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Review Protocol

Implementation Strategies for Evidence-Based Interventions in Kidney Transplant Care: A Scoping Review Protocol

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Abstract

Introduction: Kidney transplantation represents a significant period of transition, presenting numerous challenges for kidney transplant recipients and their families as they adjust to post-transplant life. To ensure kidney transplant recipients achieve optimal health outcomes, it is essential to provide evidence-based interventions (EBIs) in kidney care that encompass prevention, treatment, and long-term maintenance. Therefore, developing effective implementation strategies is crucial to support the execution, adoption, and integration of these EBIs into routine care. **Objective:** This scoping review aims to understand the extent and type of evidence on strategies used to implement EBIs into kidney transplantation care. **Methods:** This scoping review will follow the JBI methodology for scoping reviews. Included sources from databases and grey literature must discuss implementation strategies to support the implementation of EBIs into in-patient adult kidney transplant recipient care. Two independent reviewers will screen titles, abstracts, and full articles and extract data with conflict resolution through discussion or a third reviewer. Directed content analysis will guide the coding of implementation strategies to the clustered Expert Recommendations for Implementing Change (ERIC) taxonomy and barriers and facilitators to the Consolidated Framework for Implementation Research (CFIR). Finally, the ERIC-CFIR mapping tool will be employed to understand whether the appropriate strategies were selected to address the identified barriers and facilitators. Findings will be presented in tabular and visual format, accompanied by text. **Anticipated Results and Conclusion**: The proposed scoping review will illuminate current implementation science gaps and opportunities in kidney transplant. The results will provide insight for health care professionals caring for kidney transplant recipients and guide their selection of implementation strategies to support the uptake of EBIs.

Keywords: nephrology, healthcare, implementation frameworks, implementation taxonomies, JBI

Introduction and Background

In Canada, thousands of individuals are living with end-stage kidney disease (ESRD), where their only treatment options are dialysis or kidney transplantation (Kitzler & Chun, 2023). In 2021, over 18,000 Canadians were living with a functioning kidney transplant (Canadian Institute for Health Information., n.d.). Kidney transplantation is often the preferred treatment for ESRD as it is associated with increased survival and quality of life over dialysis (Nielsen et al., 2019). Kidney transplantation also reduces health care system costs overall (Ferguson et al., 2021).

While kidney transplant is typically associated with improved outcomes over other kidney replacement therapies, transplantation presents challenges for kidney transplant recipients and their caregivers. After transplantation, transplant recipients must follow strict recommendations related to medications and lifestyle modifications to mitigate these risks and preserve health (Jobst et al., 2023; Tang et al., 2020; Tong et al., 2011; Yang et al., 2020). Additionally, kidney transplant recipients are at heightened risk of complications post-operatively, which can ultimately lead to graft loss or death (Hamed et al., 2015; Lubetzky et al., 2016). Evidence-based interventions (EBIs) are needed to support this vulnerable population during the initial post-operative period and beyond in order to optimize health and well-being and to limit risk of graft loss or death. Kidney transplant is a precarious time for recipients and their families, and evidence-based practices are necessary to ensure health care providers are providing optimal care.

Many standard post-op treatments in kidney transplant are evidence-based. Common examples include triple therapy immunosuppression (Kasiske et al., 2010; Szumilas et al., 2023), cytomegalovirus prophylaxis (Vernooij et al., 2024), antihypertensive treatment (Natale et al., 2024), addressing increased skin cancer risk (Granata et al., 2023), vaccinations (Danziger-Isakov & Kumar, 2013), and exercise training (Wilkinson et al., 2022). Ensuring that practice is rooted in evidence helps clinicians provide the care that maximizes health outcomes and minimizes health risk to kidney transplant recipients. However, not all research evidence is integrated into clinical settings.

Gaps

There is a well-known gap between EBIs and their integration into health care. According to Braithwaite and colleagues (2020), the ongoing 60-30-10 Challenge in health care states that 60% of care agrees with best evidence, 30% is unnecessary or inefficient, and the remaining 10% of care results in harm. The gaps illustrated in the 60-30-10 Challenge hinder health care providers' ability to provide care that optimizes patient and health system outcomes. Gaps have been identified between best practices and implementation into practice in the nephrology setting (Jardine et al., 2017). Gaps include failure to detect chronic kidney disease (CKD) early and initiate therapeutic treatment (Luyckx et al., 2024; Padiyar et al., 2024), arrange timely access to replacement therapy (Jardine et al., 2017; Yohanna et al., 2021), and address transplant medication behaviour (Gokoel et al., 2020; Mellon et al., 2022).

Barriers and Facilitators

There are several factors that negatively or positively affect changes in health care practice, also referred to as barriers or facilitators (Flottorp et al., 2013). Examples of these barriers or facilitators to evidence-based practice for clinicians include knowledge, education, or workplace culture (Duff et al., 2020). Considering these contextual factors when discussing implementation efforts is vital, as a determinant to implementing an EBI may be a barrier in one setting or an enabler (or have no impact) in another. Determinant frameworks, such as the Consolidated Framework for Implementation Research (CFIR), are often used to assess contextual barriers and facilitators (Damschroder et al., 2009, 2022). Using the CFIR will identify and classify barriers and facilitators to EBI in the kidney transplant setting.

