Editorial: Where Do We Go from Here?

Marianne Trevorrow,[1] MA, ND

As I write another editor's letter in my downtown Ottawa office, the quiet seems almost blissful after three weeks of noise, disruptions, and chaos brought to our city by the anti-mandate/anti-public health occupations.

Our profession certainly has not been immune to the increased polarization that accompanies any discussion of vaccine mandates, as anyone who follows social media can attest. However, increasingly, there are Canadian ND voices standing up for public health in print and online media, including within this publication. At *CANDJ*, we support these colleagues and this work; as many of our contacts in health-care leadership have pointed out to us, NDs serve as a bridge to communities who may have had poor experiences in conventional medicine and are seeking a trusted person who will listen to their concerns with compassion and a balanced viewpoint, informed by good science. Additionally, when we support the work of other front-line health-care professionals (HCPs)—doctors, nurses, pharmacists and allied health practitioners—we also become trusted members of the broader community, which benefits everyone, including (and most importantly) the patients we serve.

We recognize that this position is not shared by all our colleagues in Canada and that considerable disagreements remain on this topic, as for so many issues related to the COVID-19 pandemic. At *CANDJ*, we have set up a platform to discuss contentious issues like these in a respectful and professional forum; in our commentary and letters sections, authors can make their concerns known to members on a platform that allows for nuance and balanced discussion, and that informs rather than generating further contention and divisiveness.

If we are to build resilience in our community after the pandemic is over, we need to focus on initiatives that promote cohesion and collaboration within the profession, as well as with our HCP neighbours. Like our conventional colleagues, many NDs are exhausted by this pandemic; some have had to close or downsize practices, while many new grads have struggled to find job opportunities. Some NDs, on the other hand, have been scrambling to manage a surge of new and baffling post- or long-COVID patients, and patients suffering COVID- or lockdown-related anxiety and other mood disorders. Many of us have also lost patients, friends, or family members to COVID. There is no question that two years of this pandemic have created a collective trauma in our profession, as well as our wider communities, in Canada and worldwide.

As we begin to emerge from public health physical distancing measures across Canada, we would encourage our members to check in with their colleagues and friends in the profession, consider forming local ND support groups to alleviate isolation and burnout, or just reach out to a colleague they haven't heard from recently. We strengthen our collective immunity when we engage in these individual community-building efforts. They also strengthen our individual resilience to help navigate what is likely to be another challenging year.[1]

Leading off this edition is a major announcement from World Naturopathic Federation (WNF) President Iva Lloyd on the publication of the Health Technology Assessment (HTA) report. This report is the culmination of four years of work from an international team of clinicians and researchers affiliated with the WNF. As she points out, it served two main goals, which are to clarify the status of the naturopathic professional globally and to address questions raised at the policy level by regulators, accreditors and others who seek to understand how the naturopathic profession fits into the World Health Organization's HTA guidelines.

Our case study section contains an article from Singh et al. on the use of *Withania somnifera* for vertigo associated with Ménière's disease, a condition that is often resistant to many conventional evidence-based therapies.

Finally, our research section contains a review by Aucoin et al. of knowledge mobilization strategies currently in use by the Canadian Naturopathic profession, with recommendations to bridge the divide between evidence provided by ND-led research and naturopathic clinical practice. To our knowledge, this is the first major study of its kind published in North America. and it should generate considerable discussion in Canadian naturopathic leadership about how we can bring more research-based knowledge to practicing clinicians via such methods as practice-based research networks and knowledge brokering.

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Of course, as the Canadian Naturopathic Association journal, *CANDJ* is playing a central role in bringing the work of naturopathic researchers and our senior academic clinical faculty to the membership, thereby building the evidence base for naturopathic therapeutics in North America and beyond. Our work continues with this third online edition.

AUTHOR AFFILIATIONS

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CONFLICTS OF INTEREST DISCLOSURE

I have read and understood the *CAND Journal*'s policy on conflicts of interest and declare that we have none.

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Update from the Canadian Association of Naturopathic Doctors

Mark Fontes, ND, and **Shawn O'Reilly**

Dear Members,

We head into spring with optimism that, as a society and as a profession, we can move forward and regain some of the "normal" we had in our lives pre-pandemic. To begin with, we would like to inform our membership that Dr. Sandra Murphy, ND, and Dr. Rigo Kefferputz, ND, have stepped away from the CAND board to focus on practice and family. We are very thankful for their years of hard work as CAND Board Directors and their dedication to the profession. Thank you, Dr. Murphy and Dr. Kefferputz on behalf of the profession!

The CAND continues to engage with the federal government to ensure that the naturopathic profession is included in any ongoing COVID benefits and, as a member of the Public Health Agency of Canada's Health and Allied Health Sector Table, to advocate for the use of natural products in the treatment of SARS-CoV-2. In 2022, the CAND is revisiting much of the government relations work we had implemented prior to the pandemic. We are currently engaged with Veterans Affairs Canada to have NDs added to their list of approved health-care professionals and with the Natural and Non-prescription Health Products Directorate (NNHPD) on the Proposed Self-Care Framework and improved labelling for Natural Health Products (NHPs). We are establishing relationships with the new senior staff and Ministers of Health and of Indigenous Services and will be participating in the upcoming consultation in conjunction with the review of the Cannabis Act.

We continue to be incredibly pleased with the success of our peer-reviewed, fully searchable online journal, the *CANDJ*. Launched on October 1, 2021, the *CANDJ* has over 2,400 readers, 2,300 abstract views, over 500 article downloads, and an engagement rate of 26% on social media platforms, Instagram and Twitter. Members may be interested to know that 66% of readers are Canadian, 20% are from the United States, and the remaining 14% are from the rest of the world. With the recent launch of subscriptions, the *CANDJ* is now available to individuals and organizations interested in furthering their knowledge of naturopathic medicine, both inside and outside the profession.

In November 2021, the CAND board held its second semi-annual planning session. At this weekend-long meeting, your Board of Directors and the CAND staff reviewed the successes and challenges of 2021 and discussed how we can improve on our efforts to serve and represent our membership across Canada in 2022. A thorough review of our financial statements was completed, and we are pleased to report that the CAND is in a very good position in terms of the funding needed to continue our work on the profession's behalf. We thank each and every one of our members and corporate partners for their support of the CAND and the profession.

We have since had our first meeting of the New Year, in January 2022. We continue our work with our core customer groups based on newly established budgets and priorities for the year. In addition to this, work is already underway for Naturopathic Medicine Week (May 15–21, 2022). The CAND will continue to keep you updated on these projects and how we are supporting the profession. We look forward to seeing each other in person soon.

Dr. Mark Fontes, ND, is Chair of the Canadian Association of Naturopathic Doctors.
Shawn O'Reilly is Executive Director and Director of Government Relations of the Canadian Association of Naturopathic Doctors.

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Health Technology Assessment – Naturopathy

Iva Lloyd[1]

The World Naturopathic Federation undertook the task of compiling a Health Technology Assessment (HTA) on naturopathy to provide an evidence-based summary of naturopathic practice and the safety, economics, and effectiveness of naturopathic care. Naturopathic doctors Iva Lloyd, Amie Steel, and Jon Wardle were the lead authors on the project.

The HTA resulted in a 750-page report, which took four years to complete.[1] It was truly a global effort, with 51 naturopaths/naturopathic doctors (NDs) and 60 reviewers contributing to the HTA. The project was made possible due to the generous financial contribution of the Naturopaths and Herbalists Association of Australia (NHAA). The contributors from Canada included Dr. Iva Lloyd, ND (as lead editor of the HTA) and the following NDs from the Canadian College of Naturopathic Medicine: Monique Aucoin, Valentina Cordozo, Kieran Cooley, Deborah Kennedy, Paul Saunders, and Dugald Seely. Reviewers from Canada included NDs Tasnim Adatya, Anne-Hélène Genné, Verna Hunt, Colleen McQuarrie, Michelle Richea, Jim Spring, and Pat Wales.

The protocol and methods for the HTA were drafted in line with the World Health Organization (WHO) HTA guidelines, adapted to meet the specific requirements and nature of the naturopathic profession. The scope of the HTA was informed by research conducted by the international naturopathic community over the last 30 years encompassing over 2,000 peer-reviewed scientific articles, including more than 300 clinical studies involving over 100 different health populations. Seven international surveys on various aspects of naturopathic practice were also conducted to support the HTA.

