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Enhancing evidence-based chiropractic practice: bridging the knowledge-to-action gap for the needs of community-based chiropractors

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Objective: *To summarize key factors of knowledge translation (KT) and offer actionable recommendations to improve uptake and application of evidence-based practice (EBP) in chiropractic care*.

Methods: *We conducted a narrative review searching for KT literature in PubMed, Web of Science, and Scopus from January 2016 to August 2024. Titles and abstracts were screened for eligibility and relevant articles underwent full-text review. We used an expert consensus approach to form our recommendations*.

Améliorer la pratique de la chiropractie fondée sur des données probantes: combler le fossé entre la connaissance et l'action pour les besoins des chiropraticiens communautaires.

Objectifs: *Pour résumer les principaux facteurs du transfert des connaissances et offrir des recommandations concrètes pour améliorer l'adoption et la mise en œuvre des pratiques fondées sur des données probantes (PFDP) dans les soins chiropratiques*.

Méthodes: *Nous avons réalisé une revue narrative à la recherche de documentation sur le transfert des connaissances dans PubMed, Web of Science et Scopus pour la période allant de janvier 2016 à août*

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Results: *We identified KT barriers and facilitators at individual, collegial, and organizational levels. Recommendations include advocating for individual clinicians to pursue continuous education and mentorship, and for professional organizations to support KT funding and foster supportive and collaborative environments for individual clinicians to engage in KT.*

Conclusions: *To bridge the knowledge-to-action (KTA) gap in the chiropractic profession, chiropractors should engage in learning environments to develop necessary EBP skills, while associations should focus on supporting and incentivizing chiropractors to enhance their KT abilities.*

Author's Note: *This paper is one of seven in a series exploring contemporary perspectives on the application of the evidence-based framework in chiropractic care. The Evidence Based Chiropractic Care (EBCC) initiative aims to support chiropractors in their delivery of optimal patient-centred care. We encourage readers to review all papers in the series.*

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KEY WORDS: chiropractic, clinical skills, evidence-based practice, institutional practice, interdisciplinary research, knowledge translation, organizational policy

2024. Les titres et les résumés ont été examinés pour déterminer leur admissibilité et les articles pertinents ont été présentés en vue d'un examen complet. Nous avons utilisé une approche de consensus d'experts pour formuler nos recommandations.

Résultats: *Nous avons cerné des obstacles et des facilitateurs au transfert des connaissances aux niveaux individuel, collégial et organisationnel. Les recommandations incluent de plaider en faveur de la formation continue et du mentorat pour les cliniciens particuliers, et les organisations professionnelles doivent soutenir le financement du transfert des connaissances et favoriser des milieux de soutien et de collaboration pour que les cliniciens particuliers participent à ce transfert.*

Conclusions: *Pour combler le fossé entre la connaissance et l'action dans la profession chiropratique, les chiropraticiens devraient participer dans des milieux d'apprentissage pour améliorer les compétences des PFDP nécessaires, tandis que les associations devraient se concentrer sur le soutien et l'incitation des chiropraticiens à améliorer leurs capacités en transfert des connaissances.*

Note de l'auteur: *Ce document fait partie d'une série de sept documents examinant les perspectives contemporaines sur la mise en œuvre du cadre fondé sur des données probantes pour les soins chiropratiques. L'initiative de soins chiropratiques fondés sur des données probantes (SCFDP) vise à soutenir les chiropraticiens dans la prestation de soins optimaux axés sur le patient. Nous encourageons les lecteurs à consulter tous les articles de la série.*

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MOTS CLÉS : chiropratique, compétences cliniques, pratique fondée sur des données probantes, pratique institutionnelle, recherche interdisciplinaire, transfert des connaissances, politique organisationnelle

Introduction

Evidence-based practice (EBP) is essential to enabling the highest standard of clinical care. Central to EBP is the incorporation of the best available research evidence with clinical expertise, clinical circumstances, and patient preferences, as we discuss in companion articles throughout this JCCA special edition.[1,2] Integrating research evidence into each of these factors of EBP facilitates optimal clinical decision-making, contributing to enhanced patient outcomes.[1]

Effectively applying the best evidence into practice is dependent on the resources available to a clinician,

as well as on a clinician's ability to translate new knowledge into improved practice.[3] This process, however, is often 'slow and haphazard', thereby delaying the benefits of new research and subsequently, improved outcomes for patients.[4,5] There are also inconsistencies across disciplines in the application of high-quality research in practice, posing risk of providing potentially ineffective or even harmful treatments through either outdated or prematurely adopted research.[4] Clinicians also face ever-expanding bodies of literature, making it challenging to keep up-to-date with the latest evidence.[4] Additionally, the support available to clinicians is context-dependent, making it harder for clinicians in private practice settings to efficiently translate new evidence into practice. In Ontario, for example, the majority of chiropractic practitioners are in small, community-based private practice settings, and do not have access to the same institutional supports as other healthcare professions, such as medicine or nursing, practising in the publicly-funded system.

The increasing availability of high-quality research, corresponding with a lack of uptake and utilization of such research has been described as the "knowledge-to-action (KTA) gap".[4] This gap between what clinicians know as opposed to what clinicians actually do has been identified to be an important determinant of overuse, misuse, and underuse of healthcare services, caused by the limited ability of healthcare providers to translate research, policy, and new technology into practice safely and appropriately.[6] As a consequence, patients may not always receive safe and effective healthcare, and even if they do it may not be in a timely manner.[6]

The term "knowledge translation (KT)" has gained prominence in Canada, where KT refers to addressing this gap between knowledge gained from research and knowledge implementation by key stakeholders, including patients, policy-makers, healthcare professionals and others, to improve health outcomes and healthcare efficiency.[4] Bridging the KTA gap therefore requires identifying and overcoming barriers to KT at each of these levels (Figure 1). One significant, looming KTA barrier is the lack of conceptual clarity regarding the meaning of "knowledge translation", creating a source of confusion for researchers and clinicians alike.[4,5] With many existing definitions of KT, one that has been largely adopted comes from the Canadian Institutes of Health Research (CIHR) in 2007,[5] which was subsequently updated in 2016 to describe KT as a:

> *"…dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the healthcare system".*[3]

Nonetheless, ambiguity surrounding a universal understanding of KT remains. Potentially explaining, in part, findings from a recent scoping review analyzing KT, evidence implementation, and research utilization in chiropractic that found there is still a KTA gap between research and practice despite favourable attitudes toward EBP among clinicians.[7] Collectively, this calls for more robust dissemination and implementation of research to improve the application of research into practice.[4,7] Accordingly, the objectives of our paper were to: (1) Summarize key facilitators and barriers to KT of EBP from the published literature; and (2) offer actionable recommendations to improve the uptake and application of EBP in routine chiropractic care.

Methods

Working group

The working group included researchers (n=4), clinicians (n=4), educators (n=3), and Ontario Chiropractic Association staff members (n=2). The group's content expertise and experiential knowledge of the unique challenges faced by healthcare professionals working in private community-based practice settings were incorporated with the literature review findings to guide recommendations.

Study design

We conducted a narrative review of the literature to summarize barriers and facilitators to KT of care providers across all healthcare relevant disciplines, at the individual, collegial/peer, and organizational level. The working group then reviewed the findings and developed actionable recommendations to improve the uptake and application of EBP into chiropractic care.

Data sources and searches

We searched PubMed, Web of Science, and Scopus databases to identify KT articles published between January