Implementation Strategies

Implementation strategies can help close the evidence-to-practice gap by addressing identified barriers and facilitators to EBI implementation in health care. Implementation strategies are "methods or techniques to enhance the adoption, implementation, and sustainability of a clinical program or practice" (Proctor et al., 2013, p. 2). Examples of implementation strategies include educational meetings or materials, audit and feedback, and policy changes (Proctor et al., 2013). There is a call to increase implementation science use and understanding in nephrology, including enhancing implementation science capacity among practitioners, contextual considerations, and evaluation of implementation strategies (Jardine et al., 2017). Taxonomies of strategies, such as the Expert Recommendations for Implementing Change (ERIC), can be used to identify and report implementation strategies. Using ERIC will characterize current use of implementation strategies in the kidney transplant setting.

A mapping tool was developed by Waltz and colleagues (2019) that matches CFIR barriers to strategies in the ERIC taxonomy. This helps ensure that implementation barriers are addressed by appropriate strategies. As the tool was recently created, its application and evaluation are limited, yet growing (Bouma et al., 2023; Delaforce et al., 2023; Howell et al., 2022; Rommerskirch-Manietta et al., 2023; Waltz et al., 2019; Weir et al., 2021). The tool has yet to be used in the renal care setting. However, the narrow use and evaluation completed thus far suggest the tool's promise for identifying appropriate strategies (Yakovchenko et al., 2023). Applying the mapping tool to the kidney transplant setting will help ensure identified implementation barriers are addressed with appropriate strategies. Further use of the tool will strengthen the knowledge base on mapping barriers and facilitators to implementation strategies to facilitate successful implementation of evidence into practice.

Initial Literature Search

There is a need to understand which strategies can address barriers in real-life health care settings (Waltz et al., 2019). An initial search of the literature using the words implementation strategies, implementation interventions, and kidney or renal revealed that while reviews have been completed, they are focused on primary care interventions in CKD patients with limited focus on specialized populations such as transplant recipients (Elliott et al., 2017; Galbraith et al., 2018; Silver et al., 2017; Tsang et al., 2016). A review of implementation strategies in renal replacement therapy has been completed; however, the search was completed over 14 years ago (van der Veer et al., 2011). There is more recent interest in renal care implementation strategies, evidenced by the publication of a systematic review protocol on clinician-focused implementation strategies in CKD primary care (Kamath et al., 2019). Further, there is a need to understand implementation processes in renal care. Implementation theories, models, and frameworks help to guide a better understanding of the implementation process (Nilsen, 2015). Additionally, clarity is needed regarding which outcome measures are focused on the implementation process (Proctor et al., 2013, 2023).

A scoping review was selected as the most appropriate method to examine the use of implementation strategies for EBIs in kidney transplant care, as it is often used to map the available evidence on a topic (Munn et al., 2018; Tricco et al., 2016). Scoping reviews also help explore reported outcomes and how they are measured (Pollock et al., 2023). Finally, scoping reviews are beneficial when there is heterogeneity in the literature (Peters, Marnie, et al., 2020), such as with implementation strategies.

A preliminary search of CINAHL, the Cochrane Database of Systematic Reviews, and *JBI Evidence Synthesis* was conducted, and no current or underway systematic reviews or scoping reviews on the topic were identified. This scoping review aims to assess the extent of the literature on the implementation process to bring EBIs into kidney transplant care, focusing on the

implementation strategies. The review will identify barriers and facilitators to EBIs in the kidney transplant setting. Finally, the review will explore whether the selected strategies are appropriate to address the identified barriers and facilitators.

Review Question

The primary review question is as follows: What implementation strategies are used to implement evidence-based interventions in post-kidney transplant care? The sub-questions are as follows:

1. What theories, models, and frameworks were used to guide implementation?
2. What barriers and facilitators have been identified for implementing evidence-based practice?
3. What strategies have been used specifically for adoption, sustainability, and de-implementation?
4. Are the identified barriers and facilitators in alignment with the selected implementation strategies?
5. What are the reported implementation process and outcome measures?

For data analysis, sub-question 2 will use the CFIR, sub-question 3 will use the ERIC taxonomy, and sub-question 4 will used the CFIR-ERIC mapping tool.

Methodology

The proposed scoping review will follow the JBI methodology for scoping reviews published in the *2020 JBI Manual of Evidence Synthesis* (Peters, Godfrey, et al., 2020).

Eligibility Criteria

Following the *JBI Manual of Evidence Synthesis*, the eligibility criteria will be discussed using population (participant), concept, context, and the types of studies to be included (Table 1).

Search Strategy

A preliminary search of CINAHL was completed to identify articles on the topic. The text words in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a complete search strategy for CINAHL in collaboration with a health sciences librarian (Appendix A). The search strategy, including all identified keywords and index terms, will be adapted for each included database. The reference list of all included sources of evidence will be screened for additional studies.