The HTA on naturopathy serves two main goals. The first is to clarify the status of the global naturopathic profession, and the second is to address key questions raised by policy-makers, accreditors, regulators, and those looking to further understand the breadth and depth of the naturopathic profession and naturopathic practice.

GLOBAL STATUS OF THE NATUROPATHIC PROFESSION

The HTA provides a global and unified understanding of the naturopathic profession. The key points outlined in this report include the following:

- Naturopathy is a traditional system of medicine originating in Europe that is now part of Traditional and Complementary Medicine (T&CM) around the world.
- The naturopathic philosophies of *vitalism* (an innate intelligence of living organisms) and *holism* (the body is a complex adaptive system that exists as a unified whole) embrace every aspect of naturopathic care and are supported by the seven naturopathic principles.
- Several theoretical and conceptual frameworks inform naturopaths'/NDs' clinical reasoning and decision-making. The main theories included in the HTA are the Naturopathic Therapeutic Order, Emunctory Theory and Theory of Complex Systems
- Naturopathic practice is characterized by specific assessment, diagnosis, and treatment approaches that can successfully bridge traditional and biomedical approaches to patient care.
- Naturopaths/NDs treat patients throughout the span of their life. Naturopathic care focuses on prevention and chronic conditions, but also treats patients with acute conditions and those in palliative care.
- Naturopathic practice is complex and multi-modal and incorporates core naturopathic therapies, modalities, and practices, including applied nutrition, clinical nutrition, herbal medicine, lifestyle modification, mind–body medicine counselling, naturopathic physical medicine, hydrotherapy, and other therapies, based on jurisdictional regulations and naturopathic education.
- There is strong consensus on the core naturopathic modalities used in practice, with a typical naturopathic visit generally involving the prescription, recommendation, or use of an average of four different naturopathic therapeutic modalities or practices.
- The naturopathic profession includes more than 110,000 naturopaths/NDs practising in over 107 countries spanning all WHO regions.
- Naturopaths/NDs are actively engaged in various forms of community education and health promotion activities and are well suited to play a more formal role in public health initiatives aimed at increasing health literacy.

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KEY QUESTIONS ASKED BY POLICY-MAKERS

What Are the Risks and Economics Associated with Naturopathic Practice?

"Chapter 7: Safety and Risks of Naturopathic Practice" provides research and rationale supporting the statement that direct risks associated with naturopathic care have been reported very infrequently and that the vast majority are minor. It describes the main categories of risk associated with naturopathic practice and reports that these are similar to any other health profession that employs a broad scope of practice. "Chapter 8: Economics of Naturopathic Care" provides a review of naturopathic cost-effectiveness research and outlines that naturopathic care is cost-effective, particularly for longer-term and chronic conditions and for persons with a higher disease burden.

What Regulation Currently Exists for the Naturopathic Workforce?

Regulation involving the naturopathic workforce follows several legislative frameworks, including voluntary certification, co-regulation, negative licensing and occupational licensing or statutory regulation. Thanks to the support of a regulatory consultant, "Chapter 5: Regulation of the Naturopathic Workforce" provides a detailed review of the global regulatory status of the naturopathic profession and provides policy-makers with the rationale to support statutory regulation of the naturopathic profession globally. There are currently 34 WHO Member States (countries) with some form of statutory regulation for the naturopathic workforce. There are also 21 Member States across three WHO regions, including the European region, the Americas, and the Western Pacific region, with voluntary certification regimens.

What Are the Naturopathic Educational Standards?

"Chapter 6: Educational Standards for the Naturopathic Workforce" provides an overview of the status of naturopathic education globally. There are 131 naturopathic educational programs globally, with 39% residing in the South-East Asian region, 27% in the European region, 22% in the region of the Americas, 6% in the Western Pacific region, and 6% in the African region. There are two main types of naturopathic educational programs emerging globally: the doctorate-level training programs, at over 4,000 hours, which currently represents 52% of all programs, and the practitioner-level training programs, at 2,500 hours.

What Research Is There to Support Naturopathic Practice?

The bulk of the HTA addresses the research question. Chapter 14 outlines the importance of researching naturopathy as a total system of traditional medicine when designing and conducting research on naturopathic practice. Chapter 15 provides a closer exploration of the challenges and advancements that contemporary health research offers to naturopathic research and the opportunities that naturopathic research can provide to other areas of health research. Chapter 16 indicates that the international naturopathic research community has been actively publishing peer-reviewed research literature for over 30 years and has demonstrated a sustained commitment to codifying existing knowledge, generating new knowledge, and disseminating this knowledge to the naturopathic and wider allied-health clinical and research communities. Naturopathic research is conducted in most of the educational institutions that have a naturopathic program, especially in the United States, Canada, Australia, Germany, India, and New Zealand.

The twelve chapters in Section 5 summarize 235 original clinical research papers outlining the effectiveness of naturopathic care for the main conditions researched by the naturopathic profession and commonly treated by naturopaths/NDs. It also includes references to the 1,456 journal articles, including observational studies, reviews, and meta-analyses, related to health conditions. It highlights that naturopathic researchers have conducted original clinical research involving 81 different illness populations, including cancer, cardiovascular, complex immune, endocrine, gastrointestinal, mental health, musculoskeletal, neurological, skin, women's health.

Naturopathic practice is known for its complexity and flexibility, with a range of treatments, therapies, and practices. The twelve chapters in Section 6 summarize over 300 clinical research papers on naturopathic therapeutics and practices for over 140 conditions. It highlights how such treatments are employed—singularly and in combination—by naturopaths/NDs, both in naturopathic clinical interventions and at times in collaboration with other healthcare settings, and features pragmatic elements, such as multimodal interventions, flexibility in administration, and real-world settings. It also includes references to the 1,203 peer-reviewed observational studies, reviews, and meta-analyses examining the broad range of therapies commonly used in naturopathic practice. The naturopathic therapeutic modalities and practices highlighted in this section include complex naturopathic interventions, applied nutrition, clinical nutrition, herbal medicine, lifestyle modifications, mind–body medicine counselling, naturopathic physical medicine, hydrotherapy, acupuncture, yoga, and research on pharmaceutical-based interventions or comparisons.

CONCLUSION

In summation, the HTA highlights that naturopathy is one of the most common traditional and complementary medicine professions globally and has a practice presence in all WHO regions. Naturopathic practice is therapeutically diverse, with a consistent holistic and person-centred approach and a core philosophical and traditional knowledge framework that focuses on the effective prioritization of non-invasive or non-pharmacological interventions and preventive care. Naturopathy/naturopathic medicine is a safe and effective therapeutic intervention that has utility across different geographic regions, clinical settings, and conditions, and naturopathic practitioners

are trusted and consulted by the global public for a wide range of conditions.

Given the promising emerging evidence base for naturopathy/naturopathic medicine shown in this HTA, it is warranted that individual policy-decision makers consider how to regulate and integrate naturopathy/naturopathic medicine in the manner most appropriate to their setting.

The full HTA is available as an e-book at
https://worldnaturopathicfederation.org/project/health-technology-assessment-naturopathy/

For a hard copy of the HTA please contact the WNF at
info@worldnaturopathicfederation.org.

All proceeds from the HTA will go towards supporting regulation of the naturopathic profession globally.

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Knowledge Mobilization in the Canadian Naturopathic Community

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ABSTRACT

The process of applying new scientific knowledge to clinical decision-making is critical for the provision of optimal health-care delivery; however, this process is often slow or inconsistent. Knowledge mobilization is the iterative and bidirectional process that involves the generation, dissemination, and translation of knowledge between researchers and knowledge users. Incorporation and application of knowledge mobilization in health care is being increasingly recognized across all fields, including naturopathic medicine. This review explores generally employed knowledge mobilization approaches. Additionally, it summarizes the knowledge mobilization strategies currently being used by the Canadian naturopathic profession and makes recommendations on the strategies which might be used in the future to bridge the gap between research evidence and clinical practice.