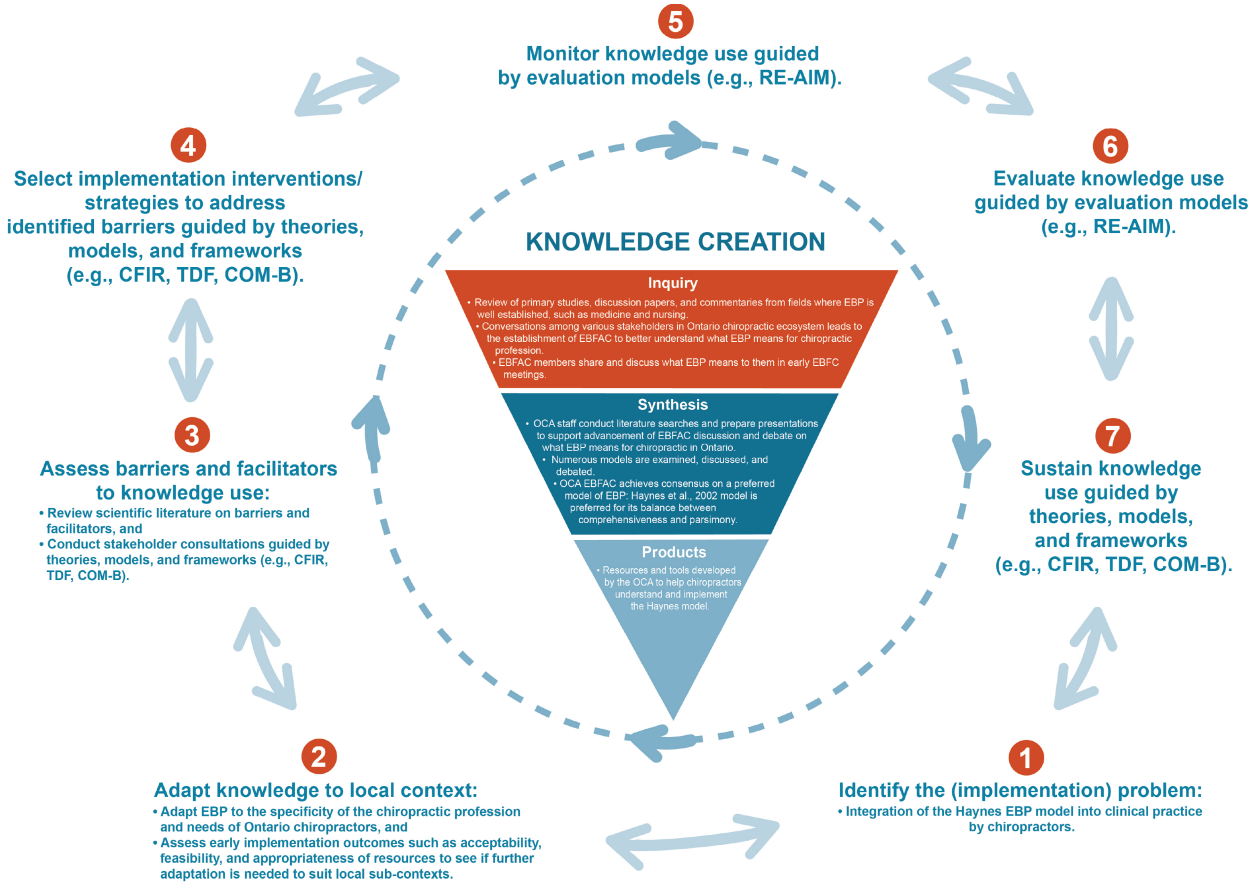

Figure 1.

The knowledge-to-action process: a framework to implement the Haynes EBP model with chiropractors in Ontario and close the KTA gap. Adapted from "The Knowledge to Action Process" by the Canadian Institutes of Health Research (CIHR), as available on the CIHR website.[3] *CFIR = Consolidated Framework for Implementation Research, TDF = Theoretical Domains Framework, COM-B = Capability, Opportunity and Motivation model of Behaviour, RE-AIM = Reach, Effectiveness, Adoption, Implementation, Maintenance.*

1, 2016, and August 1, 2024. This date range was imposed to extend the findings of the 2016 scoping review by Bussières *et al.*[7] and provide a contemporary summary of barriers and facilitators to KT that are applicable to today's clinical chiropractic environment. We employed a range of search terms to capture pertinent literature on barriers and facilitators to KT, evidence integration (EI), or research utilization (RU), in line with our objectives (Appendix 1).

Selection criteria

We included empirical research articles as well as secondary sources of evidence (e.g., systematic, scoping, or narrative reviews, and commentaries) that explored the barriers, facilitators, and strategies for successful KT of EBP, EI, or RU across disciplines. We included articles regardless of discipline because KT implementation strategies are valued and transferable across sectors. We excluded conference abstracts and letters or editorials, as well as articles that did not explicitly analyze KT, EI, or RU.

Screening process

One author assessed titles and abstracts of identified articles to determine eligibility. Articles deemed potentially relevant underwent full-text review by the same author.

The rest of the working group confirmed inclusion of each full-text article.

Data extraction

Descriptive information was extracted from included full-text articles (i.e., first author, year of publication, field/discipline, and barriers and facilitators to KT, EI, or RU). Extracted data were summarized and presented in tabular form and grouped within overarching themes of KT, EI, and RU barriers and facilitators from the reviewed literature by one reviewer. Each barrier and facilitator were also categorized according to whether KT was influenced by individuals alone, the collegial/peer relationship, or organizations/institutions for recommendations by the same reviewer. The data extraction table underwent independent review among the full working group, and required unanimous consensus among the full group.

Data analysis and development of recommendations

Recommendations were developed and proposed individually via e-mail by members of the working group. All recommendations required unanimous consensus to be approved, which was achieved through iterative discussions among the working group, also via e-mail. The recommendations were focused specifically on what professional associations and similar organizations could do to support their members' KT, EI, and RU needs and responsibilities.

Results

Of 1,432 articles identified in database searches, 45 were included in our review (Appendix 2). Included articles encompassed 20 unique health related disciplines with each providing insights into KT and offering barriers and/or facilitators to the effective integration of evidence into clinical practice (Appendix 3).

Barriers and facilitators to KT

We found many key determinants of KT in the reviewed literature that are relevant to community-based chiropractors (Appendix 3), and categorized these into three levels: (1) individual practitioner[7–32], (2) collegial/peer community[7,12,14,16–18,20,23–25,30,32–44], and (3) institutional/organizational[7,8,10–20,23,25–28,31–35,37,38,40–42,44–51] (Figure 2). Regardless of the field of practice, determinants of KT, EI, and RU in practice were found to share commonalities.

Level 1: Barriers and facilitators to KT for the individual practitioner

At the individual level, we identified barriers and facilitators to KT in the reviewed literature that influenced a practitioner's and/or researcher's ability to engage in KT initiatives (Appendix 3).

Barriers

Without adequate training (and/or time to train) in research methods and KT implementation, practitioners across fields often lack the confidence and ability necessary to assess and appropriately translate research into practice.[7,9,10,13,20,22,28,29,32] One systematic review investigating KT of health research found that insufficient critical appraisal skills and difficulty in understanding and applying research among clinicians were major barriers to KT.[10] This issue was also raised in veterinary medicine, in that practitioners tend to focus on journal abstracts rather than the full-text articles, which prevents them from gaining a deeper understanding of the findings and methods described in the parent article.[9] A scoping review exploring uptake of new research and technologies in neurorehabilitation identified that steep learning curves associated with applying new findings or technologies in research also pose barriers to KT, exacerbating challenges of limited research training and KT skills.[20] Moreover, chiropractic literature adds that time constraints faced by practitioners hinders robust dissemination of research into practice, posing challenges to KT regardless of a clinician's KT knowledge, skill, or attitudes.[7,11]

Research involving the disciplines of health policy and physical rehabilitation has identified that tensions within researcher-clinician interactions further serve as a barrier to effective KT, EI, and RU at the individual level.[30,31] In particular, research investigators often develop robust programs of research; however, clinicians face challenges with applying research results to the realities of clinical practice and individual patient circumstances.[30,31] Contextually, these tensions can sometimes arise as a consequence of investigators making recommendations based on ideal circumstances (e.g., carefully calibrated characteristics and inclusion criteria for research participants in fastidiously conducted clinical trials), as compared with

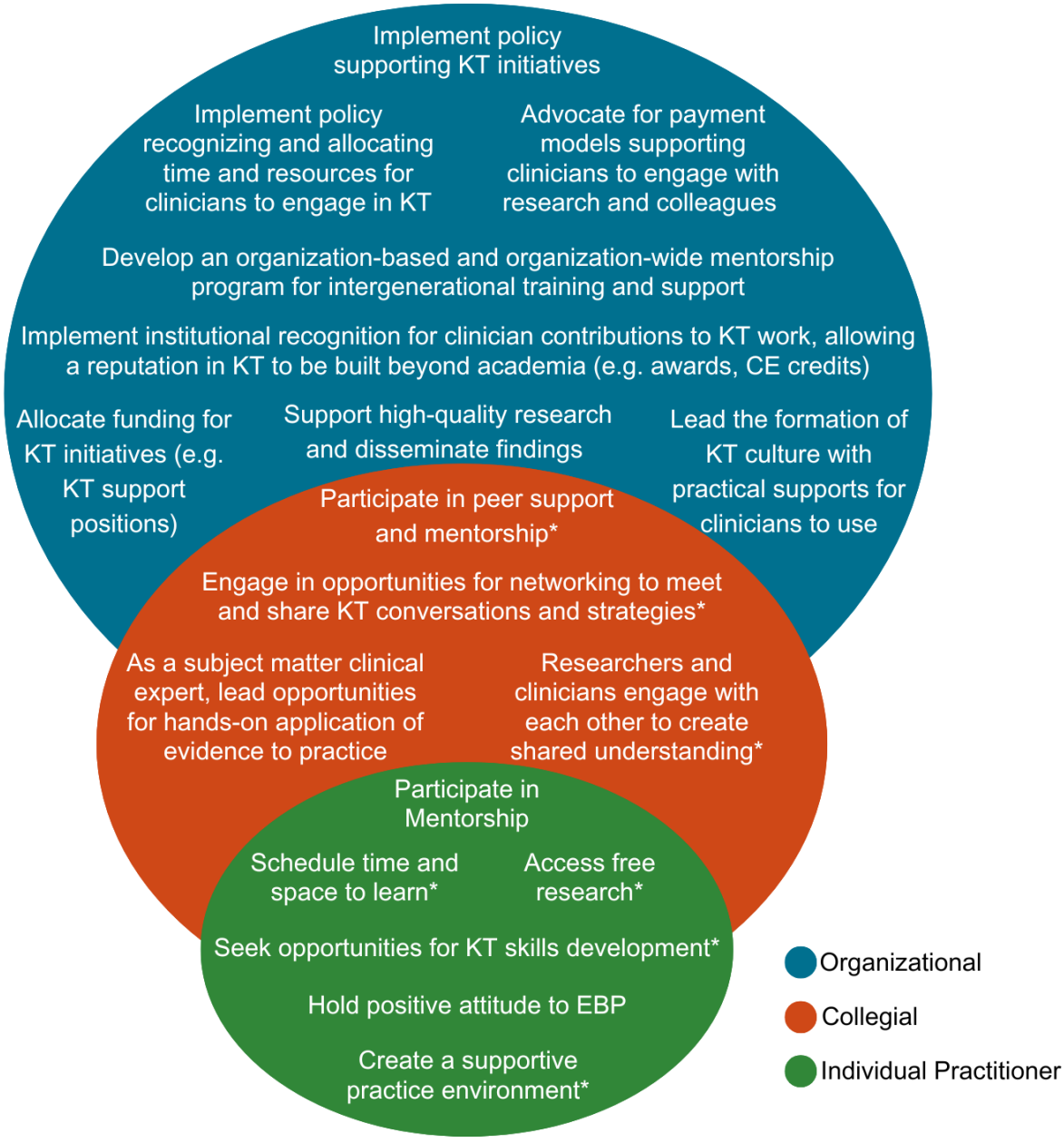

Figure 2.