The databases to be searched include CINAHL, Embase, PubMed, Nursing and Allied Health Database, Cochrane Library, and JBI EBP Database. Sources of unpublished studies/grey literature to be searched include ProQuest Dissertations and Theses. There will be no limitations on the geographical location. Studies published in English will be included from the publication date of 1954 onwards, the year of the first successful human kidney transplantation (Tantisattamo et al., 2022). The full search will be conducted with the assistance of the health sciences librarian, who is experienced in scoping reviews.

Evidence Selection

Following the search, all identified citations will be organized and uploaded into systematic review software Covidence (https://www.covidence.org) for removing duplicates and screening. Two independent reviewers will screen the citation titles and abstracts for assessment against the

outlined eligibility criteria. A third independent reviewer will resolve any conflicts. Citations included at the title and abstract stage will be accessed as full texts and uploaded to Covidence to facilitate screening. Two independent reviewers will critically assess the full text of included

Table 1

Eligibility Criteria

Eligibility Criteria	Inclusion	Exclusion
Population	Papers focused on kidney transplantation recipients or health care providers of kidney transplantation recipients will be included in the study. Papers focused on all recipients of all ages, whether de novo (new) or repeat transplant recipients, will be included in the review.	Papers do not include kidney transplant recipients or health care providers of kidney transplant recipients.
Concept	Papers discussing implementation strategies for facilitating the adoption, implementation, sustainability, or de-implementation of EBIs for kidney transplant recipients.	Papers do not discuss implementation strategies related to adoption, implementation, sustainability, or de-implementation of EBIs for kidney transplant recipients.
Context	All settings delivering post-operative solid-organ transplant recipient care (e.g., in-patient [e.g., transplant unit] and outpatient [e.g., post-transplant clinic] settings).	Papers focused on care unrelated to the transplantation (e.g., transplant recipients admitted for surgical intervention unrelated to their transplant).
Types of Studies	• Experimental and quasi-experimental study designs (including randomized controlled trials, non-randomized controlled trials, before and after studies, and interrupted time-series studies) • Analytical observational studies (including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies) • Descriptive observational study designs (e.g., case series, individual case reports, and descriptive cross-sectional studies) • Qualitative studies • Mixed methods studies	• Text and opinion papers • Conference abstracts • Dissertations • Systematic reviews (however, if they otherwise fit the eligibility criteria, their references will be scanned for individual studies that are appropriate for inclusion)

citations against the eligibility criteria. At the full-text stage, the rationale for citation exclusion will be noted and documented in the scoping review. Again, any conflicts will be resolved by a third reviewer. Ongoing discussion among the review team will occur to ensure all reviewers understand the eligibility criteria. A screening guidance sheet will be provided to reviewers. The search results and the study inclusion process will be comprehensively reported in the scoping review and presented visually in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) flow diagram (Tricco et al., 2018).

Data Extraction

Data will be extracted from sources included in the scoping review by two independent reviewers using a data extraction tool developed by the review team. The data extracted will include specific details about the author, publication year, country of origin, study design, study setting, implementation intervention, implementation strategies, and identified barriers and facilitators to the EBI. Strategies will be identified by their target (patient, health care provider, health system) and their purpose (implementation, de-implementation, or sustainability of the EBI). Barriers and facilitators will be further divided into patient-, provider-, and researcher-identified barriers and facilitators. The extraction process will also note whether an implementation theory, model, or framework (and if so, which one) guided the implementation. Acknowledging the increasing focus in implementation science on integrated knowledge translation (Graham et al., 2018; Nguyen et al., 2020), the presence and level of knowledge-user engagement in the implementation process will be captured. Equity, diversity, and inclusion considerations will be extracted to advance these principles in the implementation of EBIs (Baumann et al., 2023; Baumann & Cabassa, 2020; Rodrigues et al., 2023). Finally, included outcomes will be extracted and classified as implementation, clinical, and service system outcomes (Proctor et al., 2011).

A draft data extraction tool was created (Appendix B). The drafted tool will be collaboratively revised throughout the data extraction process. All revisions will be described in the scoping review manuscript. Similarly to screening, a data extraction guidance sheet will also be created to clarify the extraction process. A team approach to communication will be prioritized throughout the review process, from screening to data analysis and presentation. All differences that arise during data extraction will be resolved through a third reviewer and discussion where necessary. If required, authors of included papers will be contacted in pursuit of missing or additional data.

Data Analysis

After the data extraction, the data will be coded to address the objectives of the review fully. Coding will be completed by two independent reviewers who have received training on the included frameworks and taxonomies. Conflicts in the coding process will be resolved through discussion and a third trained reviewer where necessary. A deductive content analysis approach (Hsieh & Shannon, 2005) will be used to code the strategies, determinants, and outcomes. Deductive content analysis is useful when coding data using implementation taxonomies, as the results will be more easily applied to other settings (Delaforce et al., 2023).

Barriers and Facilitators

The CFIR will be used to code barriers to and facilitators for implementing the EBIs in the kidney transplant setting. The CFIR was developed by Damschroder and colleagues (2009) to address the issue of implementation of many similar constructs with slightly different definitions. The original CFIR comprises 39 constructs further categorized into five domains: (a) intervention characteristics, (b) outer setting, (c) inner setting, (d) characteristics of individuals, and (e)

implementation process (Damschroder et al., 2009, 2022). The barriers and facilitators will be coded to constructs within these five domains.