Key Words Naturopathic, naturopathy, knowledge translation, knowledge mobilization, knowledge transfer

INTRODUCTION

The process of applying new scientific knowledge to clinical decision-making is critical for the provision of optimal health-care delivery. This process, however, is often slow or inconsistent[1]; it has been estimated that it takes an average of 17 years for clinical practice to change in response to new research findings.[2] Attention to this issue has been steadily increasing in the past two decades and has led to the development of strategies to close the gap between knowledge and action.[3,4] These strategies have been described using a range of terminology. The Canadian Institutes of Health Research (CIHR) defines knowledge translation (KT) as "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge" involving interactions between researchers and knowledge users with the goal of positively impacting health outcomes and the health-care system.[5] A related term is knowledge mobilization (KMb), defined by the Social Science and Humanities Research Council (SSHRC) as "the reciprocal and complementary flow and uptake of research knowledge between researchers, knowledge brokers and knowledge users"; this includes a broad array of activities including "knowledge synthesis, dissemination, transfer, exchange and co-creation or co-production by researchers and knowledge users."[6] Although KT and KMb describe similar activities related to moving knowledge into action, KMb places an additional emphasis on a bidirectional flow of activities and engagement between researchers and stakeholders.[7] This engagement allows knowledge to be refined into a format that is understandable and tailored to the needs of the user in order to increase the likelihood of effecting change compared with simple dissemination.[8] The process, and the ethics, of moving knowledge into action is being increasingly recognized for its importance, and research in this field is expanding.

In order to effectively research the process of closing the gap between knowledge and action, systematic study using clear terminology and conceptualization is required. One obstacle to this process is the large number of words or phrases that have been used to describe the process of closing the knowledge–action gap. Beyond KMb and KT, at least 100 additional terms have been identified.[4] Other frequently used terms include knowledge transfer, knowledge exchange, implementation, and dissemination, and research utilization.[3] The CIHR Knowledge-to-Action Model was created to conceptualize the process of mobilizing knowledge.[3] Rather than viewing the process of bringing knowledge to action as a one-way street from researchers to knowledge users, this circular model represents a non-hierarchical, multidirectional, iterative, and ongoing process. It highlights important steps such as the identification of knowledge gaps, assessment of barriers to change, adaptation of knowledge to the local context, and selection, tailoring, and implementation of interventions. Further steps include evaluation of outcomes and efforts to sustain ongoing knowledge use.[3] In response to a need to systematically research methods used to promote the transfer of research evidence into clinical practice and health-care policy,

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a new field of study was created. Implementation science (IS) is defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services."[9] These efforts to define, conceptualize and study the process of mobilizing knowledge are essential to improving the uptake of research evidence by clinicians as well as the communication of research between relevant stakeholders.

Incorporation and application of knowledge mobilization in health care is being increasingly recognized across all fields, including naturopathic medicine. Naturopathic medicine is a distinct system of health care which uses traditional and natural therapies in combination with modern scientific knowledge.[10] A set of guiding principles unify a fundamental approach to clinical care.[10] Naturopathic medicine is typically considered a type of complementary and alternative medicine, as services are not provided within Canadian hospitals and are not eligible for reimbursement by provincial health insurance plans.[11,12] Within Canada, naturopathic medicine is currently regulated in six provinces: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Nova Scotia.[13] Registration as a Naturopathic Doctor (ND) requires the completion of an undergraduate degree, a full-time, 4-year naturopathic medical program offered by an accredited institution, as well as proof of liability insurance, completion of licensing and provincial board examinations, and expectations for continuing education.[10] There are approximately 2,400 NDs in Canada.[13] In provinces where naturopathic medicine is unregulated, practitioners with various levels of experience or training may use similar titles (for example "naturopath" or "naturopathic practitioner")[12]; however, these unlicensed practitioners are not the focus of the present publication. In recent years, there has been increasing attention paid to the way in which the foundational principles of naturopathic medicine interface with modern scientific evidence and how these different types of evidence might be incorporated into clinical decision-making.

The uptake of new knowledge into clinical practice is a critical component of evidence-based medicine (EBM) or evidence-based practice (EBP), defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" through attention to and integration of best available scientific evidence, patient values and preferences, and clinician experience.[14] Research has identified several benefits related to the use of EBP in medical practice, including improved patient outcomes and a decrease in health-care costs.[15] A recent review was published summarizing the evidence related to Canadian NDs' attitudes, skills, and usage of EBP.[16]

While there are indications that Canadians NDs are seeking out new evidence and applying it to clinical care, it also appears that, as in many professions, this use falls below optimal levels. In order to facilitate the use of evidence within the Canadian naturopathic profession, consideration of KMb strategies is important. To date, no previous reviews have attempted to identify the KMb strategies currently used in the Canadian naturopathic community. The present publication aims to address this important gap.

OBJECTIVE

Based on an exploration of generally employed KMb approaches, the purpose of the present publication is to summarize the KMb strategies currently being used by the Canadian naturopathic profession, including international strategies that involve the participation of Canadian NDs, and to make recommendations on those which might be used in the future to bridge the gap between research evidence and clinical practice.

RESULTS

While the purpose of the present publication is to review the KMb strategies being used by the Canadian naturopathic profession and to make recommendations on those that might be used in the future, it is important to first describe KMb strategies more generally. The KMb strategies have been investigated using a variety of research approaches, including randomized controlled trials, interrupted time series trials, cohort studies, and qualitative studies, which have captured results related to patient outcomes, professional/process outcomes, and economic outcomes, as well as cultural and attitudinal shifts.[17] This section will begin with a summary of the different characteristics of KMb strategies, as these can impact the intervention's cost, accessibility, acceptability, degree of involvement by different stakeholders, and effectiveness in changing behaviour. Following this will be a review of the types of KMb strategies that frequently target health professionals, including their effectiveness and some of the advantages and disadvantages of the different strategies. Lastly, the strategies currently being used in the Canadian naturopathic community will be presented.

Characteristics of KMb Strategies

Passive and Active Strategies

Passive strategies do not involve interaction between the knowledge-creator and the knowledge-user. These include publication of peer-reviewed journal articles, clinical practice guidelines, websites, and textbooks. Passive strategies do not tailor the message to a targeted recipient, and the dissemination is not planned or controlled.[18] These strategies are typically lower in cost[19]; however, effectiveness is highly dependent on the audience's motivation and efforts to look for them,[18] and as a result, they are considered to be less effective.[20] Active strategies involve targeting and packaging information for an indented audience. These include conferences, lectures, workshops, outreach visits, and audit and feedback interventions. Active strategies are generally considered to be more effective than passive ones[21]; however, examples of successful passive strategies exist, including one study that found similar improvement in use of guidelines with passive and active dissemination.[22]

Push, Pull, and Exchange Strategies

Push strategies (also described as "research-push" or "producer-push") are projects where the researcher initiates and conducts

the study as well as the transfer of findings. In contrast, pull (also described as "user-pull") strategies take place when the knowledge user or decision maker commissions the research to address a need. Exchange strategies involve a collaboration between researchers and knowledge users to generate research which is relevant to both groups.[23] These knowledge exchange strategies align with the knowledge-to-action cycle[3] in that they are interactive, iterative, and involve ongoing collaboration. The result is information that is perceived as relevant and useable to the researcher and the user; there is evidence that this results in increased application of the findings.[24]

Tailored Interventions

Tailored interventions are initiatives aimed at changing professional behaviour that are designed with consideration of prospectively identified barriers that could limit the intervention's effectiveness.[25] Categories of barriers that have been identified by The Cochrane Effective Practice and Organisation of Care include patient expectations, financial disincentives, clinical uncertainty, standards of practice, sense of competence, perceptions of liability, and administrative constraints.[26] A 2010 review reported that tailored interventions are more likely to impact behaviour change than no intervention or printed educational materials and guidelines.[25]

Multifaceted Interventions

Multifaceted interventions combine two or more individual components with the goal of overcoming multiple barriers. While the results of one systematic review suggest that multifaceted interventions improve effectiveness,[20] an analysis of multifaceted interventions did not find a greater effect associated with a larger number of interventions,[19] and consideration of additional costs and potential interactions between individual components are potentially relevant considerations.[1]

Strategies Targeted at Health Professionals

Printed Educational Materials

Printed educational materials are published or printed documents, including peer-reviewed journal articles, clinical care recommendations, guidelines, or monographs. They can include audio-visual components and may be published electronically. The audience may be targeted, or the materials may be distributed broadly through mass mailings.[27] The purpose of this widely used KMb method[27] may be an increase in knowledge or motivation among recipients. A benefit of printed educational materials is their feasibility and relatively low cost.[27] A recent Cochrane review synthesized the results of 84 studies, including 32 RCTs, that tested the effectiveness of this KMb strategy. The review found, with moderate certainty, that the materials improved practice compared with no intervention but exerted little or no impact on patient health outcomes. No difference was found between paper-based and computer-based delivery of the same material.[27]

