CH on joint pain and stiffness in women treated with aromatase inhibitors for breast cancer.⁴⁴ In this observational cohort study conducted at two different centers, women at one center received both homeopathic medicines twice daily, beginning 7 days prior to aromatase inhibitor initiation ($n = 20$), and women at the second center received aromatase inhibitors only ($n = 20$). After 3 months, women in the homeopathy group had significantly fewer sites of joint pain ($p = 0.03$), reduced frequency ($p = 0.0004$), and intensity ($p = 0.0004$) of pain, and lower consumption of analgesics ($p = 0.0076$) compared with the control group.

A pragmatic RCT by Frass and colleagues assessed the effects of individualized homeopathic treatment on global health status and subjective well-being in 373 patients with a variety of different stage 3 and stage 4 tumors.⁴⁵ They found significant improvements in both parameters after 4 months of follow-up

(mean difference between groups = 7.7, $p = 0.005$ and 14.7, $p < 0.001$, respectively). They also noted significant improvements in the group receiving individualized homeopathy compared with the control group in a variety of other domains, including physical, cognitive, and emotional functioning, as well as fatigue, pain, insomnia, and appetite.

Intriguingly, in a retrospective study involving a separate cohort of patients receiving individualized homeopathy as an adjunctive treatment to their cancer care, this group found significantly improved survival compared with control patients with similar diagnoses and who did not receive homeopathic treatment.⁴⁶ Although the authors tried to account for bias in their analysis, more prospective data are needed to confirm these findings.

Homeopathy and Health Care Costs

Of major concern to many governments is the increasing cost of health care and providing care that is equitable and cost-effective. Among its peer nations, the United States performs worst in this regard.⁴⁷ Could expansion of homeopathy within the United States help to stem the rising tide of health care costs? A 2014 review examined economic evaluations of homeopathy and found that of 14 published studies, 8 found health improvements and reduced costs with homeopathy, 4 studies found health improvements at least as good as controls for comparable costs, and 2 studies found health improvement equal to conventional care at higher costs.⁴⁸ Since that time, several additional studies have been published.

The EPI3 study from France analyzed costs for 6,379 patients seeing 804 physicians for a variety of different complaints.⁴⁹ Compared with those seeing a conventional GP, those seeing a homeopathic GP incurred significantly higher costs for the consult, significantly lower costs for prescriptions, and overall a significantly lower cost for medical care.

A retrospective analysis of claims from a private German health insurer compared costs before and after it started covering visits to homeopathic physicians and showed an initial increase in costs in those patients using homeopathy compared with those who were not using it.⁵⁰ Whether these costs represented new use of homeopathic treatment, a shift away from prior out-of-pocket expenses, or some combination of both is unclear. Costs incurred by those using homeopathy gradually decreased over time, eventually approaching costs in those not using it by 1.5 years after initiation of coverage. There were no data on costs after 1.5 years and no data on outcomes. Though costs were increased across multiple categories, the major drivers were calculated lost productivity, outpatient care costs, and treatment of depression.

It is unclear why the results from France and Germany are so different, but a steady-state versus initiation of new system may partially explain the differences. Longitudinal studies that include outcomes will be important to clarify issues around costs.

Safety of Homeopathy

With the recent FDA hearing and alerts about specific products, there has been increased scrutiny regarding the

safety of homeopathic products in the United States. The most comprehensive analysis of safety to date was recently published, examining 41 RCTs including over 6,000 patients.⁵¹ In a meta-analysis, the authors found that homeopathy had no more side effects than placebos (OR: 1.03, 95% CI: 0.89–1.20). A smaller sub-analysis (five studies) also showed no difference compared with usual care. Nonetheless, many trials of homeopathy fail to report on adverse effects and even fewer mention aggravations or proving symptoms.