Implementation Strategies

The ERIC taxonomy will be used to code the identified implementation strategies. The ERIC taxonomy was developed by Powell and colleagues (2015) through a modified Delphi process to produce a compilation of 73 discrete strategies and their definitions. Since its conception, it has been further categorized into nine thematic clusters (Waltz et al., 2015). The ERIC taxonomy has also been considered explicitly for de-implementation (Ingvarsson et al., 2022) and sustainability strategies (Nathan et al., 2022). Coders will initially map each strategy to one of the nine thematic clusters: (a) engage consumers, (b) use evaluative and iterative strategies, (c) change infrastructure, (d) adapt and tailor to the context, (e) develop stakeholder interrelationships, (f) utilize financial strategies, (g) support clinicians, (h) provide interactive assistance, and (i) train and educate stakeholders (Waltz et al., 2015).

Alignment of Implementation Strategies with Contextual Determinants

After coding the strategies and contextual determinants, the CFIR-ERIC mapping tool developed by Waltz and colleagues (2019) will be used to determine whether the appropriate strategy was selected to address the identified barriers. The tool was developed by expert consensus and uses barriers identified using the CFIR, prioritizes them, and matches them to strategies in the ERIC taxonomy (Waltz et al., 2019). The mapping tool is downloadable as an Excel file into which barriers categorized by the CFIR can be entered, and a prioritized list of ERIC taxonomy implementation strategies will be produced. The strategies all include a percentage representing the number of experts who felt the strategy to be among the top seven best to address a particular barrier (Waltz et al., 2019). The tool will be used to enter the coded barriers. The output of the strategies will then be used in a comparison matrix to compare to the included literature to determine if the appropriate strategy was selected.

Implementation Outcomes

Given their importance to understanding both the implementation success and how the implementation process drives clinical and health system outcomes, implementation outcomes will be coded using the Outcomes for Implementation Research (Proctor et al., 2023). These eight outcomes were developed from narrative review and through iterative discussion in an expert working group. The eight outcomes include acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost, penetration, and sustainability (Proctor et al., 2023).

Presentation of Results

Results will be presented numerically through frequency counts and percentages, in addition to tabular format where possible. Figures will be created to visualize how the strategies map to the clustered ERIC taxonomy and how barriers and facilitators map to the CFIR. The alignment of the strategy with the identified barriers and facilitators (using the ERIC-CFIR mapping tool) will be displayed in tabular form. Narrative summaries will accompany all data to describe how it relates to the identified objectives of the review.

Scoping review findings will be shared with health care professionals to provide insight into caring for kidney transplant recipients and guide their selection of implementation strategies to support the uptake of evidence-based interventions for improved patient outcomes. The scoping review protocol has been presented at multiple national conferences and meetings. The scoping review findings will be shared at a knowledge translation (KT) implementation research conference.

Locally, results will be disseminated through seminar series or lunch-and-learn events to reach academics and clinicians. The review findings will uncover evidence gaps to inform future implementation research efforts in this area as part of a multi-phase study supporting evidence-based interventions in kidney care. Finally, documented use of the CFIR-ERIC will add to the evidence on determinant-strategy mapping, an area of implementation science requiring further exploration.

Interprofessional Health Education (IPHE) Implications and Conclusion

Implementing EBIs often involves collaboration between several health disciplines to ensure adoption and sustainability of the intervention in practice. Understanding the role and scope of each profession is critical to understanding how health professionals can work together to improve health outcomes. Implementation science is often used by researchers and health care professionals from varied clinical backgrounds. Further, the frameworks and taxonomies employed in this scoping review are useful for supporting interprofessional practice. The CFIR domains and constructs have been used to map barriers and facilitators to interprofessional practice in primary care (Grant et al., 2024). The ERIC taxonomy provides several implementation strategies that can be used in interprofessional practice, such as conducting local consensus discussions or education meetings, creating new clinical teams, or promoting network weaving (Powell et al., 2015). This review will capture current interprofessional practice involving implementation strategies, providing insight into future directions. Integrating implementation science into IPHE provides students with pragmatic ideas and tools to collaboratively improve patient and health system outcomes.

The proposed scoping review will reveal implementation science gaps and opportunities in kidney transplant. The findings will support health care professionals in collaboratively caring for kidney transplant recipients. Firstly, it will characterize current barriers to and facilitators for implementing EBIs into practice, which health care professionals can consider for their local context. Second, it will describe implementation strategies currently used across kidney transplant care. Finally, it will consider the appropriateness of implementation strategies in addressing identified EBI implementation barriers. Overall, the review findings will support the selection of implementation strategies to support the uptake of EBIs across kidney transplant care and beyond.

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Conflict of Interest

No conflict of interest.

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Declaration of Ethics

Ethics not needed for scoping review protocol.