Educational Meetings

Educational meetings are widely used in continuing medical education. Educational meetings include conferences, workshops, and lectures. Meetings vary with respect to their content, length, number of participants and degree of participant interaction.[28] Didactic meetings are better suited to address knowledge gaps while interactive workshops can be used to address attitudes and skills.[1] A Cochrane review reported the findings of 81 RCTs assessing the impact of educational meetings on clinical practice or patient outcomes.[28] When assessing behaviour change in comparison with no intervention, educational meetings resulted in a risk difference of 6% (interquartile range [IQR]: 1.8–15.3%) for comparison trials and a 10% adjusted percent change for continuous outcomes. There was also a benefit to patient outcomes. A greater impact was associated with higher attendance, mixed interactive/didactic meetings (vs either alone), meetings targeting less complex behaviour change, and those addressing more serious medical conditions.[28]

Educational Outreach Visits

Also known as academic detailing, educational outreach involves the personal meeting of a trained individual and a clinician in their practice setting and the provision of information aimed at altering clinician behaviour. The most common target behaviour is physician prescribing practices.[29] A Cochrane review of 69 studies reported a 5.6% mean adjusted risk difference (IQR: 3–9%) in desired practice and a 21% improvement in continuous outcomes (IQR: 11–41%). It has been suggested that surveying clinicians in order to identify barriers prior to intervention design is an important component of this strategy.[29] While the one-on-one nature of this intervention can be resource-intensive, a small number of studies have assessed cost-effectiveness and reported benefit related to changes in prescribing behaviours.[29]

Local Opinion Leaders

Local opinion leaders are clinicians whose colleagues have nominated them as "educational influencers." These leadership roles are not based on a formal position but rather on the view of this person being likable, credible and trustworthy.[30] These individuals influence others' attitudes or behaviour in an informal manner through a central position in interpersonal communication networks and an elevated social status. The impact of opinion leaders is typically in the areas of knowledge, attitudes, and social norms within their group of colleagues; however, their effectiveness is dependent on the presence of social networks within professions.[30] It has been recognized that opinion leaders are often specific to particular medical conditions and that the individual operating in this role changes over time. Costs associated with this strategy include those related to identifying and training the individual. A Cochrane review, updated in 2019, included 18 studies assessing the impact of opinion leaders. Overall, there was a mean 12% increase in behaviour compliance (IQR: 6–14.5%) with this form of KMb, although significant heterogeneity and a lack of clear intervention description was noted along with the absence of patient-outcome or cost-effectiveness data.[30]

Audit and Feedback

Audit and feedback initiatives objectively measure clinician performance over a period of time, with the purpose of changing behaviour. The process may also include recommendations for action.[31] Behaviour may be measured by assessing medical records or databases or through direct observation and can be facilitated by a variety of internal (e.g., clinician office) and external (e.g., peer, employer, or regulator) processes. It has been reported that health-care providers overestimate their compliance with guidelines.[31] Audit and feedback processes are thought to create cognitive dissonance between perceived and actual behaviour as a stimulus for change. Costs related to this strategy include those associated with obtaining and analyzing data and communicating findings. The availability of meaningful data impacts the usefulness of this strategy. A systematic review including 140 studies reported a 4.3% risk difference (IQR: 0.5–16%) among studies with dichotomous outcomes and a 1.3% (IQR: 1.3–28.9%) change in continuous outcomes compared with the control.[31] This type of intervention was more effective in cases where baseline performance was low, when delivered by a colleague or supervisor, when delivered more than once, when feedback was provided in both written and verbal forms, and when explicit targets and action plans were included.[31]

Reminders

Reminder strategies include specific prompts to remind a clinician of information that will cause them to perform or avoid a particular action in the course of clinical care. Reminders may be provided verbally, on paper, or electronically.[32] A Cochrane review identified 28 studies using reminders. Improvements were identified in process outcomes, medication prescribing, vaccination, and test ordering. When pooled, the median improvement was 5.6% (IQR: 2–19.2%). This strategy has the benefit of being low-cost. The features of reminders that are most likely to yield benefit have yet to be identified; however, reminders within electronic medical records that alert clinicians while they are delivering care are considered promising.[32]

Communities of Practice and Social Media

A community of practice is defined as a group of people who share expertise and passion and interact in order to deepen their knowledge and expertise.[33] While communities of practice can take many forms, it has been suggested that health-care providers have created viable virtual communities of practice using social media.[34] Social media includes a range of technology-mediated platforms that allow users to create and share content within virtual communities. A recent scoping review of the use of social media in medical KMb found a large number of articles related to the following platforms: Twitter, blogs, Facebook, podcasts, video archival platforms, and Wikipedia, as well as several others.[35] Types of platforms included open social media platforms, interactive multimedia, direct peer-to-peer contact, and closed platforms. The benefits associated with this KMb strategy include real-time speed of sharing, communication across geographic regions, the ability to connect with experienced colleagues,[36] and the ability to communicate information outside the typical channels such as conferences and publications.[35] The review acknowledged that studies of these strategies typically did not assess cost, although these are thought to be primarily related to the time needed to set up, monitor, and maintain the platforms. Few studies have assessed the direction of effect, and there is some recognition of the impact on professionalism as well as other challenges in this more "open-forum" style of KMb strategy.

Mass Media

Mass media strategies involve dissemination though public channels, such as newspapers, posters, television and radio broadcasts, and websites. A Cochrane review of 20 studies using mass media included campaigns to promote immunization, cancer screening, and HIV education.[37] Methodological quality was variable; however, the direction of effect was consistent, and several studies detected statistically significant differences in health behaviours, such as frequency of screening. When observing changes in rates of screening, for example, it is difficult to differentiate the effects of the mass media interventions on health-care provider and consumer behaviours. Cost may be a disadvantage of this strategy; however, a thorough analysis of cost-effectiveness has not been completed.[37]

Knowledge Brokering

Knowledge brokers (KBs) are individuals who facilitate the transmission of knowledge between researchers and research users through human interaction.[38] Several roles have been described as part of this strategy. Knowledge brokers act as information managers, by translating and applying knowledge. They act as linkage agents by developing relationships between knowledge creators and users. They act as capacity builders by increasing knowledge users' skills and increasing their capacity to identify and apply knowledge.[39] A systematic review attempted to analyze the effectiveness of this strategy, but insufficient data precluded conclusions.[40]

Practice-Based Research Networks (PBRNs)

Practice-based research networks have been defined as groups of affiliated community-based clinical practices, primarily focused on clinical care, with the goal of investigating questions relevant to community practice.[41] They are frequently affiliated with a professional or academic organization and include 15 to several hundred practices.[42] Practicing clinicians contribute their experience and perspective in the development of relevant research questions often related to practice patterns, the process of care and clinical outcomes in "real-world" settings. More recently, the potential for PBRNs to serve as communities for learning, to promote evidence-based culture and to facilitate collaboration between researchers and research users is being explored.[42] It has been suggested that fewer dissemination efforts are needed when clinicians are involved in planning what to study, how to study it and how to evaluate outcomes.[42] There has been an increase in the use of complimentary alternative medicine (CAM)-focused PBRNs globally in the past decade.[43]