*Summary of facilitators, enablers, and recommendations for implementing effective KT, EI, and RU in community-based clinical practice. *Indicates individual and collegial level facilitators that can be directly supported by organizations.*

the imperfect and uncalibrated realities faced by practitioners serving patients in clinical practice.[30] Moreover, poor methodological rigour of studies, lack of standardized outcome measures, and feasibility issues for implementing results (e.g., lengthy protocols for clinicians to follow), have additionally been shown to hinder uptake of research into practice.[15,44] A survey of Swiss chiropractors further indicated that a perceived lack of clinical evidence in the chiropractic field itself contributed to limited application of research findings in daily practice.[11]

Facilitators

Research in occupational therapy and physiotherapy education suggests that collaboration between academic faculty, clinical preceptors, researchers, clinicians, and patients in classroom settings can enhance EBP and KT competencies among individual students.[16] Findings from a mixed methods study by Roberge-Dao *et al*. showed that involving clinicians at the start of a research project's conceptualization, as well as throughout the research process, can help improve the external validity of the results and the likelihood of their implementation in practice.[30] Provider internal motivation and willingness to learn have also been shown to be major facilitators for uptake of research and implementation of EBP among individual practitioners in nursing.[10,24]

As suggested in academic and education-related literature, individual level barriers to KT can be balanced by formal institutional recognition of the value of KT work, and the opportunity for researchers to build a reputation in KT, beyond academic publishing, to enhance career development.[19,31] This could incentivize and personally motivate researchers and practitioners alike to overcome barriers to KT at the individual level, and promote better research culture and implementation in general.[19,31] A scoping review investigating KT of EBP practices within cerebral palsy care highlights how protected, or compensated, time for individual clinicians to engage with research facilitates KT and implementation of EBP.[17] Others have similarly shown that compensated 'release time' for clinicians to engage in KT activities effectively facilitates KT.[23]

Research findings themselves can also offer potential incentives for KT.[25] For example, a qualitative study involving Swiss pharmacists and clinicians found that when research favoured implementation of pharmacist/clinician services that had potential to offer economic value to these practitioners, it facilitated uptake of the research findings into clinical practice.[25]

Level 2: Barriers and facilitators to KT for the collegial/peer community

We found several variables in the reviewed literature that influence effective KT at the collegial/peer community level (Appendix 3). In particular, we identified several facilitators that can help overcome common barriers surrounding KT initiatives.

Barriers

Lack of interpersonal skills or physical proximity represent the major barriers to effective KT at the collegial/peer community level. These can lead to limited interdisciplinary collaboration, which has been shown to hinder implementation of care services that are beneficial to patients.[25] A difficult or poor work culture in which colleagues/peers show resistance to change has also been shown to hinder uptake of new findings or methods.[12,14] Due to the collaborative nature of work involving the interdisciplinary and public health fields, literature in these areas offer a unique context for overcoming barriers to effective KT,[35,36,43] as described below.

Facilitators

Findings from both interdisciplinary and public health research suggest that early engagement with stakeholders facilitates KT at the collegial/peer community level by ensuring research is tailored to the end-user.[36,38,43] Moreover, the use of effective knowledge brokers (e.g.., intermediary organizations or persons) to disseminate research or engage stakeholders in collaborative training activities can facilitate evidence-informed decision-making for institutions and clinicians, as well as increase understanding for patients and the public.[17,18,30,35,43] Reviewed literature further suggests that researchers, policy-makers, and practitioners across disciplines must engage in collaborative efforts to enhance their KT abilities.[8,30,32,35,36,38–43] Such efforts contribute to acquired collaborative skills and strengthened partnerships among those involved in the care and research process, further facilitating KT.[34,35,43] Members of multidisciplinary teams, given their unique position to perceive contextual barriers across disciplines, also play a major role in facilitating collaborations and advancing KT.[52]

Another major facilitator of collaboration and KT at the collegial/peer community level is physical proximity (e.g., shared office or clinic space).[23,30,32] Close physical proximity enables more frequent, engaging, and in-person conversations allowing for the sharing of motivations for engaging in KT work and skills development.[30,32] Conversations among practitioners in particular help frame individual clinical projects (e.g., sharing of patient cases, study findings, lectures, etc.) within the broader context of research, fostering an understanding that each project is a part of a larger initiative.[30,36] Moreover, close physical

proximity between researchers and clinicians facilitates researcher and knowledge-user interaction and collaboration, further promoting KT.[23]

Collaborative dialogue among KT stakeholders depends on a strong 'top-down' organizational culture valuing KT, EI, and RU.[37] In the nursing profession, for example, nurses are seen as integral members of care teams, and research utilization in practice depends on access to electronic resources, organizational support for KT-related skills development, and a culture that values continuous learning.[37] A qualitative study of program directors in medical education also found that easy access to summaries, reviews, and guidelines of primary research, facilitated use of research within the field.[14] Some studies further suggest that mentorship programs are effective strategies in facilitating KT (e.g., supportive KT "champions"), bridging knowledge-practice gaps and fostering collaboration among different generations.[7,12,14,17,24,33,39,52]

Level 3: Barriers and facilitators to KT at the institutional/organizational level

At the institutional/organizational level, the main barriers and facilitators to KT that we identified in the reviewed literature included factors that either supported or restricted KT initiatives at the individual or collegial/peer community level (Appendix 3).

Barriers

Lack of funding is a key barrier for KT at the institutional level. For funding to most effectively enable KT, it is necessary to be geared by way of policy to KT, EI, and RU as well as align with the researchers' and institutions' goals and priorities.[47,48] However, developing and maintaining continuity and motivation in funding partnerships is a challenging and intensive process, hence there is a need for institutions to establish KT leaders within their organization to maintain engagement with all stakeholders, including funding agencies.[48,51] A lack of funding and/or institutional restrictions have been demonstrated in the literature to be major organizational barriers to optimal KT.[45] Professional associations, educational institutions, funding agencies, and organizations therefore play an important role in shaping the culture of KT, EI, and RU within practitioner communities.[46] This is particularly done through policy adoption and creating an environment that values KT.[26,53]

Facilitators

A national environmental scan found that demonstrable institutional support and advocacy for practitioners to engage collaboratively with literature was needed to address barriers of evidence-informed healthcare and KT.[38] In particular, institutional backing demonstrated through policies mandating dedicated time for literature review, organizing educational events, and promoting research literacy was suggested in the scan to set the tone for KTA priorities.[38] Organizational supports provided within these expectations included opportunity for building capacity and networks to participate in KT activities, sharing accessible evidence, education, training, motivation/incentives, and enabling researchers to carry out KT activities.[38] Additional literature suggests that tailored capacity building, education, and training sessions for KT purposes offered by organizations in particular, should be recommended across disciplines to bolster KT.[7,12,16,17,19,20,28,33,37,38,45,50] Certain disciplines such as dementia care and neurorehabilitation recommend continuous learning and aligning methods with KT goals, learner preferences, and workplace dynamics to facilitate optimal KT knowledge, skills, and implementation, as well as sustainability and effectiveness of KT.[19,20,33,38]

The reviewed literature also suggested that institutional-level actors are positioned to develop key messaging around KT, EI, and RU that resonates with diverse populations that access the institutions' resources.[19,34] Resources that are dedicated to ensuring the utilization of evidence in practice, such as free educational materials, access to critical reviews, full-text articles and support for RU in practice necessitates leadership, with a commitment to outcomes of KT-advancing initiatives.[7,27,38,50] This requires developing and allocating these resources for staff to foster a culture conducive to effective KT[10–13,18,23,33,38,46], as well as ensuring all resources are easily accessible.[8,14,28,37,50] Medicine-based literature suggests that institutions should also provide practitioners with pre-digested, trusted information, and paid time in daily practice devoted to systematic reading of clinical journals.[27] By providing these resources, organizations can optimize staff time, and improve confidence and ability in effectively translating research into practice.[28,37,50] Additional resources for facilitating KT at the institutional level include continuing education workshops and opportunities for networking with researchers.[10,16,17,23] Organizations

can offer incentives to their members for engaging in KT work[31,32,40–42], as a lack of KT incentives has been demonstrated to restrict KT in the chiropractic literature.[7]

Engaging knowledge-users (e.g., clinicians) in the research process was also found in our review as a key facilitator of KT in practice, particularly when building consensus around policy issues.[35,41,54] Institutions can contribute to this by fostering collaboration among stakeholders.[10,35,41,54] An institution's ability to have well-placed and credible KT researchers helps to facilitate KT activities through the effective installation of leaders who can facilitate and develop strategies to champion KT initiatives and motivate practitioners to join and participate meaningfully.[12,14,17,49] Individuals with such KT expertise would also be able to assist with informing funding agencies to ensure proper allocation of resources, maximizing KT benefits of EBP.[49]

Actioning review findings: context and recommendations

Context

The evolution of the historical boundaries between the public and private health systems in Canada is significant in context, shaping both the nature and level of institutional support for research and KT in these parallel but entangled systems. In the public single-payer system, data collection is centralized at the provincial level and is used to set the strategic direction of payment policy to drive clinical practice improvements and support for research.[55] KT is further supported by physical and social infrastructures characteristic of interprofessional team environments in, for example, hospitals, family health teams, and community health centres.