References

Baumann, A. A., & Cabassa, L. J. (2020). Reframing implementation science to address inequities in healthcare delivery. *BMC Health Services Research*, *20*, Article 190. https://doi.org/10.1186/s12913-020-4975-3

Baumann, A. A., Shelton, R. C., Kumanyika, S., & Haire-Joshu, D. (2023). Advancing healthcare equity through dissemination and implementation science. *Health Services Research*, *58*(S3), 327–344. https://doi.org/10.1111/1475-6773.14175

Bouma, S., van den Akker-Scheek, I., Schiphof, D., van der Woude, L., Diercks, R., & Stevens, M. (2023). Implementing lifestyle-related treatment modalities in osteoarthritis care: Identification of implementation strategies using the Consolidated Framework for Implementation Research-Expert Recommendations for Implementing Change matching tool. *Musculoskeletal Care*, *21*(4), 1125–1134. https://doi.org/10.1002/msc.1791

Braithwaite, J., Glasziou, P., & Westbrook, J. (2020). The three numbers you need to know about healthcare: The 60-30-10 Challenge. *BMC Medicine*, *18*, Article 102. https://doi.org/10.1186/s12916-020-01563-4

Canadian Institute for Health Information. (n.d.). *Annual statistics on organ replacement in Canada, 2012 to 2021.* Retrieved September 17, 2023, from https://www.cihi.ca/en/annual-statistics-on-organ-replacement-in-canada-2012-to-2021

Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. *Implementation Science*, *4*, Article 50. https://doi.org/10.1186/1748-5908-4-50

Damschroder, L. J., Reardon, C. M., Widerquist, M. A. O., & Lowery, J. (2022). The updated Consolidated Framework for Implementation Research based on user feedback. *Implementation Science*, *17*, Article 75. https://doi.org/10.1186/s13012-022-01245-0

Danziger-Isakov, L., & Kumar, D. (2013). Vaccination in solid organ transplantation. *American Journal of Transplantation*, *13*(S4), 311–317. https://doi.org/10.1111/ajt.12122

Delaforce, A., Li, J., Grujovski, M., Parkinson, J., Richards, P., Fahy, M., Good, N., & Jayasena, R. (2023). Creating an implementation enhancement plan for a digital patient fall prevention platform using the CFIR-ERIC approach: A qualitative study. *International Journal of Environmental Research and Public Health*, *20*(5), Article 3794. https://doi.org/10.3390/ijerph20053794

Duff, J., Cullen, L., Hanrahan, K., & Steelman, V. (2020). Determinants of an evidence-based practice environment: An interpretive description. *Implementation Science Communications*, *1*, Article 85. https://doi.org/10.1186/s43058-020-00070-0

Elliott, M. J., Gil, S., Hemmelgarn, B. R., Manns, B. J., Tonelli, M., Jun, M., & Donald, M. (2017). A scoping review of adult chronic kidney disease clinical pathways for primary care. *Nephrology, Dialysis, Transplantation*, *32*(5), 838–846. https://doi.org/10.1093/ndt/gfw208

Ferguson, T. W., Whitlock, R. H., Bamforth, R. J., Beaudry, A., Darcel, J., Di Nella, M., Rigatto, C., Tangri, N., & Komenda, P. (2021). Cost-utility of dialysis in Canada: Hemodialysis, peritoneal dialysis, and nondialysis treatment of kidney failure. *Kidney Medicine*, *3*(1), 20–30.E1. https://doi.org/10.1016/j.xkme.2020.07.011

Flottorp, S. A., Oxman, A. D., Krause, J., Musila, N. R., Wensing, M., Godycki-Cwirko, M., Baker, R., & Eccles, M. P. (2013). A checklist for identifying determinants of practice: A systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. *Implementation Science*, *8*, Article 35. https://doi.org/10.1186/1748-5908-8-35

Galbraith, L., Jacobs, C., Hemmelgarn, B. R., Donald, M., Manns, B. J., & Jun, M. (2018). Chronic disease management interventions for people with chronic kidney disease in primary care: A

systematic review and meta-analysis. *Nephrology Dialysis Transplantation*, *33*(1), 112–121. https://doi.org/10.1093/ndt/gfw359

Gokoel, S. R. M., Gombert-Handoko, K. B., Zwart, T. C., van der Boog, P. J. M., Moes, D. J. A. R., & de Fijter, J. W. (2020). Medication non-adherence after kidney transplantation: A critical appraisal and systematic review. *Transplantation Reviews*, *34*(1), Article 100511. https://doi.org/10.1016/j.trre.2019.100511

Graham, I. D., Kothari, A., & McCutcheon, C., On behalf of the Integrated Knowledge Translation Research Network Project Leads. (2018). Moving knowledge into action for more effective practice, programmes and policy: Protocol for a research programme on integrated knowledge translation. *Implementation Science*, *13*, Article 22. https://doi.org/10.1186/s13012-017-0700-y

Granata, S., Tessari, G., Stallone, G., & Zaza, G. (2023). Skin cancer in solid organ transplant recipients: Still an open problem. *Frontiers in Medicine*, *10*, Article 1189680. https://doi.org/10.3389/fmed.2023.1189680

Grant, A., Kontak, J., Jeffers, E., Lawson, B., MacKenzie, A., Burge, F., Boulos, L., Lackie, K., Marshall, E. G., Mireault, A., Philpott, S., Sampalli, T., Sheppard-LeMoine, D., & Martin-Misener, R. (2024). Barriers and enablers to implementing interprofessional primary care teams: A narrative review of the literature using the consolidated framework for implementation research. *BMC Primary Care*, *25*, Article 25. https://doi.org/10.1186/s12875-023-02240-0