Example KMb Strategies Used in the Canadian Naturopathic Community

Printed Educational Materials

1. Peer-reviewed publications: The World Naturopathic Federation (WNF), an organization that represents naturopathic doctors and naturopaths from 37 countries with the goal of uniting, defining, and promoting the profession, has undertaken projects that aim to measure ND involvement in research and KMb activities. A recent bibliometric analysis identified all peer-reviewed, indexed publications authored by at least one ND.[44] A total of 2,218 research articles met the criteria, of which 18% were authored by Canadians. While interventional and observational studies made up 19% and 28% of the articles, respectively, 23% of the studies were synthesis research (reviews and meta-analyses) and 16% commentaries; monographs, case reports, and other article types made up smaller percentages. Stemming from this work, the WNF has also assembled a soon-to-be published Health Technology Assessment for the profession, which outlines the practice, effectiveness, costs and safety associated with naturopathy as defined by peer-reviewed publications authored by NDs (or equivalent title) globally.[45]
2. Books: The WNF has identified a list of textbooks, professional books, and consumer books written by NDs globally that included 1,335 entries.[46] Of these, 8% were textbooks and 73% were published since 2000. In terms of authorship, 44% were written by North American NDs.
3. Guidelines: Although some guidelines include therapies within the scope of an ND, few naturopathic clinical practice guidelines exist; however, guidelines have been created in the field of adjunctive cancer care. The Society for Integrative Oncology, an organization with members from a range of health professions, including NDs, has created guidelines for the use of integrative therapies during and after breast cancer treatment[47] and integrative medicine in the treatment of lung cancer.[48] The KNOW Website (Knowledge in Integrative Oncology Website) is a clinical tool that contains up-to-date summaries of research related to integrative oncology so that clinicians can quickly access information required for evidence-informed practice.[49] This project was an initiative of the Oncology Association of Naturopathic Physicians in collaboration with the Ottawa Integrative Cancer Centre, an ND-led organization.
4. Professional publications: Several naturopathic professional publications disseminate evidence summaries to practicing NDs. These include publications created by the Canadian Association of Naturopathic Doctors (CAND) and The Ontario Association of Naturopathic Doctors (OAND), The American Association of Naturopathic Physicians (AANP) and The Naturopathic Doctor News and Review, among others. An international survey of naturopathic organizations and publishers, undertaken by the WNF, attempted to quantify the number of reference-based articles written by NDs and published by naturopathic organizations.[50] Approximately 15,000 articles published in 24 journals were identified; of these 71% were published open-access. The target readership included NDs and students, as well as other health professionals, and the article types included commentaries, systematic reviews, practice-based articles, research summaries, and original research articles. Over 80% of the professional journals were in the process of achieving standards such as a peer-review process, diverse editorial board and authors, and editorial and publishing policies.

Educational Meetings

1. Conferences: Several organizations host conferences which are attended by Canadian NDs. A small selection of these conferences includes those offered by the OAND, CAND, AANP, Canadian Interdisciplinary Network of Complementary and Alternative Medicine Research (INCAM), International Congress on Integrative Medicine and Health, International Congress on Naturopathic Medicine, Oncology Association of Naturopathic Physicians (OncANP), Gastroenterology Association of Naturopathic Physicians, Pediatric Association of Naturopathic Physicians, Psychiatric Association of Naturopathic Physicians, and Academy of Integrative Health and Medicine. Conferences typically include didactic lectures, experiential sessions, and workshops, include speakers from within and outside of the naturopathic profession, and have expectations for both inclusion of peer-reviewed content and disclosures of conflicts of interest for presenters.
2. Continuing education (CE) courses/webinars: Many organizations offer in-person or virtual courses on a variety of topics. Canadian-based organizations include the Canadian College of Naturopathic Medicine (CCNM), OAND, Collaborative Education,[51] and BRB CE group,[52] for example. Currently, approval of CE activities is completed by regulatory authorities; however, in other health professions, a national organization exists with the purpose of accrediting CE courses. Created recently by the Federation of Naturopathic Medicine Regulatory Authorities (FNMRA), the North American Naturopathic Continuing Education Accreditation Council (NANCEAC) seeks to ensure that CE activities are of high quality and free of commercial bias.[53]

Communities of Practice and Social Media

1. Social media platforms: Several closed social media groups provide knowledge sharing among Canadian NDs. Some are broad in scope, with large numbers of members, while others are smaller and narrower in scope. Topics include discussion of challenging clinical cases, sharing research, and discussion of ideas and philosophies, among others.
2. INCAM Naturopathy Special Interest Group (N-SIG): The N-SIG is a special interest group of INCAM dedicated to advancing naturopathic research. Its members include NDs who are researchers and clinicians. Previous activities

include surveying the profession to identify interest, barriers, and enablers to participation in research.[54]

Local Opinion Leaders

Local opinion leaders have not been formally recognized in the naturopathic profession; however, several individuals who hold leadership roles in various naturopathic organizations and academic institutions fulfill this role. Others have established leadership roles informally through an accumulation of expertise in a particular subject matter and participation in many of the activities listed previously, including teaching CE courses, publishing articles, and social media discussion forums.

DISCUSSION

A range of KMb strategies have been used in health care with varying rates of effectiveness. Overall, strategies that are active, interpersonal, and tailored to a specific audience in order to meet their unique needs at a particular time are considered advantageous.[24] Strategies involving bidirectional collaboration between knowledge creators and knowledge users are consistent with the CIHR Knowledge-to-Action model. A number of KMb strategies are used within the Canadian naturopathic community; however, opportunities exist to increase these efforts.

While naturopathy has been regulated in Ontario since 1925,[12] it has been considered an emerging profession in Canada, undergoing several steps towards professionalization in recent decades.[55] These include regulation under the Regulated Health Professions Act in Ontario and self-regulation or title protection in additional Canadian provinces,[13,56] as well as rapid membership growth, from 500 to 2,400, over two decades[55] and degree-granting status at the largest Canadian naturopathic college. At the same time, significant efforts to generate knowledge related to naturopathic treatments have occurred. The results of the WNF surveys related to codification of naturopathic knowledge revealed that 75% of all publications, and 97% of peer-reviewed articles, have been created since the year 2000. As in other professions,[57] insufficient naturopathy-related research is cited as a barrier.[58] This is due to the relatively recent history of naturopathic research and the small number of researchers—a recent survey of 201 Canadian NDs identified 22 currently involved in conducting research.[54] Despite the field's small size, naturopathic research has been described as "fighting above its weight class"[59]; there is evidence that, with the current steps forward in professionalization, the generation and transfer of knowledge is increasing.

Within the field of implementation science, there is increasing attention to the factors and contexts that influence the effectiveness of KMb. The process by which new knowledge impacts behaviour is thought to proceed through three steps: awareness, acceptance, and, finally, adoption,[60] each of which may be impacted by the unique contexts of a health profession. A recent commentary on the topic of IS of complementary medicine (CM) highlighted several considerations that could influence these steps.[61] With respect to awareness, one challenge is the underdeveloped professional and organizational infrastructure in many CM professions. Because awareness and persuasion may occur through multiple avenues within an organization (infrastructure, oversight, change agents), community-based practice settings, common in CM, may pose a barrier to increasing awareness and subsequent behaviour change.[61] Awareness of new research also depends on the practitioner's ability and opportunity to search for and review relevant literature. Insufficient skill at identifying and appraising scientific literature, and lack of time, are widely cited barriers among many professions including naturopathic medicine.[58,62-64] KMb strategies should be tailored to address barriers to awareness.

With respect to the acceptance phase of knowledge uptake, Canadian NDs have a relatively positive view of evidence, although a spectrum exists, and several barriers related to acceptance have been identified. A qualitative study investigated the perceptions and attitudes of North American and Australian ND students and faculty towards the role and influence of traditional and scientific knowledge in naturopathic education. One of the themes that emerged was the goal of finding a balance between traditional and scientific knowledge. An older study of Australian naturopaths reported the perception that scientific evidence could undermine traditional knowledge by devaluing and eroding its role in clinical practice.[65] Consideration of traditional knowledge in the development of KMb strategies is likely to be important. Another qualitative study explored the development of attitudes towards pediatric vaccination among medical, chiropractic, and naturopathic students as a case study of professional enculturation.[66] A powerful influence of both formal education and informal socialization was reported. One of the largest influences on student perceptions, in all three professions, was the view of senior or respected individuals in their field, such as professors. It was noted that these influences were also the least likely to be critically examined. These findings may illuminate how historical attitudes may be perpetuated within a profession at the expense of the uptake of new best practices and serve as important considerations for the design of tailored KMb strategies.