The situation for community-based private practice is substantially different, and this difference matters for how we conceptualize, plan for, and support KT initiatives in the chiropractic profession. For example, in Ontario, there are some 5,120 licensed chiropractors,[56] ~3,944 of which are members of the OCA. According to market research undertaken by the OCA in 2019, approximately 80% of the chiropractic care delivered is paid for through the private health insurance system,[57] primarily employer-sponsored plans. Though the market in Canada is dominated by a small number of large companies, there are over 160 insurance providers.[58] This results in a high degree of fragmentation and proprietary ownership of data collected by payors and clinics. This largely for-profit context does not have the same drivers of change as a public-payer system.

With respect to research funding, the CIHR has an annual budget of approximately $1 billion allocated across four pillars, which are (understandably) reflective of the priorities of the public system: (1) biomedical; (2) clinical; (3) health systems services; and (4) population health.[59] While research related to chiropractic practice fits within these pillars and does get funded, musculoskeletal (MSK) research related to rehabilitation and prevention does not get as much attention as other priority areas. By contrast, the major funder of chiropractic research in Canada is a private foundation, the Canadian Chiropractic Research Foundation (CCRF) (https://canadianchiropracticresearchfoundation.ca/). The CCRF relies on contributions from individuals, charities, and, in large part chiropractors themselves, via their membership dues in their provincial associations. Over a three-year span up until 2021, the CCRF provided just under $900,000 in grants to support chiropractic research.[60] However, both CCRF and CIHR funding are highly competitive and difficult to access. In 2021, for example, the average size per CIHR grant was $770,000 (CAD) over four years, with only a 17% success rate.[61] Moreover, the CCRF placed a recent funding cap of $25,000 on individual projects and no longer funds chiropractic university-based research chair positions, further limiting access to Canadian chiropractic research funding and support. Thus, there is an opportunity for chiropractic associations to collaborate with research and teaching institutions to monitor the research funding landscape with the aim of supporting chiropractic researchers, and especially early career researchers, to access the diverse sources of funding available.[62] In the Ontario environment these would also include the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council (SSHRC), and Mitacs. However, to access government grants, chiropractic researchers need to hold a faculty position at an academic institution or be directly affiliated with one of the few chiropractic researchers who does.[62] Accordingly, if the chiropractic profession wishes to compete for large research grants and keep pace with other healthcare professions, there needs to be support for university-based faculty positions for chiropractic researchers.

Given this context, while chiropractic clinicians have

Table 1.
Recommendations and corresponding actionable steps to support KT within evidence-based chiropractic practice, focusing on individual, peer/collegial, and organizational levels.

Recommendations	Actionable steps
1. Clinician development in research literacy – the ability to find, understand, evaluate, and apply research evidence (Individual Level)	– Dedicate regular time for reading and critically analyzing relevant research articles. – Participate in workshops or online courses focused on research literacy, including evidence appraisal and interpretation.
2. Participation in clinical research to improve understanding and generate clinically relevant insights (Individual Level)	– Volunteer as a clinician participant in research studies and support research teams by gathering clinical data. – Advise researchers on practical considerations for addressing the research question within real-world clinical settings. – Seek opportunities to collaborate with researchers as a co-investigator or contributor.
3. Engagement in collaborative peer communities, mentorship and networking for continuous learning (Individual and Collegial/Peer Level)	– Join or establish mentorship programs within professional associations. – Participate in peer-led events like webinars and networking meetings to share experiences and challenges related to research application. – Form local or virtual practice groups to discuss challenges and solutions in applying EBP. – Advocate for regional associations to sponsor events or digital platforms that facilitate collaboration.
4. Implementation of KT as a core strategic goal (Organizational Level)	– Include KT goals in strategic and annual plans. – Allocate resources to support KT initiatives among members (e.g., provide free educational materials, digestible summaries of research findings, journal subscriptions). – Host relevant webinars, training, and networking events.
5. Recognition of engagement in research and evidence-based practice initiatives (Organizational Level)	– Establish awards, certifications, or other forms of recognition for members who actively engage in research initiatives and EBP. – Provide incentives for member engagement, such as financial rewards, continuing education credits, or public acknowledgement.
6. Bridging the gap between researchers and clinicians (Organizational Level)	– Organize webinars, workshops, and networking events that facilitate collaboration between researchers and clinicians. – Develop committees or initiatives designed to create practical tools, educational materials, and strategies to bridge the research-to-practice gap.

KT = knowledge translation, *EBP* = evidence-based practice.

a responsibility to provide care that is based on the best available evidence, they need support for all aspects of KT, EI, and RU. Our next section of this paper identifies the opportunities and responsibilities for associations like the OCA to support KT for their members. The recommendations made here are done in accordance with the KT facilitators identified in our literature review.

Recommendations

A summary of our recommendations made based on the findings of this review, along with actionable steps corresponding to each recommendation can be seen in Table 1.

Recommendations: the individual

At the individual level, chiropractors have a responsib-

ility to seek out the best available research evidence and hone the necessary skills for integrating this evidence into their treatment plans with patients.[9,26,27,45] Clinicians should seek to create time and space for learning and development of research literacy and critical appraisal skills to gain the confidence required to apply research in context.[9–12,16,17,23,26,27,45] This should include developing an understanding of core KT competencies[26] and use of specific organizational resources.[26] Clinicians at all career stages can seek out and contribute to supportive professional learning environments, for example, through participation in mentorship and preceptorship programs[7,33,39,52], or by leading or attending webinars, lunch-and-learns, or networking events.[10,16,17,23,30,32,43] This also includes participation in research, whether as a study clinician collecting data from patients, or being involved within the core author group through study development and completion.[8,30,35,41] Clinicians should also advocate on behalf of themselves and the profession for improved supports.

Recommendations: collegial/peer community

At the collegial/peer community level, key recommendations include creating supportive environments for mentorship and modelling of inter-generational learning,[7,33,39,52] as well as opportunities for hands-on application of putting evidence into practice.[30,32,43] Close locational proximity to colleagues and collaborators will help to facilitate this.[23,30,32,43] Given many practitioners in Ontario are in solo practice, organizations such as professional associations could establish or support practice communities in specific geographic areas (e.g., local chiropractic societies or clusters) or across areas of professional interest and expertise. Opportunities for networking to meet with colleagues and researchers to share in substantive KT conversations could improve morale and attitudes regarding KT, EI, and RU, and could be facilitated at the organizational level through the sponsorship of in-person and virtual events.[30,32,43] Organizations could devote resources to keeping abreast of leaders in clinical research and KT, and facilitate access to these people and groups for "rank and file" clinicians.[48,49,51] This may include provision of human resources in KT, financial resources (e.g., providing salary support for a KT champion), and incentivized clinician time.[49] Organizations can also support KT at the collegial/peer community level by promoting conversation and collaboration.[35,43] For example, this might be accomplished by engaging with knowledge brokers to disseminate research[17,18,35] and stakeholders (e.g., clinicians, researchers, patients) to participate in collaborative training activities,[10,16,18,43] or promoting regular dialogue with their members and affiliates on research priorities to inform research investments. Organizations should also facilitate collaboration among researchers and field practitioners to ease noted tensions (or misunderstandings) between the two groups, which will further facilitate KT in clinical practice.[8,30,35,41]

Recommendations: institutional/organizational

At the institutional/organizational level, professional organizations and associations like the OCA are leaders for their membership and, therefore, their values, goals, and mandates serve as a model for those of their professional members and associated research communities. The importance of KT, EI and RU should therefore be reflected at the organizational level as a core aspect of strategic planning, for example, and of formal reporting and other communications to members and stakeholders.[26,38,46] This includes implementing institutional recognition for practitioner contributions to KT and research[19,31,32,40–42], such as through mentor or preceptor awards or certifications. Engagement with the expertise of recognized specialties within the profession, as well as fostering new specialties, could further advance this goal.[49] For example, organizations could allocate dedicated funds to support KT specialists (e.g., knowledge-brokers) to engage with community practitioners.[35] Furthermore, organizations can model the culture of KT via a focus on evaluation and continuous learning in their own programs and initiatives[37], such as through impact evaluations. The OCA and other chiropractic associations can sponsor or organize conferences, seminars, webinars, workshops and other educational platforms to enhance learning opportunities for KT[7,19,28,33,37,38,45,50], ensuring robust scientific validity through careful vetting of presentations and presenters.