Regulation of Homeopathy in the United States

Homeopathic medicines are regulated by the U.S. FDA according to the 1938 Food, Drug, and Cosmetic Act and more recent compliance guidelines. These regulations differ both from those governing supplements and those governing conventional pharmaceutical drugs, placing homeopathic medicines in a unique category unto themselves.⁵² With the exception of certain potencies and nosodes, many homeopathic medicines are available for purchase OTC. Licensing and certification to practice homeopathy vary based on state and the provider's qualifications.⁵³ Providers recommending homeopathy differ widely in their backgrounds from those with medical training of varying degrees (e.g., medical doctors, osteopathic doctors, naturopathic doctors, chiropractors, nurses, acupuncturists) to those without a medical background. The proportion of patients in the United States receiving homeopathic care from non-medical practitioners is unknown, as is how this affects perceived effectiveness. Although the total number of homeopathic providers in the United States is unknown, the total number based on available organizational data is likely less than 1,000.

Summary and Future Directions

This review highlights several recent studies published in peer-reviewed journals on the use of homeopathy to target health concerns that have the potential to significantly impact public health and possibly reduce health care costs. In URTIs and fibromyalgia, there is a small but significant evidence base. In other conditions, there is the suggestion of a possible health benefit, but much work still remains to be done. In particular, more independent replications of published positive studies using well-validated measures are needed. Investigators seeking to explore new avenues for research should particularly try to adhere to model validity in homeopathy research, as many published trials in homeopathy do not represent standard treatment approaches used in clinical practice.^{54–57} Moreover, adequately powering studies to account for the likelihood of enhanced placebo effects in homeopathy is also important.⁸ Finally, the RED-HOT reporting guidelines should be more rigorously followed to reduce the potential for bias in reporting.⁵⁸ This also includes better reporting of adverse effects and aggravations. Of course, all of these recommendations presuppose adequate funding for research in this field, a challenge worldwide and particularly difficult in the United States.

What role does homeopathy have in public health in the United States? At present, it represents a very small fraction of health care in terms of both patients and the health care workforce with an overall negligible impact. Nonetheless, if it were made a standard part of the health care offerings in the United States for URTIs and fibromyalgia alone, there is the potential for significant public health benefit in terms of symptom reduction and improvement in quality of life. While there are OTC combination products that target URTI symptoms that the public can access, use of homeopathy to treat fibromyalgia or other chronic health conditions would require an evaluation by trained homeopathic providers. Data suggest this approach may be more effective; however, there is a dearth of such providers in the United States. Data also suggest that use of homeopathy can decrease the use of pharmaceuticals that have known adverse effects. How potential cost savings in terms of reduced costs for lost productivity, medications, and adverse medication effects would be counter-balanced by longer consultation times is unknown. Measuring these costs would be challenging given the complex landscape of health care financing in the United States. Nonetheless, these questions deserve further exploration.

Conflict of Interest

None.