Another possible barrier to the acceptance phase of knowledge uptake is the compatibility of evidence with naturopathic principles. The principle "Treat the Cause" suggests a need to look beyond presenting symptoms for factors which may have contributed, or increased susceptibility, to illness.[11] These factors include environmental, behavioural, lifestyle, social, genetic, and others. This view of illness having unique origins in different individuals and the importance of tailoring treatment plans to address underlying causes may be considered at odds with KMb strategies such as guidelines, in which a hierarchy of interventions is presented based on their level of evidence. For example, if a patient presented with a concern of headaches that coincided with her menstrual cycle, an ND may recommend an intervention that is targeted at improving hormonal balance rather than another intervention which has more evidence for the treatment of headaches in a general population. The naturopathic principle "Treat the Whole Person" is similar to the concept of patient-centred care, defined as health-care decisions and quality measures which are guided by "an individual's specific health needs and desired health outcomes" and in which "patients are partners with their

health-care providers, and providers treat patients not only from a clinical perspective, but also from an emotional, mental, spiritual, social, and financial perspective."[67] While necessary, research evidence is considered insufficient for clinical decision-making by some proponents of patient-centred care, due to the influence of unique biopsychosocial factors, preferences, beliefs, expectations, and goals[68]; the importance of KMb strategies that are respectful of patient-centred care has been highlighted in the field of CM.[61] While the principles "Treat the Cause" and "Treat the Whole Person" do not preclude the development of guidelines, they may be recognized as possible barriers to acceptance of guidelines, and consideration of the importance attributed to individualization of care may be a relevant consideration in developing guidelines that support clinical practice guided by both naturopathic principles and the best available scientific evidence.

Concerns about potentially limited applicability of "gold-standard" single-intervention RCT findings to real-world clinical situations with multimorbid patients, a population that frequently accesses naturopathic care,[69] have been cited in medicine[70] and may be a relevant barrier in evidence uptake among NDs as well. The CAM professions are recognized as having an increased awareness of the limitations of studying complex, multi-modal, individualized clinical interventions using research designs such as RCTs.[71] Evidence generated using a variety of research methodologies such as whole-systems research may have a higher level of model validity and may increase the relevance of KMb strategies in the naturopathic profession. Ongoing efforts to study naturopathic therapies using pragmatic research designs are warranted.[72]

While these barriers to KMb uptake are significant, strengths and opportunities also exist. For example, practising in complex organizations has been viewed as a barrier to change.[73] Because many NDs work in private practice settings, either in solo practice or with other CM professionals,[58] fewer organizational barriers to change may exist. Furthermore, consistent with the bidirectional nature of KMb, the Canadian naturopathic community has demonstrated an interest in participating in the generation of new research. The survey of 201 Canadian NDs that identified 22 individuals presently involved in research also identified an additional 108 who were interested in becoming involved. There is also evidence that additional NDs are involved in KMb activities. An international survey recently investigated the frequency of ND participation in KMb activities.[74] The survey was completed by 478 NDs, including 118 Canadians. In response to a question about how respondents share their knowledge, the percentage of individuals who reported engaging in the production of information for different purposes was as follows: publication in scientific journal articles, 18%; publication in naturopathic journal articles, 18%; publication in modern naturopathic clinical text books, 11%; publication in general clinical text books, 9%; for the general public, 73%; product companies, 9%; for patients, 72%; CE events for other clinicians, 28%; clinical training for naturopathic students, 32%. These results are limited by a small sample size and potential self-selection and self-reporting biases. Several research projects undertaken by naturopathic researchers, including whole-practice trials and Delphi studies, have involved collaboration between researchers and clinicians.[75-77] These factors may facilitate the generation and implementation of KMb strategies.

There is also evidence that enablers, such as special interest groups, may have contributed to advancement of KMb efforts in sub-groups of NDs. Overall, guidelines are lacking in naturopathic medicine; however, a notable exception is the area of naturopathic cancer care. This progress relative to other clinical areas may be related to the existence of the American Board of Naturopathic Oncology, which grants the status of Fellow of the American Board of Naturopathic Oncology (FABNO) to individuals with specialized training in oncology.[78] This clearly defined group of clinicians may have been a factor in identifying needs for coordinated KMb work; the organization may have also been well-placed to initiate these efforts. A relative abundance of research in the area of naturopathic cancer care may have been a further facilitator. The WNF analysis of peer-reviewed articles identified cancer as the most commonly researched condition. Cancer was the subject of 27% of articles, with breast cancer the most frequently studied type of cancer. As more research evidence is generated in other clinical areas and increased mobilization of condition-specific organizations and networks occur, this may facilitate additional KMb efforts such as evidence synthesis and dissemination.

KMb Opportunities in the Canadian Naturopathic Community

Many types of KMb strategies may be well suited for use in the naturopathic profession. A number are described below; however, this list is not intended to be exhaustive. Strategies used by other professions or in other geographic regions will be highlighted. Overall, strategies that are likely to be impactful are those addressing some of the barriers discussed in the previous section. Knowledge mobilization strategies should increase connectedness among widely dispersed community practitioners, address barriers, such as lack of time and skill, prioritize pragmatic research, and respect traditional knowledge, patient-centred care, and naturopathic principles.

1. Practice-based research networks: To our knowledge, there are currently no Canadian-specific PBRNs specifically for NDs. Although neither is currently operating as a PBRN, the International Research Consortium of Naturopathic Academic Clinics (IRCNAC)[79] and the Naturopathic Physicians Research Institute (NPRI) may have the potential to accelerate the type of infrastructure, culture, and KMb desirable by PBRNs.[80] The establishment of a PBRN would build KMb infrastructure and facilitate knowledge exchange among community-based NDs and researchers, in addition to creating opportunities for new research studies. A call for PBRNs has been made as a way to refine the approach of IS based on the unique factors related to complementary medicine practice.[61] In Australia, the Practitioner Research and Collaboration Initiative (PRACI) is a PBRN including 14 complimentary medicine professions that was launched in 2015.[81] Efforts have been made in the Canadian chiropractic community towards the development of a PBRN.[82]

2. Guidelines: Guidelines, and other forms of knowledge synthesis, address the common barriers that clinicians report related to insufficient time and skill in locating and critically appraising research evidence. To date, limited naturopathic guidelines and best-practice documents have been created; however, the existence of best-practice documents in the field of integrative cancer care suggest that this strategy may be feasible and acceptable. Naturopathic guideline development should address the unique aspects of naturopathic philosophy, such as the principle "Treat the Cause" and a focus on patient-centred care. This is in line with other calls that have been made for inclusion of contextual information and qualifying statements in guideline development.[83] The Canadian chiropractic profession has undertaken a process of developing clinical practice guidelines.[84] Further information is available at http://chiropractic.ca/guidelines-best-practice/.
3. Continuing education related to EBM: Knowledge and skills related to acquiring and using research evidence are an important part of successful KMb. While Canadian NDs have reported moderate to high perceived levels of skill, an interest in further learning opportunities has been expressed by practicing clinicians.[58] A CE course on EBP that was co-designed with 22 Canadian NDs is currently being delivered and evaluated. A high level of enrollment and attendance by Canadian NDs suggest that this course is feasible; data on acceptability of the course by this population is forthcoming. Following revision based on the results of participant evaluation, additional education opportunities may be provided to Canadian NDs.
4. Knowledge brokering: We proposed that a knowledge broker position be established to facilitate interactions between clinicians, researchers, and other stakeholders. This individual would be involved in knowledge dissemination but also in identifying the knowledge needs of the profession. Professional and academic organizations are presently engaged in these efforts; however, there is not a dedicated individual focused on these activities. The University of British Columbia's Physical Therapy Department has created a knowledge broker role with the goal of facilitating "both evidence-informed practice and practice-informed evidence."[85]

CONCLUSION

The Canadian naturopathic profession has undergone significant changes in recent decades with respect to the use of evidence. There has been increased use of a range of KMb strategies aimed at aligning clinical practice with best evidence. However, many opportunities exist to further develop and implement KMb strategies, paying attention to the profession's unique characteristics and barriers. This review identifies established KMb strategies that are used successfully and highlights unique considerations and opportunities for KMb in the Canadian naturopathic community.

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Withania somnifera as an Intervention for Vertigo in the Management of Ménière's Disease: A Case Report

Simone Singh[1] and **Lauren Quinn**[2]

ABSTRACT

Ménière's disease (MD) is a disorder of the inner ear, with a triad of symptoms consisting of spontaneous and episodic vertigo, aural fullness and/or tinnitus and sensorineural hearing loss. Increasing evidence suggests that psychological factors may play a significant role in the onset of the disease and/or its progression. Current conventional treatment does not provide a cure, nor complete relief of symptoms, and there is limited literature on alternative treatment options. This case report describes a 47-year-old Portuguese female who presented with a diagnosis of MD wanting relief from daily episodes of vertigo after conventional treatment failed. Botanical intervention with *Withania somnifera*, an adaptogen, was recommended at a dose of 500 mg daily. The patient reported a complete resolution of vertigo within one week of supplementation. Symptom resolution continued after five months of treatment. Further research is warranted to evaluate the use of *Withania somnifera* in improving vertigo in individuals with MD.