In the Ontario environment, the OCA has developed an electronic patient record and practice management platform, called "OCA Aspire,"[63] that allows for the integration of evidence-based pathways into care planning. This platform will assist in transforming both the physical and temporal availability of evidence and best practices, and enable care plan adherence and outcome mon-

itoring. Longer term, the OCA Aspire platform also has significant potential to address issues of data ownership and fragmentation. This could, for the first time, allow individual practitioners and researchers in Ontario (and beyond) to have access to centrally aggregated de-identified data specific to the chiropractic profession, generated through daily encounters with patients logged in electronic health records across the province. Such data could be used to inform future clinical trial research (i.e., higher quality evidence), to support the development of robust clinical guidelines for conditions commonly seen within the chiropractic scope.

Chiropractic organizations might also support KT by developing incentives [9,42,43,51,64–66] tied to healthcare providers' overhead costs, such as membership fees or administrative costs. For example, healthcare professionals could earn reward points or credits for continuing professional development (CPD) hours with substantial KT, EI or RU elements, which could then be used for discounted membership fees. Likewise, organizations including associations and regulatory bodies have an important role to play in the adoption and enforcement of policy and incentives for affording practitioners the time during business hours to collaboratively engage with KT in clinical practice.[19,31] Recognition for mentorship and preceptorship would likewise be contingent on the demonstration of successful role modelling of EI and RU in practice with student interns in clinic. In addition, chiropractic organizations could provide pre-digested and trusted information sourced from recent relevant literature to chiropractors to be considered for implementation into practice.[27] These recommendations all target the need for dedicated time and resources for clinicians to engage in KT, EI, and RU.[7,9,27–29,32]

Discussion

In this paper we aimed to summarize key determinants of KT across disciplines and offer actionable recommendations to improve uptake and application of EBP in routine chiropractic care. We identified KT barriers and facilitators at three levels: (1) individual practitioner, (2) collegial/peer community, and (3) institutional/organizational, in alignment with previous findings.[45] Articles included in our review spanned multiple disciplines. Regardless of the field of practice, we found that barriers and facilitators to KT, EI, and RU in practice shared commonalities, largely because human practitioners were the research users in every case. Importantly, KT, EI, and RU require human research users to become informed, skilled, collaborative, and pragmatic implementers of the best available evidence. The values, supports, and resources attributed to KT require active participation of actors at all three aforementioned levels (i.e., individual, collegial, and institutional), and the efforts and abilities of individual practitioners should be intertwined with organizational RU and EI values, cultures, expectations, attitudes, and opportunities to engage in KT work.

In the chiropractic profession, barriers exist at the individual level regardless of how strongly a practitioner believes in EBP.[2,11,64,66] For instance, chiropractors report "positive attitudes" toward EBP, yet uptake of research into practice, as measured by the use of clinical practice guidelines, is less favourable even when clinicians express confidence in the ability to identify clinically relevant research.[2,64,66] This suggests that chiropractors may be more comfortable consuming research than integrating evidence into clinical practice, which requires additional skill, collaboration, mentorship, and institutional resources, all of which have been identified in the literature as being significant influencers of KT.

Chiropractors' difficulties in integrating evidence into practice may be exacerbated by tensions within researcher-clinician interactions. [30,31] A mixed methods study in physical rehabilitation suggested that tensions develop when researchers provide recommendations that are not easily generalizable to 'real-world' practice.[30] In the 2004 UK BEAM trial[67], for example, 89% of the 11,929 back pain patients identified were either unavailable or excluded prior to randomization, thereby reducing the study's generalizability to a niche low back pain population. In line with reviewed literature, we recommend engaging knowledge-users in the research process to facilitate KT in clinical practice, as well as to build consensus around policy issues.[30,35,36,38,41,43,54]

A lack of time, shown to impact individual, collegial/peer community, and institutional/organizational levels, also likely contributes to limited research uptake into chiropractic practice.[2,11,64,66] Several chiropractic surveys indicate that clinicians report "lack of time" as the most common barrier to developing their EBP skills, despite being interested in improving them.[64,65] In line with our review, this perceived lack of time amongst clinicians can

create significant barriers to KT, including a lack of confidence or ability to locate, interpret, and critically appraise research to apply in clinical practice. [7,32,40,41] As such, organizational provision of training, resources, and pre-digested information to chiropractic clinicians, as well as incentivizing time dedicated to KT (e.g., through reduced membership fees), could enhance KT in the chiropractic profession, particularly because clinicians' attitudes appear to already be favourable toward EBP. Furthermore, in addition to academic journals, knowledge dissemination should occur through additional outlets, including those focusing on community-based providers (e.g., chiropractic opinion leaders) to further bridge the KTA gap.[11,66,68]

Regardless of strategy, effective KT approaches require flexibility to account for varying clinical and local contexts,[69] and must be tailored to overcoming barriers to knowledge use identified in those contexts. KT efforts often fail when KT barrier assessments are not conducted, or KT interventions/implementation strategies are not aligned. Assessments of barriers should therefore be comprehensive, and assessed using frameworks such as the Theoretical Domains Framework (TDF) or Consolidated Framework for Implementation Research (CFIR).[70,71] Additional frameworks such as the Capability, Opportunity, Motivation – Behaviour (COM-B) model can then be used to design KT interventions tailored to address locally identified KT barriers.[21,72] To optimize time and resources in the chiropractic profession, individual practices and chiropractic organizations should assess KT barriers unique to their context, in light of the broader stakeholder and policy landscape.[73]

Overall, the reviewed literature suggests that institutions/organizations play a major role in facilitating KT, as they can cultivate the landscape for KT, EI, and RU culture through their strategic priorities, values, and allocation of resources. In line with our recommendations, organizations can offer sponsorship of in-person and virtual events, devote resources to developing and maintaining leaders in research and KT, and reflect the importance of KT as a core aspect of strategic planning, formal reporting and other communications to members and stakeholders.[8,10–14,16–18,20,23,28–31,40,41,46–48,51] Organizations can also incentivize practitioners by affording them time during business hours to engage with the research literature, as well as with their colleagues, and collaborate on ways to implement the best available evidence into clinical decision-making.[19,31]

Implications for patient outcomes

Integrating best evidence into clinical practice can enhance care quality and patient outcomes (e.g., more effective pain relief, greater functional improvement).[39,74] KT strategies that promote active patient engagement and education have also been shown to result in higher levels of satisfaction, improved adherence to treatment plans, and reduced reliance on opioid prescriptions.[74,75,76,77] As such, the strategic implementation of KT in clinical practice is essential for healthcare providers in delivering higher-quality, effective, safe, patient-centred care.

Limitations

This narrative review has several limitations that are inherent to its design. First, we did not use a systematic search strategy or formal risk of bias assessments, as the goal was to broadly capture literature on KT, EI, and RU from multiple disciplines to inform chiropractic practice rather than to exhaustively review all possible evidence. In narrative reviews, this flexibility can allow for the integration of diverse sources and perspectives, which may be valuable for generating actionable insights. Additionally, only one reviewer initially conducted screening and data extraction, posing bias risk that some authors may have included articles this reviewer excluded in the screening process. However, final inclusion and data extraction of studies was reviewed by the full working group, helping to ensure a broader validation of included studies.

Another limitation is that only English-language articles were included, which may have excluded relevant studies published in other languages. However, given the quantity of literature returned in our searches published in English, we expect that the key findings and recommendations are still well represented. Additionally, the selected timeframe (January 1, 2016, to August 1, 2024) may have limited the findings to recent literature, potentially overlooking studies with relevant insights published prior to 2016. However, this timeframe was chosen to extend the foundational insights from the 2016 landmark scoping review by Bussières *et al*.[7], allowing us to build on previous work while focusing on contemporary barriers and facilitators that are directly applicable to today's clinical environment.

Finally, we did not employ a formal consensus method (e.g., Delphi or nominal group technique) to develop recommendations. Instead, recommendations were derived through iterative discussions among the working group, composed of chiropractors, researchers, and educators with relevant expertise. While this informal consensus process may limit reproducibility, it allowed for practical, context-specific recommendations tailored to the needs of community-based chiropractic practice. Future research could enhance rigor by employing systematic review methodologies, including studies from multiple languages, expanding the timeframe, and using formal consensus methods, such as Delphi panels, to further validate and refine recommendations.

Strengths

This review contributes valuable, context-specific insights that address the practical needs of KT within chiropractic care. By tailoring its focus to the unique barriers and facilitators relevant to community-based chiropractic practice, the review offers recommendations that are directly applicable to clinicians and professional organizations in this field. While it does not introduce new theoretical frameworks, the review fills a gap by providing discipline-specific guidance for chiropractors, a group often underrepresented in broader KT literature. Additionally, the inclusion of cross-disciplinary perspectives enriches the findings, as KT strategies validated in other healthcare disciplines are adapted here for use in chiropractic practice, promoting a more integrated approach. Recognizing the time constraints of busy practitioners, the review emphasizes accessible and practical recommendations, making the KT process more manageable for chiropractic professionals. This flexible approach allows for the integration of recent and relevant literature, which supports actionable steps that can be feasibly implemented in real-world settings.