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References

- Clarke TC, Black LI, Stussman BJ, Barnes PM, Nahin RL. Trends in the use of complementary health approaches among adults: United States, 2002–2012. *Natl Health Stat Rep* 2015;1–16
- Black LI, Clarke TC, Barnes PM, Stussman BJ, Nahin RL. Use of complementary health approaches among children aged 4–17 years in the United States: National Health Interview Survey, 2007–2012. *Natl Health Stat Rep* 2015;1–19
- Frass M, Strassl RP, Friehs H, Müllner M, Kundi M, Kaye AD. Use and acceptance of complementary and alternative medicine among the general population and medical personnel: a systematic review. *Ochsner J* 2012;12:45–56
- Italia S, Wolfenstetter SB, Teuner CM. Patterns of complementary and alternative medicine (CAM) use in children: a systematic review. *Eur J Pediatr* 2014;173:1413–1428
- Dossett ML, Davis RB, Kaptchuk TJ, Yeh GY. Homeopathy use by US adults: results of a national survey. *Am J Public Health* 2016;106:743–745
- Jacobs J, Chapman EH, Crothers D. Patient characteristics and practice patterns of physicians using homeopathy. *Arch Fam Med* 1998;7:537–540
- Cella D, Yount S, Rothrock N, et al; PROMIS Cooperative Group. The Patient-Reported Outcomes Measurement Information System (PROMIS): progress of an NIH Roadmap cooperative group during its first two years. *Med Care* 2007;45:S3–S11
- Davidson J, Jonas W. Individualized homeopathy: a consideration of its relationship to psychotherapy. *J Altern Complement Med* 2016;22:594–598
- Bornhöft G, Matthiessen PF, eds. *Homeopathy in Healthcare – Effectiveness, Appropriateness, Safety, Costs*. Berlin, Heidelberg: Springer Berlin Heidelberg; 2011 [cited 2015 Apr 28]. Available at: <http://link.springer.com/10.1007/978-3-642-20638-2>. Accessed May 22, 2015
- Zoorob R, Sidani MA, Fremont RD, Kihlberg C. Antibiotic use in acute upper respiratory tract infections. *Am Fam Physician* 2012;86:817–822
- Klemas N, Dowling R. Clinical economics. Cough, cold & flu. *Med Econ* 2015;92:17–19
- Gonzales R, Malone DC, Maselli JH, Sande MA. Excessive antibiotic use for acute respiratory infections in the United States. *Clin Infect Dis* 2001;33:757–762
- Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010–2011. *JAMA* 2016;315:1864–1873
- Jernberg C, Löfmark S, Edlund C, Jansson JK. Long-term ecological impacts of antibiotic administration on the human intestinal microbiota. *ISME J* 2007;1:56–66
- Esposito S, Canevini MP, Principi N. Complications associated with antibiotic administration: neurological adverse events and interference with antiepileptic drugs. *Int J Antimicrob Agents* 2017;50:1–8
- Stahlmann R, Lode HM. Risks associated with the therapeutic use of fluoroquinolones. *Expert Opin Drug Saf* 2013;12:497–505
- American Institute of Homeopathy - Letter from concerned physicians - antibiotic resistance. Available at: <http://www.homeopathyusa.org/about-aih-2/position-statements-letters-2/letter-regarding-antibiotic-resistance.html> Accessed May 22, 2017
- Grimaldi-Bensouda L, Bégaud B, Rossignol M, et al. Management of upper respiratory tract infections by different medical practices, including homeopathy, and consumption of antibiotics in primary care: the EPI3 cohort study in France 2007–2008. *PLoS One* 2014;9:e89990
- Taylor JA, Jacobs J. Homeopathic ear drops as an adjunct in reducing antibiotic usage in children with acute otitis media. *Glob Pediatr Health* 2014;1;. Doi: 10.1177/2333794×14559395
- Thinesse-Mallwitz M, Maydannik V, Keller T, Klement P. A homeopathic combination preparation in the treatment of feverish upper respiratory tract infections: an international randomized controlled trial. *Forsch Komplement Med* 2015;22:163–170
- van Haselen R, Thinesse-Mallwitz M, Maidannik V, et al. The effectiveness and safety of a homeopathic medicinal product in pediatric upper respiratory tract infections with fever: a randomized controlled trial. *Glob Pediatr Health* 2016;3;. Doi: 10.1177/2333794×16654851
- Jacobs J, Taylor JA. A randomized controlled trial of a homeopathic syrup in the treatment of cold symptoms in young children. *Complement Ther Med* 2016;29:229–234
- Siqueira CM, Homsani F, da Veiga VF, et al. Homeopathic medicines for prevention of influenza and acute respiratory tract infections in children: blind, randomized, placebo-controlled clinical trial. *Homeopathy* 2016;105:71–77
- Pedrero-Escalas MF, Jimenez-Antolin J, Lassaletta L, Diaz-Saez G, Gavilán J. Hospital clinical trial: homeopathy (*Agraphis nutans* 5CH, *Thuya occidentalis* 5CH, *Kalium muriaticum* 9CH and *Arsenicum iodatum* 9CH) as adjuvant, in children with otitis media with effusion. *Int J Pediatr Otorhinolaryngol* 2016;88:217–223
- Bell IR, Boyer NN. Homeopathic medications as clinical alternatives for symptomatic care of acute otitis media and upper respiratory infections in children. *Glob Adv Health Med* 2013;2:32–43
- Dean ME. *The Trials of Homeopathy: Origins, Structure and Development*. Essen: KVC; 2004