Key Words Ashwagandha, endolymphatic hydrops, inner ear, tinnitus, hearing loss

INTRODUCTION

Case Background

Ménière's disease (MD), also known as endolymphatic hydrops, is a disorder of the inner ear that is associated with a triad of symptoms consisting of spontaneous and episodic vertigo that lasts longer than 20 minutes, aural fullness and/or tinnitus, and sensorineural hearing loss.[1,2] No population-based studies have been conducted to investigate the incidence or the prevalence of MD; however, global studies have suggested that the prevalence of MD is between 120 and 513 per 100,000 individuals.[1] The literature has also found that MD affects males and females equally and is more prevalent in Caucasian patients.[1] The average age of onset is between the fourth and fifth decade of life.[1,2] Additional signs and symptoms that can occur during an episode of vertigo include nausea, vomiting, sweating, and diarrhea. Current conventional treatments are limited and do not provide a cure for MD.[1,2] Conventional treatment goals are to alleviate symptoms, and none have proven to provide complete symptom relief.[1,2]

The etiology and pathogenesis of MD remain unclear. One theory suggests an association with an increased volume of inner ear fluid or, in other words, an excessive build-up of endolymph fluid.[2] An association between psychological factors and MD has also been observed and has been shown to play a significant role in the development and disease progression of MD, as well as impacting quality of life in these patients.[3] One theory proposes that life stressors result in increased levels of tension, which can trigger the onset of MD, suggesting the patient may lack the ability to cope with stress.[3] A proposed mechanism of action is related to increased levels of stress-related hormones (i.e., vasopressin) and how this may affect the endolymph.[4] Another theory suggests that stress can aggravate symptoms of MD and lead to its progression.[3,4] What is certain is that there is a decrease in quality of life for patients with MD, especially those individuals who fear the sudden onset of symptoms, especially that of vertigo.[3] This case report details the use of an adaptogen, with periodic stress management, in a patient with MD.

Background

Supplementation with *Withania somnifera* was recommended for this patient to address the stress component of the disease. *Withania somnifera*, commonly known as ashwagandha, is a widely used herb in Ayurveda medicine.[5] It is known as an adaptogen, which helps to support an individual's ability to cope with stress, increasing the body's resilience to mental, physical, and emotional stress.[5,6,7] The available literature also suggests that it is an effective anxiolytic and antidepressant.[6] The active constituents of the *Withania somnifera* plant that provide therapeutic benefits include withanolides and sitoindosides. It has been suggested that these decrease cortisol levels associated with chronic stress and play a role in the hypothalamus-pituitary-adrenal axis.[6,7]

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A recent randomized, placebo-controlled study on the safety of *Withania somnifera* was conducted with 80 healthy volunteers. Supplementation with either *Withania somnifera* or a placebo was given at a dose of 300 mg twice a day for 8 weeks. Throughout the study, vital signs were consistently within normal limits and hematological parameters remained stable, as did liver function and thyroid hormone levels. None of the participants in this study reported any adverse events. *Withania somnifera* at a dose of 600 mg daily was shown to be well tolerated and safe.[8]

Currently, no study has evaluated the use of *Withania somnifera* as an intervention for MD. This case report seeks to further the knowledge of naturopathic medicine and to shape the direction of future research for patients diagnosed with MD who experience vertigo and for whom conventional treatment may have failed.

CASE PRESENTATION

History of Present Illness

L.O. is a 47-year-old female born in Portugal, who immigrated to Canada at the age of 14. She presented to the Robert Schad —Naturopathic Clinic (RSNC) via telemedicine on July 8, 2020, with a diagnosis of Ménière's disease. She reported that her symptoms had begun 2 years prior with the onset of tinnitus that was accompanied by pressure and tightness in the neck and shoulders. She noted that acute stress, due to feeling rushed, was a trigger for this pressure and tightness and had found temporary relief with massage therapy. One year after the onset of tinnitus, L.O. started to experience dizziness, which she described as the room spinning, with fullness in her ears, preceded by the tinnitus. She stated that the left ear was worse than the right. The tightness soon progressed and became associated with numbness of the left arm and hand.

In February 2020, she was diagnosed by an otolaryngologist with MD after magnetic resonance imaging (MRI) of the head, and audiologic and vestibular testing confirmed loss of hearing in the left ear. L.O. had no history of trauma to the head but did report her father had been diagnosed with Ménière's disease. She was prescribed 16 g of Teva betahistine for her daily debilitating vertigo. She discontinued betahistine after 2 to 3 months, as she found no relief, and started using *Ginkgo biloba* on the advice of friends.

The patient only presented for telemedicine video appointments as the global pandemic restricted her ability to attend in-person visits. She reported no drainage from the ears, change in vision, headaches, loss of consciousness, or loss of balance and had no cardiovascular, gastrointestinal, or genitourinary complaints. She stated restrictions and limitations in cervical range of motion. She reported dry ears bilaterally and noted that she tired easily with minimal activity. Her main complaint was daily episodes of sudden vertigo resulting in fear of driving and working.

L.O. reported using 120 mg daily of *Ginkgo biloba* 1 month prior to her initial visit at the RSNC. She reported a slight improvement in the intensity of the vertigo with the use of the *Ginkgo biloba*, but the daily episodes continued to occur.

Relevant Medical History

This patient has a past medical history of iron deficiency anemia and suffers from seasonal allergies that result in frontal sinus pressure and epiphora. She has no history of smoking, alcohol use, or use of recreational drugs. Her family history is significant for hypertension, heart disease, and lymphoma in her mother and colon cancer and MD in her father. Upon presentation to the RSNC, this patient was taking Teva betahistine (16 g daily, for vertigo), a multivitamin (1 capsule daily), elemental magnesium (oxide, gluconate, lactate = 250 mg, daily), gentle iron by Jamieson (provides 28 mg of ferrous bisglycinate) and *Ginkgo biloba* (120 mg daily for vertigo). Her diet was mostly vegetarian, and she did not consume eggs or fish. She drank on average two cups of coffee daily. She did report living a sedentary lifestyle, with no daily physical activity.

Psychosocial History

L.O. is married with 2 children, ages 18 and 16, and is a seamstress for a textile factory. She lives with her husband and two children and reports she has no stress at home or at work. She did state an inability to cope with acute stress, which causes her significant neck and shoulder stiffness that results in fullness and tinnitus in the ears. She stated that she feels stressed when she feels rushed or when activities are fast-paced. She shared that her fear of having an episode of vertigo while driving or at work had started to cause her stress levels to increase, and this feeling had begun to disrupt her daily activities. She also indicated that just prior to the onset of tinnitus, she had been let go from her current employment due to the sale of the company, and job security at that time was uncertain. While she was unemployed for several months, she now works within the same industry in a different position. She has no history of elevated blood pressure and reports a decreased cervical range of motion. No physical examinations could be done due to limitations as a result of the COVID-19 virus.

Treatment

First Visit

Her response to stress was a primary modifiable factor in this case and, as such, ashwagandha (root extract 5% *withanolides*, 500 mg per capsule, CA$0.50/capsule) was recommended at a dose of 1 capsule daily at bedtime. Dietary recommendations were also provided, with instructions to limit sodium intake and caffeine. The patient was also counseled on stress management and encouraged to incorporate 15 to 30 minutes of daily meditation.

Second Visit

On August 12, 2020, the patient presented for her second telemedicine appointment. She reported that taking the ashwagandha supplement caused her to wake at 3:00 am for 3 consecutive nights. She then decided to take the ashwagandha first thing in the morning. Upon further questioning, L.O. indicated that she found reducing her sodium and caffeine consumption to be challenging. She stated the need to consume coffee daily and did not change her sodium consumption. She did start meditating for

15 minutes periodically. L.O. reported that she had not experienced an episode of dizziness, headache, or vertigo within one week of starting supplementation with ashwagandha and periodic meditation. She also noticed significant improvement in stress reduction and an increase in relaxation overall, despite continued neck stiffness. She did not notice fullness in the ears but did continue to report tinnitus that improved with movement. A cervical pillow and magnesium bisglycinate (200 mg) were recommended at the second visit to aid with the neck stiffness. She was advised to discontinue her elemental magnesium.