Hamed, M. O., Chen, Y., Pasea, L., Watson, C. J., Torpey, N., Bradley, J. A., Pettigrew, G., & Saeb-Parsy, K. (2015). Early graft loss after kidney transplantation: Risk factors and consequences. *American Journal of Transplantation*, *15*(6), 1632–1643. https://doi.org/10.1111/ajt.13162

Howell, D., Powis, M., Kirkby, R., Amernic, H., Moody, L., Bryant-Lukosius, D., O'Brien, M. A., Rask, S., & Krzyzanowska, M. (2022). Improving the quality of self-management support in ambulatory cancer care: A mixed-method study of organisational and clinician readiness, barriers and enablers for tailoring of implementation strategies to multisites. *BMJ Quality & Safety*, *31*(1), 12–22. https://doi.org/10.1136/bmjqs-2020-012051

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Ingvarsson, S., Hasson, H., von Thiele Schwarz, U., Nilsen, P., Powell, B. J., Lindberg, C., & Augustsson, H. (2022). Strategies for de-implementation of low-value care—A scoping review. *Implementation Science*, *17*, Article 73. https://doi.org/10.1186/s13012-022-01247-y

Jardine, M. J., Kasiske, B., Adu, D., Alrukhaimi, M., Ashuntantang, G. E., Basnet, S., Chailimpamontree, W., Craig, J. C., O'Donoghue, D. J., Perkovic, V., Powe, N. R., Roberts, C. J., Suzuki, Y., Tanaka, T., & Uhlig, K. (2017). Closing the gap between evidence and practice in chronic kidney disease. *Kidney International Supplements*, *7*(2), 114–121. https://doi.org/10.1016/j.kisu.2017.07.006

Jobst, S., Stadelmaier, J., Zöller, P., Grummich, K., Schmucker, C., Wünsch, A., Kugler, C., & Rebafka, A. (2023). Self-management in adults after solid-organ transplantation: A scoping review protocol. *BMJ Open*, *13*(1), Article e064347. https://doi.org/10.1136/bmjopen-2022-064347

Kamath, C. C., Dobler, C. C., Lampman, M. A., Erwin, P. J., Matulis, J., Elrashidi, M., McCoy, R. G., Alsawaz, M., Pajouhi, A., Vasdev, A., Shah, N. D., Murad, M. H., & Thorsteinsdottir, B. (2019). Implementation strategies for interventions to improve the management of chronic kidney disease (CKD) by primary care clinicians: Protocol for a systematic review. *BMJ Open*, *9*(8), Article e027206. https://doi.org/10.1136/bmjopen-2018-027206

Kasiske, B. L., Zeier, M. G., Chapman, J. R., Craig, J. C., Ekberg, H., Garvey, C. A., Green, M. D., Jha, V., Josephson, M. A., Kiberd, B. A., Kreis, H. A., McDonald, R. A., Newmann, J. M., Obrador, G. T., Vincenti, F. G., Cheung, M., Earley, A., Raman, G., Abariga, S., … Balk, E. M. (2010). KDIGO

clinical practice guideline for the care of kidney transplant recipients: A summary. *Kidney International*, *77*(4), 299–311. https://doi.org/10.1038/ki.2009.377

Kitzler, T. M., & Chun, J. (2023). Understanding the current landscape of kidney disease in Canada to advance precision medicine guided personalized care. *Canadian Journal of Kidney Health and Disease*, *10*, Article 20543581231154185. https://doi.org/10.1177/20543581231154185

Lubetzky, M., Yaffe, H., Chen, C., Ali, H., & Kayler, L. K. (2016). Early readmission after kidney transplantation: Examination of discharge-level factors. *Transplantation*, *100*(5), 1079–1085. https://doi.org/10.1097/TP.0000000000001089

Luyckx, V. A., Tuttle, K. R., Abdellatif, D., Correa-Rotter, R., Fung, W. W. S., Haris, A., Hsiao, L.-L., Khalife, M., Kumaraswami, L. A., Loud, F., Raghavan, V., Roumeliotis, S., Sierra, M., Ulasi, I., Wang, B., Lui, S.-F., Liakopoulos, V., & Balducci, A., for the World Kidney Day Joint Steering Committee. (2024). Mind the gap in kidney care: Translating what we know into what we do. *Kidney International*, *105*(3), 406–417. https://doi.org/10.1016/j.kint.2023.12.003

Mellon, L., Doyle, F., Hickey, A., Ward, K. D., de Freitas, D. G., McCormick, P. A., O'Connell, O., & Conlon, P. (2022). Interventions for increasing immunosuppressant medication adherence in solid organ transplant recipients. *Cochrane Database of Systematic Reviews*, (9), Article CD012854. https://doi.org/10.1002/14651858.CD012854.pub2

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, *18*, Article 143. https://doi.org/10.1186/s12874-018-0611-x

Natale, P., Mooi, P. K. L., Green, S. C., Cross, N. B., Cooper, T. E., Webster, A. C., Masson, P., Craig, J. C., & Strippoli, G. F. M. (2024). Antihypertensive treatment for kidney transplant recipients. *Cochrane Database of Systematic Reviews*, (7), Article CD003598. https://doi.org/10.1002/14651858.CD003598.pub3