Future directions

Future research could expand on this review by incorporating primary data collection methods, such as interviews or surveys, to gather in-depth insights from individual practitioners, peer groups, and institutions. Such studies could further explore perspectives on and engagement with KT, EI, and RU initiatives within chiropractic care. Additionally, examining the views and experiences of various stakeholders—ranging from clinicians to organizational leaders—would enhance understanding of the factors that support or hinder KT efforts, potentially leading to more targeted and effective strategies.

Conclusions

Knowledge translation (KT) through evidence integration (EI) and research utilization (RU) in clinical practice is a collaborative endeavour between clinicians and their stakeholder ecosystem. Professional organizations and associations must not only adopt policy and model their value of KT, EI, and RU, but also clearly demonstrate their commitment to improving patient outcomes by equipping their membership with the tools and resources they need to succeed in developing the required skills, research literacy, and confidence for the most effective implementation of KT. The structural significance of professional organizations, regulators and associations cannot be understated, since structural reform has a widespread and influential trickle-down effect for practitioner-members and the patients they care for.

Actionable steps we feel that professional organizations, associations, and funding agencies should take include, but are not limited to: (1) allocating funding to EI and RU implementation initiatives; (2) adopting policy that encourages and incentivizes KT (i.e., paid time during business hours to develop clinicians' KT skills and practical strategies for implementation of EI and RU); (3) developing institution-based and institution-wide mentorship programs that support and prioritize inter-generational mentorship, modelling, and collaboration; and (4) offering programs to facilitate KT using various educational platforms. Practitioners would also benefit from formal, professional, career advancing recognition of their KT implementation work.

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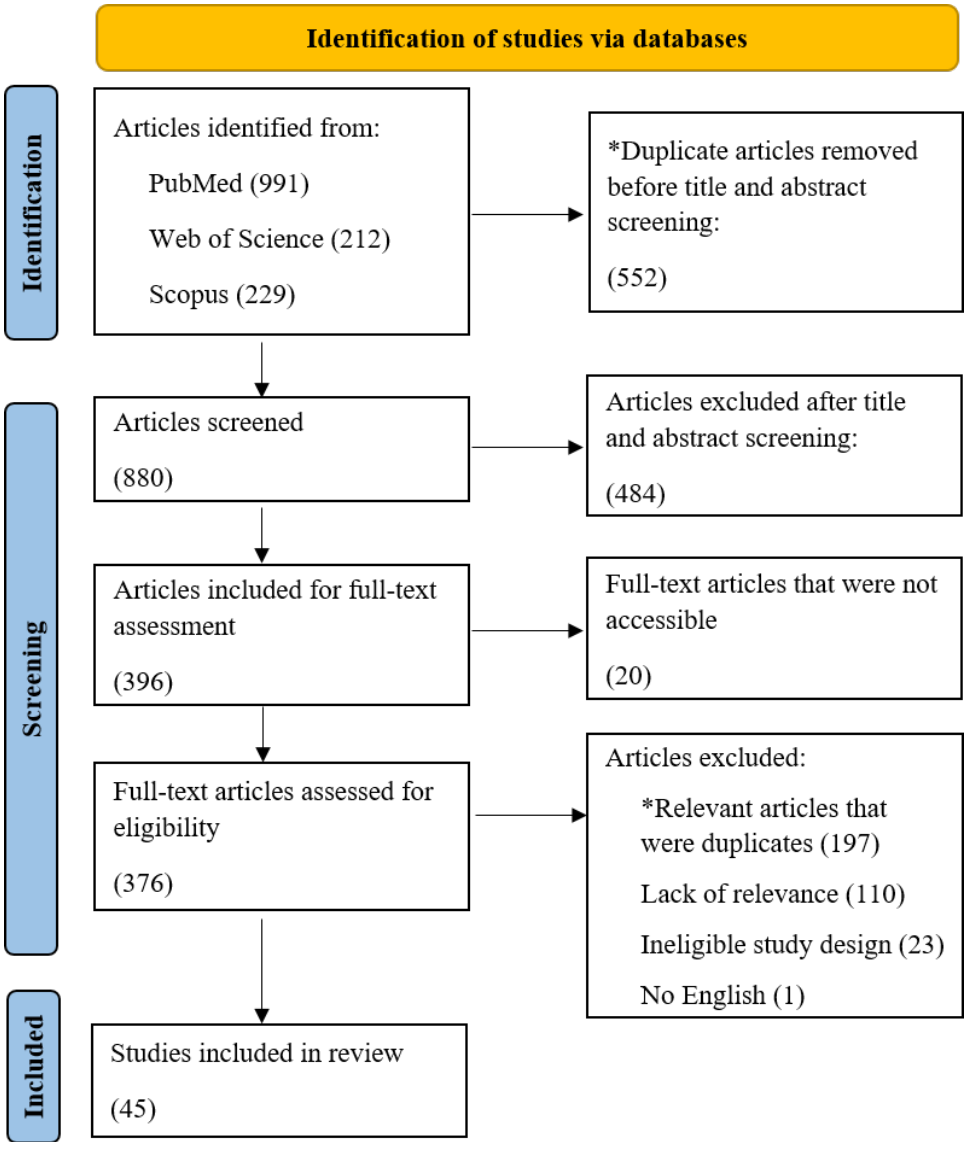
77. Emary PC, Brown AL, Oremus M, Mbuagbaw L, Cameron DF, DiDonato J, et al. The association between chiropractic integration in an Ontario community health centre and continued prescription opioid use for chronic non-cancer spinal pain: a sequential explanatory mixed methods study. BMC Health Serv Res. 2022;22(1):1313.

Appendix 1.
Search terms and phrases.

We used the key terms "knowledge translation," "knowledge-to-action," "evidence integration," "research utilization," "evidence-based practice," "evidence-based medicine" (EBM), and "clinical practice" to identify relevant literature. These terms were utilized in the following phrases to conduct searches in PubMed, Scopus, and Web of Science: (1) "Barriers to Knowledge Translation and Evidence Integration", (2) "Barriers to Knowledge Translation and Evidence Integration and Strategies", (3) "Barriers to Knowledge Translation and Evidence Integration in Evidence Based Medicine", (4) "Barriers to Knowledge Translation and Evidence Integration in Clinical Practice", (5) "Barriers to Knowledge Translation and Evidence Integration in Evidence Based Practice", (6) "'Knowledge Translation' and 'Research Utilization'", (7) "'Evidence Integration' and 'Research Utilization'", (8) "Strategies for Knowledge Translation and Evidence Integration in Clinical Practice", (9) "Strategies for Knowledge Translation and Evidence Integration in Evidence Based Medicine", and (10) "Strategies for Knowledge Translation and Evidence Integration in Evidence Based Practice".

Appendix 2.

Flowchart diagram showing the search and selection process of studies included in this review.



*The search was conducted in two separate phases. Phase one included articles from 2016-2021. In these searches, duplicate articles were removed automatically, prior to screening, both within databases and between databases. For phase two, which included searches for articles from 2022-2024, duplicates were not removed prior to screening. As such, for phase two, duplicates were only accounted for once an article was included following full-text screening.

Appendix 3.