Third Visit

The patient returned for her third telemedicine appointment on September 2, 2020. She continued to report no episodes of headaches or vertigo. She also noted significant relief from neck and shoulder stiffness with the cervical pillow. L.O. did state that when she forgot to take the magnesium bisglycinate one night, the next day she experienced heaviness and tinnitus in the left ear that lasted for 3 days, but she did not experience the vertigo during these 3 days. The patient was counseled on compliance with all previous recommendations.

Fourth Visit

The patient presented for her fourth appointment on November 25, 2020, and continued to report no episodes of headache or vertigo. She stated that she had decided to stop taking the ashwagandha for several days and noticed an increase in localized pressure behind the left ear. However, when she resumed the supplementation, this pressure resolved. She also reported that the ashwagandha had significantly helped improve her reaction to stressful events as she felt more relaxed and better able to manage being rushed or feeling pressured. During this visit, the patient stated that she had reduced her salt intake; however, this was a challenge as there were family members who did not support this change. She also noted that she had stopped drinking coffee and did not feel the need to use caffeine. She reported good quality sleep with no trouble falling or staying asleep and waking up feeling refreshed.

DISCUSSION

This case report describes the treatment of a 47-year-old female with MD for whom conventional treatment with betahistine failed and who found complete resolution of vertigo with supplementation of *Withania somnifera* and several other stress management interventions (meditation, magnesium, Gingko) and lifestyle modifications. This report could provide evidence that warrants further investigation into the pathogenesis of MD in relation to psychosocial factors.

Differential Diagnosis

It is important to note that the hallmark triad of MD overlaps with other conditions that require further investigation.[3,4,9] This patient had an extensive medical work-up that included an MRI of the brain, which ruled out a cerebrovascular accident (stroke), intracranial tumours (e.g., acoustic neuroma, multiple sclerosis, aneurysms), brain infections, and signs of traumatic brain injury. This patient was also assessed by her primary care provider for orthostatic hypertension, dehydration, and cardiogenic causes, all of which returned negative findings. An extensive evaluation by her otolaryngologist determined that she did not have vestibular migraines, vestibular neuronitis, viral labyrinthitis, or benign paroxysmal positional vertigo. Her diagnosis of MD was given by her otolaryngologist after audiologic and vestibular testing confirmed hearing loss in her left ear, with the presence of vertigo, aural fullness and tinnitus. Due to the limitations of COVID-19, an in-person physical examination could not be performed. There are no current established biomarkers in bloodwork that have been identified to diagnose MD.[1]

Treatment/Interventions

Conventional treatment for MD includes both non-invasive and invasive intervention but no treatment has proven to be curative or provide complete symptom relief.[1,10] Non-invasive treatment options include diuretics, SERC (betahistine) and antiemetics, while invasive treatment options include gentamicin injections, endolymphatic sac decompression, vestibular neurectomy, labyrinthectomy, and steroid injections. Counseling on lifestyle modifications is now also routine and includes a reduction in caffeine and alcohol intake, as well as sodium and monosodium glutamate.[10]

Botanical medicine has been used in the treatment of MD.[11,12] One botanical treatment that has shown some benefit is *Gingko biloba*. One study suggested that *Gingko biloba* was as effective as betahistine in a double-blind, randomized controlled trial.[11] Seventy-nine percent of patients who received *Gingko biloba* reported significant improvement compared with 70% of patients in the betahistine group. This study also found that *Gingko biloba* was better tolerated than the betahistine, with fewer adverse effects. There was significant conflict of interest with the investigators, and the sample size was small. However, *Gingko biloba* is a botanical treatment option, with limitations.[13] For those patients on anticoagulant therapy, the use of *Gingko biloba* may not be a treatment option as it can increase the risk of bleeding. This patient had seen only a slight improvement in her symptoms with the use of *Gingko biloba* and sought naturopathic treatment for further support.

This patient presented to the Robert Schad Naturopathic Clinic (RSNC) with increased stress levels due to the symptoms associated with MD. This was in addition to stress experienced as a result of feeling occasionally rushed. She voiced her inability to cope with stress, and as a result, the recommendation was made to supplement with an adaptogen to help support the body's ability to counteract the effects of stress. *Withania somnifera* has long been used in Ayurvedic medicine to reduce stress and improve overall well-being.[14] The literature demonstrates the effectiveness of this botanical in the reduction of stress and overall improvement in quality of life.[5,14] A dose of 300 mg given twice a day was found to be effective in reducing stress levels.[8] One theory of the mechanism of action of *Withania somnifera* is its ability to decrease the activation of the hypothalamic-pituitary-adrenal (HPA) axis and reduce the release of cortisol in acute stress.[6]

In a study by Aoki et al., they evaluated the association of HPA axis-related hormones in patients with MD regarding cochlear symptoms. The authors found that hearing at high frequency was significantly reduced in patients with an elevated cortisol level. They also observed a significant correlation between serum cortisol levels and average levels of hearing. They suggested that the elevation of cortisol affected endolymph elevation, resulting in hearing loss.[15] There is also minimal evidence that suggests that patients who suffer from tinnitus have higher levels of cortisol.[16] Earlier studies have shown the presence of mineralocorticoid and glucocorticoid receptors in the cochlea, which could result in an imbalance in sodium and potassium levels in the endolymph, with hyperactivation as a result of stress, leading to vertigo and tinnitus in patients with MD.[16]

Currently, there are no known studies that evaluate the use of *Withania somnifera* in individuals with MD suffering from vertigo. This case report provides an additional avenue of investigation on the use of *Withania somnifera* in the management of MD.

Cost Analysis

According to a recent systematic review and meta-analysis on pharmacologic and surgical therapies for patients with MD, a leading cause of disability in Canada is hearing loss.[10] More than one million Canadians are affected by hearing loss, and this has been shown to significantly affect quality of life. While no data could be found for the economic burden of MD in Canada, a British analysis found that a treatment of MD was estimated to cost the health-care sector between US$829.9 and US$934.2 million annually, and on average US$5,112 to US$5,748 per person annually.[17] *Withania somnifera* as an oral supplement costs, on average, CA$0.50 per day for a dosage of 500 mg.[18] This case report suggests that intervention with this adaptogen could potentially resolve vertigo and provide symptomatic relief in patients with MD. Since psychosocial factors have been shown to be a potential trigger for MD, reducing stress levels with *Withania somnifera* may provide relief involving a lower an economic burden both on the health-care system and for the patient.[19]

Limitations

No validated outcome assessment, blinding, or placebo control were used in this case report. The finding of improved symptoms was subjective. By the very nature of a case report, data limitations exist due to a small population size. Concurrent interventions with meditation, magnesium, and *Ginkgo biloba*, used in addition to the *Withania somnifera,* could have contributed to the relief of symptoms.

CONCLUSION

Psychosocial factors may play a role in the development and/or progression of MD. Treatment intervention with *Withania somnifera,* along with multiple stress management interventions (e.g., meditation, magnesium, *Gingko*) and lifestyle modifications, may provide relief from debilitating vertigo associated with this condition. Currently, there are no known studies that evaluate the use of *Withania somnifera,* with or without stress management interventions, in individuals with MD suffering from vertigo. This case report is the first to report a complete resolution of vertigo in a patient diagnosed with MD with the use of an adaptogen. Currently, there are only limited successful treatment options for the treatment of vertigo in naturopathic medicine. Further research is warranted, such as blinded, randomized controlled trials, to evaluate the use of *Withania somnifera,* compared with other adaptogens and/or placebo, in providing relief of vertigo or other associated symptoms in patients diagnosed with MD. Studies of this nature could elucidate the potential pathogenesis of MD and that of vertigo and potentially provide further evidence for the use of adaptogens for acute stress. Future research could direct treatment with *Withania somnifera* in the management of vertigo in patients with MD.

Written informed consent was obtained from the patient for publication of their details.

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CONFLICTS OF INTEREST DISCLOSURE

We have read and understood the *CAND* Journal's policy on conflicts of interest and declare that we have none.

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