Nathan, N., Powell, B. J., Shelton, R. C., Laur, C. V., Wolfenden, L., Hailemariam, M., Yoong, S. L., Sutherland, R., Kingsland, M., Waltz, T. J., & Hall, A. (2022). Do the Expert Recommendations for Implementing Change (ERIC) strategies adequately address sustainment? *Frontiers in Health Services*, *2*, Article 905909. https://www.frontiersin.org/articles/10.3389/frhs.2022.905909

Nguyen, T., Graham, I. D., Mrklas, K. J., Bowen, S., Cargo, M., Estabrooks, C. A., Kothari, A., Lavis, J., Macaulay, A. C., MacLeod, M., Phipps, D., Ramsden, V. R., Renfrew, M. J., Salsberg, J., & Wallerstein, N. (2020). How does integrated knowledge translation (IKT) compare to other collaborative research approaches to generating and translating knowledge? Learning from experts in the field. *Health Research Policy and Systems*, *18*, Article 35. https://doi.org/10.1186/s12961-020-0539-6

Nielsen, C., Clemensen, J., Bistrup, C., & Agerskov, H. (2019). Balancing everyday life—Patients' experiences before, during and four months after kidney transplantation. *Nursing Open*, *6*(2), 443–452. https://doi.org/10.1002/nop2.225

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*, Article 53. https://doi.org/10.1186/s13012-015-0242-0

Padiyar, A., Sarabu, N., Ahlawat, S., Thatcher, E. J., Roeper, B. A., Anantharamakrishnan, A., Runnels, P., Bahner, C., Lang, S. E., Barnett, T. D., Raghuwanshi, Y., & Pronovost, P. J. (2024). Bridging the evidence and practice gap in chronic kidney disease: A system thinking approach to population health. *Population Health Management*, *27*(3), 151–159. https://doi.org/10.1089/pop.2023.0275

Peters, M. D. J., Godfrey, C., McInerney, P., Munn, Z., Tricco, A. C., & Khalil, H. (2020, June). Chapter 11: Scoping reviews. In E. Aromataris & Z. Munn (Eds.), *JBI Manual for Evidence Synthesis.* JBI. https://doi.org/10.46658/JBIMES-20-12

Peters, M. D. J., Marnie, C., Tricco, A. C., Pollock, D., Munn, Z., Alexander, L., McInerney, P., Godfrey, C. M., & Khalil, H. (2020). Updated methodological guidance for the conduct of scoping reviews. *JBI Evidence Synthesis*, *18*(10), 2119–2126. https://doi.org/10.11124/JBIES-20-00167

Pollock, D., Peters, M. D. J., Khalil, H., McInerney, P., Alexander, L., Tricco, A. C., Evans, C., de Moraes, É. B., Godfrey, C. M., Pieper, D., Saran, A., Stern, C., & Munn, Z. (2023). Recommendations for the extraction, analysis, and presentation of results in scoping reviews. *JBI Evidence Synthesis*, *21*(3), 520–532. https://doi.org/10.11124/JBIES-22-00123

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., Proctor, E. K., & Kirchner, J. E. (2015). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, *10*, Article 21. https://doi.org/10.1186/s13012-015-0209-1

Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health, 38*(2), 65–76. https://doi.org/10.1007/s10488-010-0319-7

Proctor, E. K., Bunger, A. C., Lengnick-Hall, R., Gerke, D. R., Martin, J. K., Phillips, R. J., & Swanson, J. C. (2023). Ten years of implementation outcomes research: A scoping review. *Implementation Science*, *18*, Article 31. https://doi.org/10.1186/s13012-023-01286-z

Proctor, E. K., Powell, B. J., & McMillen, J. C. (2013). Implementation strategies: Recommendations for specifying and reporting. *Implementation Science*, *8*, Article 139. https://doi.org/10.1186/1748-5908-8-139

Rodrigues, I. B., Fahim, C., Garad, Y., Presseau, J., Hoens, A. M., Braimoh, J., Duncan, D., Bruyn-Martin, L., & Straus, S. E. (2023). Developing the intersectionality supplemented Consolidated Framework for Implementation Research (CFIR) and tools for intersectionality considerations. *BMC Medical Research Methodology*, *23*, Article 262. https://doi.org/10.1186/s12874-023-02083-4

Rommerskirch-Manietta, M., Manietta, C., Purwins, D., Braunwarth, J. I., Quasdorf, T., & Roes, M. (2023). Mapping implementation strategies of evidence-based interventions for three preselected phenomena in people with dementia—A scoping review. *Implementation Science Communications*, *4*, Article 104. https://doi.org/10.1186/s43058-023-00486-4

Silver, S. A., Bell, C. M., Chertow, G. M., Shah, P. S., Shojania, K., Wald, R., & Harel, Z. (2017). Effectiveness of quality improvement strategies for the management of CKD: A meta-analysis. *Clinical Journal of the American Society of Nephrology*, *12*(10), 1601–1614. https://doi.org/10.2215/CJN.02490317