Included papers from our database searches that identify barriers, facilitators and strategies for successful KT of EBP.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Abu-Odah, 2022[10]	Clinical care	-Time constraints, insufficient critical appraisal skills, difficulty applying research -Lack of access or ability to interpret research due to low technology literacy -Insufficient resources to apply research -Lack of training for policy makers and skepticism about research value	-Motivation and interest to engage in research -Institutional support and communication through workshops and knowledge dissemination -Stakeholder early involvement and strong collaboration	**Individual level**: Build KT knowledge capacity. **Institutional/organizational level**: Host workshops and participate in knowledge dissemination initiatives to build clinician motivation and interest of engaging in research.
Albisser, 2022[11]	Chiropractic	-Lack of time -Perceived lack of clinical evidence in chiropractic health field	-Access to free online databases, full-text journal articles, and internet at workplace -Education and training	**Individual level**: Build KT knowledge capacity. **Institutional/organizational level**: Promote existing and valid research within the chiropractic field. Provide free access to various research related materials.
Alvarez, 2018 [49]	Global health	-Lack of guidance, ownership, and engagement for/of stakeholders -Lack of KT knowledge capacity	-Credible leaders for KT initiatives - Institutions that seek or develop KT research experts -KT experts leading and guiding stakeholders, holding them accountable for group progress	**Individual level**: Build KT knowledge capacity among individuals. **Collegial/peer community level**: Develop leadership and expert roles in KT to guide and hold stakeholders accountable. **Institutional/organizational level**: Seek or develop KT research experts within organizations.
Bennett, 2016 [29]	Occupational therapy	-Lack of education and training offered in methods and operationalizing KT -Limited confidence translating research to practice	N/A	**Individual level**: Focus on overcoming the lack of education and training in KT methods. **Collegial/peer community level**: Build confidence in translating research to practice through peer support networks.
Bussières, 2016 [7]	Chiropractic	-Lack of awareness of EBP -Limited access to research and minimal incentives -Limited time, skills (inadequate training in critical appraisal), collaboration, communication and resources -Unfavourable attitudes to EBP	-Access to educational materials, critical reviews, full text articles, and support for RU in practice	**Individual level**: Increase awareness and skills in EBP through training. **Collegial/peer community level**: Promote access to educational materials and collaborative learning opportunities. **Institutional/organizational level**: Provide institutional support and incentives for using EBP.
Cameron, 2020 [34]	Domestic violence	N/A	-Effective institutional communication centering KT that resonates with diverse populations accessing institutional resources	**Institutional/organizational level**: Implement institutional communication strategies that effectively reach diverse populations.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Cassidy, 2021 [45]	Academic research	-Organizational barriers include institutional restrictions, physical location, and lack of funding -Inter-related organizational and interpersonal barriers include competing priorities and power dynamics -Individual barriers include lack of skills -Inter-related individual and interpersonal barriers include being an 'outsider'	-Inter-related organizational and interpersonal facilitators include financial resources, existing relationships, and KT expert support -Individual facilitators include flexibility, adaptability, and reflexivity -Inter-related individual and interpersonal facilitators include trusting relationships, and setting common goals early	**Individual level**: Enhance skill development through targeted training programs. **Institutional/organizational level**: Address institutional restrictions and enhance funding strategies to support KT initiatives.
Cassidy, 2024[12]	Intensive care	-Lack of time -Resistance to change -Insufficient resources for implementation	-Ongoing training -KT champions -Mentorship programs and peer-to-peer learning -Multidisciplinary team meetings -Tailored educational materials	**Individual level**: Continuously engage in KT capacity building and research literacy. **Collegial/peer community level**: Develop leadership and expert roles in KT to lead peers. Engage with other disciplines and researchers. **Institutional/organizational level**: Seek or develop KT research experts within organizations. Provide tailored accessible and easily digestible summaries of research to clinicians
Collie, 2016 [31]	Policy	-Tensions within researcher-clinician interactions	-Institutional provision of human and financial resources -Institutional recognition of KT work -Institutional provision of opportunity for researchers to build a reputation in KT beyond academic publishing -Institutional consideration of KT as a career asset	**Institutional/organizational level**: Provide human and financial resources, recognition of KT work, and opportunities for researchers to build a KT reputation.
Dagne, 2021 [50]	Midwifery	-Lack of access to supports	-Access to free educational materials, critical reviews, full text articles, etc. -Support for RU in practice	**Individual level**: Enhance access to supportive materials for RU practice. **Institutional/organizational level**: Facilitate the provision of free educational materials, critical reviews, and full-text articles.
Dam, 2023[13]	Public health	-Lack of consensus on what constitutes research evidence -Limited skills, time, and organizational support through resources -Evidence-based priorities conflicting with political goals -Gaps in research evidence	-Capacity building on understanding and applying research -Clear communication from research findings -Local evidence to inform context-specific policies -Integrating evidence with other evidence	**Individual level**: Enhance skill development through targeted training programs. Learn to compare and contrast evidence and consider all 'levels' of evidence to address complex issues. **Institutional/organizational level**: Provide human and financial resources, recognition of KT work, and opportunities for researchers to build a KT reputation. Promote the bridge between political goals and evidence-based priorities.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
De Leo, 2019 [28]	Midwifery	-Lack of education and training offered in methods and operationalizing KT -Limited confidence translating research to practice	N/A	**Individual level**: Target the lack of education and training with specific KT methods and operationalizing KT. **Collegial/peer community level**: Address limited confidence in translating research to practice through mentorship and peer learning.
Dobbins, 2018 [43]	Public health	N/A	-Close physical proximity amongst practitioners, peers, and colleagues enabling collaboration -Technology allowing for virtual communication to collaborate -Sponsorship of in-person or online events -Mentorship and modeling for intergenerational learning that includes hands-on application of evidence to practice in supportive environments -Organizational support of communities of practice in specific geographical areas to provide opportunities for networking allowing practitioners and researchers alike to meet and share in substantive KT conversations improving morale and attitudes regarding KT	**Collegial/peer community level**: Enhance collaboration through physical proximity and technology. **Institutional/organizational level**: Support in-person events and mentorship for applying evidence in practice.
Doja, 2022[14]	Medical education	-Time constraints -Resistance to engage in the literature from colleagues	-Easily accessible summaries, reviews, and guidelines of primary research -Supportive "champions" for engaging in the literature	**Individual level**: Build KT knowledge capacity and research literacy among individuals to reduce time needed to engage in research. **Collegial/peer community level**: Develop leadership and expert roles in KT to guide and hold stakeholders accountable. **Institutional/organizational level**: Seek or develop KT research experts within organizations. Provide accessible and easily digestible summaries of research to clinicians.
Edwards, 2023[15]	Clinical care (stroke rehabilitation)	-Poor methodological rigor of studies (study design, sample size, inconsistent or incomplete reporting) -Lack of standardized outcome measures in studies -Feasibility issues, including high costs and lengthy protocols for clinical implementation	-Adhering to reporting guidelines in research (e.g., CONSORT) -Standardized outcome measures across domains -Systematic studies and adherence to transparent reporting practices	**Individual level:** Engage in research studies with high methodological rigor, as well as transparent outcome measures and complete reporting of findings. **Institutional/organizational level:** Develop standardized outcome measures for specific protocols within chiropractic related studies. Contribute funding to such studies.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Généreux, 2019 [33]	Disaster management	-Poor communication between researchers, policy makers, and practitioners	-Intergenerational collaboration (transfer of knowledge between experienced and novice professionals) -Mentorship programs -Strong culture valuing KT	**Individual level**: Develop intergenerational collaboration and mentorship programs. **Collegial/peer community level**: Build a strong culture that values KT through peer support. **Institutional/organizational level**: Encourage effective communication strategies within organizations.
Glegg, 2021[38]	Pediatric research	N/A	-Organizational supports that include building resource capacity and networks to participate in KT activities, sharing accessible evidence, providing education and training, providing motivation/ incentives, assisting with research by providing access to consultations, and providing research-dedicated space	**Institutional/organizational level**: Enhance organizational support to build resource capacity and networks for KT activities, including providing education, training, and motivation/ incentives.
Grant, 2020 [37]	Nursing	N/A	-Organizations forming the landscape of priority, value, and allocation of resources for KT -Organizations forming a KT culture -Access to electronic resources -Organizational time and space to participate in KT-related skills development	**Institutional/organizational level**: Develop an organizational culture and landscape that values KT, including providing access to electronic resources and dedicated time for KT-related skill development.
Hallé, 2024[16]	Physical and occupational rehabilitation therapy	N/A	-Partnership and communication between academic faculty and clinical preceptors -Continuing professional development workshops -Involving panels of stakeholders (researchers, clinicians, patients) in classrooms to discuss EBP -Creating joint clinical-academic positions to strengthen EBP roles	**Individual level:** Engage in KT professional development workshops and courses. **Collegial/peer community level**: Collaborate with academic faculty as a clinician, and engage in consistent communication. **Institutional/organizational level:** Integrate researchers, clinicians and patients into classroom discussions surrounding KT. Foster collaborative positions within both academic and clinical settings.
Haynes, 2018 [46]	Academic research	N/A	-Organizations forming the landscape of priority, value, and allocation of resources for KT -Organizations forming a KT culture	**Institutional/organizational level**: Foster a culture and landscape that prioritizes and values KT.
Hanson, 2024[17]	Clinical care (erebral palsy rehabilitation)	N/A	-Knowledge broker, KT champion, mentorship support -In-person workshops -EBP summaries/tools -Communication with researchers -Compensation/protected time	**Individual level:** Communicate with topic-relevant researchers and offer perspective. **Collegial/peer community level**: Develop leadership and expert roles in KT to champion KT initiatives and mentor colleagues. **Institutional/organizational level**: Seek or develop KT research experts within organizations. Provide accessible and easily digestible summaries of research to clinicians. Compensate clinicians for time dedicated to KT work. Host KT workshops.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Heinsch, 2018 [51]	Social work	-Difficulty developing and maintaining continuity and motivation in funding partnerships	N/A	**Institutional/organizational level**: Tackle the challenge of maintaining funding partnerships to support continuous motivation for KT.
Jakobsen, 2019 [40]	Policy	-Lack of time, skills, and incentives	N/A	**Individual level**: Address the lack of time, skills, and incentives through focused education and training.
Keay, 2020 [9]	Veterinary medicine	-Lack of education and training offered in methods and operationalizing KT -Limited confidence translating research to practice	N/A	**Individual level**: Improve education and training in KT methods. **Collegial/peer community level**: Build confidence in translating research to practice through peer engagement.
Kerr, 2023[18]	Clinical care	-Time constraints -Limited resources -Lack of communication between involved stakeholders	-Knowledge brokers -Electronic evidence library	**Individual level**: Engage with accessible and relevant research. **Collegial/peer community level**: Foster collaborative partnerships between researchers, practitioners, and patients that encourages consistent communication. Consider engaging with knowledge brokers. **Institutional/organizational level**: Address the lack of time, resources, and support for KT and dissemination efforts.
Kwok, 2022[44]	Speech language pathology	-Organizational restrictions -Questioning relevance and validity	-Support from personnel and technology	**Collegial/peer community level**: Support colleagues in appraising and understanding new research and translating findings. Promote open mindedness to colleagues for considering all relevant research prior to questioning relevance and validity. **Institutional/organizational level:** Establish a culture that is supportive of research integration into practice.
Lawrence, 2019 [41]	Policy	-Lack of time, resources, funding, incentives -Limited collaboration and communication amongst researchers and policy makers -Limited understanding of research evidence	- Research-users engagement in the research process (especially when building consensus around policy issues)	**Individual level**: Enhance understanding of research evidence among policymakers. **Collegial/peer community level**: Facilitate engagement in the research process for building consensus on policy issues.
Mallidou, 2018 [26]	Medicine	N/A	-Organizational policy and working environment that values KT and EBP	**Institutional/organizational level**: Emphasize the creation of policies and environments that value KT and EBP.
McGinty, 2019[35]	Inter-disciplinary	N/A	-Research-users engagement in the research process (especially when building consensus around policy issues)	**Collegial/peer community level**: Facilitate research-user engagement in the research process.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
McLean, 2018 [47]	Academic research	-Lack of funding -Funding with unclear goals or allocation	-Funding directly informed by and geared toward policy for KT -Funding that aligns with researcher and institutional goals -Research funders collaborating with other stakeholders	**Individual level**: Provide clear guidance and training on aligning research with policy-driven KT goals. **Collegial/peer community level**: Encourage collaboration among stakeholders for policy-informed research. **Institutional/organizational level**: Ensure funding aligns with the institutional and researcher goals for KT.
Montpetit-Tourangea, 2020 [39]	Physical and occupational rehabilitation therapy	-Lack of time and resources -Minimal stakeholder engagement -Lack of support for KT and dissemination efforts	-Collaborative partnerships between researchers, practitioners, and patients -Practical, and KT related, knowledge and skills of researchers and practitioners	**Individual level**: Improve practical KT knowledge and skills among researchers and practitioners. **Collegial/peer community level**: Foster collaborative partnerships between researchers, practitioners, and patients. **Institutional/organizational level**: Address the lack of time, resources, and support for KT and dissemination efforts.
Murphy, 2024[20]	Clinical care (neurorehabilitation)	-Steep learning curves for working with new technology -Lack of integration with existing clinical workflows	-Continuous training -Involving clinicians in the research and development process -Aligning research and development with clinical goals	**Individual level**: Improve KT knowledge and skills among clinicians. **Collegial/peer community level**: Foster collaborative partnerships between researchers, practitioners, and patients. **Institutional/organizational level**: Summarize how new research and technology can be integrated into existing workflows.
Mwendera, 2016 [8]	AIDS research	-Researchers lack of communication skills -Lack of research collaborations -Lack of platforms for researchers to engage with the public -Lack of funder-driven research -Unknown institutional policy positions -Lack of research repositories	-Collaboration efforts made by researchers, policy makers, and practitioners across disciplines	**Individual level**: Enhance communication skills among researchers. **Collegial/peer community level**: Improve research collaboration and public engagement platforms. **Institutional/organizational level**: Address the lack of funder-driven research and establish clear institutional policy positions.
Philipson, 2016 [19]	Dementia care	N/A	-Institutional provision of human and financial resources -Institutional recognition of KT work -Consideration of KT as a skill	**Institutional/organizational level**: Allocate resources and recognize KT work as a vital skill.
Presseau, 2022[21]	Inter-disciplinary		-Optimizing models/frameworks for quality care by tailoring them to KTA frameworks rather than creating new ones	**Individual level:** Develop skills to apply existing frameworks to various aspects of the KTA framework.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Roberge-Dao, 2019 [30]	Physical and occupational rehabilitation therapy	-Tensions within researcher-clinician interactions	-Physical proximity amongst practitioners, peers, and colleagues enabling collaboration -Technology allowing for virtual communication to collaborate -Mentorship and modeling for intergenerational learning that includes hands-on application of evidence to practice in supportive environments -Organizational support of communities of practice in specific geographical areas to provide opportunities for networking allowing practitioners and researchers alike to meet and share in substantive KT conversations improving morale and attitudes regarding KT -Clinician involvement at the start of project conceptualization and throughout the research process	**Individual level**: Tackle tensions within researcher-clinician interactions by facilitating better communication skills. **Collegial/peer community level**: Enhance physical proximity and use technology for collaboration. **Institutional/organizational level**: Support communities of practice for networking and morale improvement.
Szmaglinska, 2024 [22]	Clinical care	-Lack of formal training and education -Misconceptions of certain research -Time constraints	N/A	**Individual level**: Address narrow-sightedness through broader context training.
Tait, 2019 [32]	Policy	-Lack of education and training offered in methods and operationalizing KT -Limited confidence translating research to practice	-Focusing on developing capacity building, identifying knowledge-practice gaps, and research literacy skills -Close physical proximity amongst practitioners, peers, and colleagues enabling collaboration -Technology allowing for virtual communication to collaborate -Mentorship and modeling for intergenerational learning that includes hands-on application of evidence to practice in supportive environments -Organizational support of communities of practice in specific geographical areas to provide opportunities for networking allowing practitioners and researchers alike to meet and share in substantive KT conversations improving morale and attitudes regarding KT	**Individual level**: Focus on developing capacity building and identifying knowledge-practice gaps. **Collegial/peer community level**: Utilize technology for virtual collaboration and foster close physical proximity for effective teamwork.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Kengne Talla, 2023[23]	Rehabilitation	-Limited availability of researchers and clinicians -Limited budget and resources -Role confusion and overlap	-Organizational support through clinician release time for KT activities -Administrative support with expertise in KT -Close physical proximity between clinicians and researchers -Opportunities for networking with researchers	**Individual level**: Engage in networking events with researchers and other clinicians. Dedicate time to KT capacity building. **Collegial/peer community level**: Foster close physical proximity for effective teamwork. **Institutional/organizational level**: Provide resources, including human, and create environments conducive to KT. Provide release time for clinicians to engage in KT and opportunities for researchers and clinicians to network.
Thürliman, 2022 [24]	Nursing	N/A	-Mentorship -Understanding of role -Motivation and willingness to learn -Teamwork and commitment	**Individual level**: Engage in broad-context training to amplify motivation and willingness to learn. **Collegial/peer community level**: Foster collaboration and conversation among practitioners and researchers. Mentor those who may require it, or seek a mentor for translating evidence to practice.
Uzochukwu, 2016 [42]	Policy	-Distrust and lack of respect between researchers and policy makers	-Collaboration amongst all levels -Trust, mutual respect, and a shared understanding on the importance of evidence informed policy making among researchers and policy makers -Research findings presented in a way that is relevant and actionable for policy makers -Policy makers with skills and knowledge in understanding research	**Collegial/peer community level**: Foster collaboration, trust, and mutual respect between researchers and policymakers. **Institutional/organizational level**: Present research findings in actionable formats for policymakers.
Vaucher, 2016 [27]	Medicine	-Physicians' distrust of pharmaceutical firm influence in clinical research -Non-publication of negative results (publication bias) -Training gaps -Lack of sufficient methodological competences -Perceived mismatch between guideline recommendations and realities of patients' clinical circumstances	-Time and space -Personalized and interactive KT activities -Collegial and institutional support -Low-pressure, collaborative and supportive environments -Resources provided that are dedicated to ensuring RU in practice - Provision of pre-digested and trusted information and paid time in daily practice to systematically reading medical journals	**Individual level**: Address training gaps and methodological competencies through targeted education. **Collegial/peer community level**: Promote personalized and interactive KT activities to foster collegial support. **Institutional/organizational level**: Provide resources and create environments conducive to RU practice and systematic knowledge consumption.
Verville, 2021 [36]	Inter-disciplinary	-Narrow-sightedness on individual projects -Lack of context for researchers and practitioners on the end goal	-Collaboration and conversation among practitioners and researchers	**Individual level**: Address narrow-sightedness through broader context training. **Collegial/peer community level**: Foster collaboration and conversation among practitioners and researchers.