- 27 Dr. André Saine debates famous skeptics in U.S. and Canada. Available at: http://homeopathy.ca/debates_2013-03-22Q1ns.shtml Accessed May 22, 2017
- 28 Frass M, Linkesch M, Banyai S, et al. Adjunctive homeopathic treatment in patients with severe sepsis: a randomized, double-blind, placebo-controlled trial in an intensive care unit. *Homeopathy* 2005;94:75–80
- 29 Bracho G, Varela E, Fernández R, et al. Large-scale application of highly-diluted bacteria for Leptospirosis epidemic control. *Homeopathy* 2010;99:156–166
- 30 Golden I, Bracho G. A reevaluation of the effectiveness of homoeoprophylaxis against leptospirosis in Cuba in 2007 and 2008. *J Evid Based Complementary Altern Med* 2014;19:155–160
- 31 Fact Sheets NIH. - Pain Management. Available at: <https://report.nih.gov/nihfactsheets/viewfactsheet.aspx?csid=57> Accessed May 22, 2017
- 32 Boehm K, Raak C, Cramer H, Lauche R, Ostermann T. Homeopathy in the treatment of fibromyalgia—a comprehensive literature-review and meta-analysis. *Complement Ther Med* 2014;22:731–742
- 33 Teixeira MZ, Podgaec S, Baracat EC. Potentized estrogen in homeopathic treatment of endometriosis-associated pelvic pain: A 24-week, randomized, double-blind, placebo-controlled study. *Eur J Obstet Gynecol Reprod Biol* 2017;211:48–55
- 34 Danno K, Colas A, Masson JL, Bordet MF. Homeopathic treatment of migraine in children: results of a prospective, multicenter, observational study. *J Altern Complement Med* 2013;19:119–123
- 35 Rossignol M, Begaud B, Engel P, et al; EPI3-LA-SER group. Impact of physician preferences for homeopathic or conventional medicines on patients with musculoskeletal disorders: results from the EPI3-MSD cohort. *Pharmacoepidemiol Drug Saf* 2012; 21:1093–1101
- 36 Witt CM, Lüdtke R, Baur R, Willich SN. Homeopathic treatment of patients with chronic low back pain: a prospective observational study with 2 years' follow-up. *Clin J Pain* 2009;25:334–339
- 37 Morris M, Pellow J, Solomon EM, Tsele-Tebakang T. Physiotherapy and a homeopathic complex for chronic low-back pain due to osteoarthritis: a randomized, controlled pilot study. *Altern Ther Health Med* 2016;22:48–56
- 38 NIMH. Any mental illness (AMI) among U.S. adults. Available at: <https://www.nimh.nih.gov/health/statistics/prevalence/any-mental-illness-ami-among-us-adults.shtml> Accessed May 22, 2017
- 39 Grimaldi-Bensouda L, Abenhaim L, Massol J, et al. Homeopathic medical practice for anxiety and depression in primary care: the EPI3 cohort study. *BMC Complement Altern Med* 2016;16:125
- 40 Grimaldi-Bensouda L, Abenhaim L, Massol J, et al. Utilization of psychotropic drugs by patients consulting for sleeping disorders in homeopathic and conventional primary care settings: the EPI3 cohort study. *Homeopathy* 2015;104:170–175
- 41 de Kruif M, Spijker AT, Molendijk ML. Depression during the perimenopause: a meta-analysis. *J Affect Disord* 2016;206:174–180
- 42 Macías-Cortés EdelC, Llanes-González L, Aguilar-Faisal L, Asbun-Bojalil J. Individualized homeopathic treatment and fluoxetine for moderate to severe depression in peri- and postmenopausal women (HOMDEP-MENOP study): a randomized, double-dummy, double-blind, placebo-controlled trial. *PLoS One* 2015;10:e0118440