First author, year	Field	Barriers	Facilitators	Recommendations for KT strategies*
Wiss, 2024 [25]	Pharmacy and clinical	-Skepticism of evidence -Lack of awareness on scope of practice -Limited interdisciplinary collaboration	-Perceived benefits of the research/treatment/program -Economic incentives (research findings benefit clinician)	**Individual level**: Address narrow-sightedness through broader context training. **Collegial/peer community level**: Foster collaborative partnerships between researchers, practitioners, and patients. **Institutional/organizational level**: Summarize scope of practice for members. Summarize emerging research findings, and highlight how findings could benefit clinicians and/or patients.
Zych, 2019 [48]	Academic research	-Lack of funding -Funding with unclear goals or allocation	-Funding directly informed by and geared toward policy for KT -Funding that aligns with researcher and institutional goals -Research funders collaborating with other stakeholders	**Individual level**: Provide clear guidance and training on aligning research with policy-driven KT goals. **Collegial/peer community level**: Encourage collaboration among stakeholders for policy-informed research. **Institutional/organizational level**: Ensure funding aligns with the institutional and researcher goals for KT.

EBP = evidence-based practice; *KT* = knowledge translation; *IKT* = integrated knowledge translation; *N/A* = not applicable; *RU* = research utilization.

*Recommendations for strategies based on barriers/facilitators from included studies and consensus amongst authors