- 43 Cancer Statistics [Internet]. National Cancer Institute. Available at: <https://www.cancer.gov/about-cancer/understanding/statistics> Accessed May 22, 2017
- 44 Karp JC, Sanchez C, Guilbert P, Mina W, Demonceaux A, Curé H. Treatment with *Ruta graveolens* 5CH and *Rhus toxicodendron* 9CH may reduce joint pain and stiffness linked to aromatase inhibitors in women with early breast cancer: results of a pilot observational study. *Homeopathy* 2016;105:299–308
- 45 Frass M, Friehs H, Thallinger C, et al. Influence of adjunctive classical homeopathy on global health status and subjective wellbeing in cancer patients - a pragmatic randomized controlled trial. *Complement Ther Med* 2015;23:309–317
- 46 Gleiss A, Frass M, Gaertner K. Re-analysis of survival data of cancer patients utilizing additive homeopathy. *Complement Ther Med* 2016;27:65–67
- 47 Davis K, Squires D, Schoen C. *Mirror, Mirror on the Wall: How the Performance of the U.S. Health Care System Compares Internationally*. The Commonwealth Fund; 2014 Jun. Available at: http://www.commonwealthfund.org/~media/files/publications/fund-report/2014/jun/1755_davis_mirror_mirror_2014.pdf Accessed May 22, 2017
- 48 Viksveen P, Dymitr Z, Simoens S. Economic evaluations of homeopathy: a review. *Eur J Health Econ* 2014;15:157–174
- 49 Colas A, Danno K, Tabar C, Ehreth J, Duru G. Economic impact of homeopathic practice in general medicine in France. *Health Econ Rev* 2015;5:55
- 50 Ostermann JK, Reinhold T, Witt CM. Can additional homeopathic treatment save costs? A retrospective cost-analysis based on 44500 insured persons. *PLoS One* 2015;10:e0134657
- 51 Stub T, Musial F, Kristoffersen AA, Alræk T, Liu J. Adverse effects of homeopathy, what do we know? A systematic review and meta-analysis of randomized controlled trials. *Complement Ther Med* 2016;26:146–163
- 52 Borneman JP, Field RI. Regulation of homeopathic drug products. *Am J Health Syst Pharm* 2006;63:86–91
- 53 HOMEOPATHIC legal and regulatory practice in the United States - COMPLETE information about homeopathic legal and regulatory practice in the United States - Todd Rowe. *hpathy.com*. 2010. Available at: <http://hpathy.com/past-present/homeopathic-legal-and-regulatory-practice-in-the-united-states/> Accessed May 22, 2017
- 54 Mathie RT, Roniger H, Van Wassenhoven M, et al. Method for appraising model validity of randomised controlled trials of homeopathic treatment: multi-rater concordance study. *BMC Med Res Methodol* 2012;12:49
- 55 Mathie RT, Van Wassenhoven M, Jacobs J, et al. Model validity of randomised placebo-controlled trials of individualised homeopathic treatment. *Homeopathy* 2015;104:164–169
- 56 Mathie RT, Van Wassenhoven M, Jacobs J, et al. Model validity and risk of bias in randomised placebo-controlled trials of individualised homeopathic treatment. *Complement Ther Med* 2016;25:120–125
- 57 Mathie RT, Van Wassenhoven M, Rutten ALB, et al. Model validity of randomised placebo-controlled trials of non-individualised homeopathic treatment. *Homeopathy* 2017;106:194–202
- 58 Dean ME, Coulter MK, Fisher P, Jobst KA, Walach H. Reporting data on homeopathic treatments (RedHot): a supplement to CONSORT. *J Altern Complement Med* 2007;13:19–23