Szumilas, K., Wilk, A., Wiśniewski, P., Gimpel, A., Dziedziejko, V., Kipp, M., & Pawlik, A. (2023). Current status regarding immunosuppressive treatment in patients after renal transplantation. *International Journal of Molecular Sciences*, *24*(12), Article 10301. https://doi.org/10.3390/ijms241210301

Tang, J., James, L., Howell, M., Tong, A., & Wong, G. (2020). eHealth interventions for solid organ transplant recipients: A systematic review and meta-analysis of randomized controlled trials. *Transplantation*, *104*(8), e224–e235. https://doi.org/10.1097/TP.0000000000003294

Tantisattamo, E., Maggiore, U., & Piccoli, G. B. (2022). History of kidney transplantation: A journey of progression and evolution for success. *Journal of Nephrology*, *35*(7), 1783–1786. https://doi.org/10.1007/s40620-022-01453-3

Tong, A., Howell, M., Wong, G., Webster, A. C., Howard, K., & Craig, J. C. (2011). The perspectives of kidney transplant recipients on medicine taking: A systematic review of qualitative studies. *Nephrology, Dialysis, Transplantation*, *26*(1), 344–354. https://doi.org/10.1093/ndt/gfq376

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K., Colquhoun, H., Kastner, M., Levac, D., Ng, C., Sharpe, J. P., Wilson, K., Kenny, M., Warren, R., Wilson, C., Stelfox, H. T., & Straus, S. E. (2016). A scoping review on the conduct and reporting of scoping reviews. *BMC Medical Research Methodology*, *16*, Article 15. https://doi.org/10.1186/s12874-016-0116-4

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for Scoping Reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467–473. https://doi.org/10.7326/M18-0850

Tsang, J. Y., Blakeman, T., Hegarty, J., Humphreys, J., & Harvey, G. (2016). Understanding the implementation of interventions to improve the management of chronic kidney disease in primary care: A rapid realist review. *Implementation Science*, *11*, Article 47. https://doi.org/10.1186/s13012-016-0413-7

van der Veer, S. N., Jager, K. J., Nache, A. M., Richardson, D., Hegarty, J., Couchoud, C., de Keizer, N. F., & Tomson, C. R. V. (2011). Translating knowledge on best practice into improving quality of RRT care: A systematic review of implementation strategies. *Kidney International*, *80*(10), 1021–1034. https://doi.org/10.1038/ki.2011.222

Vernooij, R. W. M., Michael, M., Ladhani, M., Webster, A. C., Strippoli, G. F. M., Craig, J. C., & Hodson, E. M. (2024). Antiviral medications for preventing cytomegalovirus disease in solid organ transplant recipients. *Cochrane Database of Systematic Reviews*, (5), Article CD003774. https://doi.org/10.1002/14651858.CD003774.pub5

Waltz, T. J., Powell, B. J., Fernández, M. E., Abadie, B., & Damschroder, L. J. (2019). Choosing implementation strategies to address contextual barriers: Diversity in recommendations and future directions. *Implementation Science*, *14*, Article 42. https://doi.org/10.1186/s13012-019-0892-4

Waltz, T. J., Powell, B. J., Matthieu, M. M., Damschroder, L. J., Chinman, M. J., Smith, J. L., Proctor, E. K., & Kirchner, J. E. (2015). Use of concept mapping to characterize relationships among implementation strategies and assess their feasibility and importance: Results from the Expert Recommendations for Implementing Change (ERIC) study. *Implementation Science*, *10*, Article 109. https://doi.org/10.1186/s13012-015-0295-0

Weir, A., Presseau, J., Kitto, S., Colman, I., & Hatcher, S. (2021). Strategies for facilitating the delivery of cluster randomized trials in hospitals: A study informed by the CFIR-ERIC matching tool. *Clinical Trials*, *18*(4), 398–407. https://doi.org/10.1177/17407745211001504

Wilkinson, T. J., Bishop, N. C., Billany, R. E., Lightfoot, C. J., Castle, E. M., Smith, A. C., & Greenwood, S. A. (2022). The effect of exercise training interventions in adult kidney transplant recipients: A systematic review and meta-analysis of randomised control trials. *Physical Therapy Reviews*, *27*(2), 114–134. https://doi.org/10.1080/10833196.2021.2002641

Yakovchenko, V., Lamorte, C., Chinman, M. J., Goodrich, D. E., Gibson, S., Park, A., Bajaj, J. S., McCurdy, H., Morgan, T. R., & Rogal, S. S. (2023). Comparing the CFIR-ERIC matching tool recommendations to real-world strategy effectiveness data: A mixed-methods study in the Veterans Health Administration. *Implementation Science*, *18*, Article 49. https://doi.org/10.1186/s13012-023-01307-x

Yang, F.-C., Chen, H.-M., Pong, S.-C., Chen, C.-H., Wang, S.-S., & Chen, C.-M. (2020). Difficulties and coping strategies of kidney-transplant recipients during their dark postoperative recovery stage after returning home. *Transplantation Proceedings*, *52*(10), 3226–3230. https://doi.org/10.1016/j.transproceed.2020.05.011

Yohanna, S., Naylor, K. L., Mucsi, I., McKenzie, S., Belenko, D., Blake, P. G., Coghlan, C., Dixon, S. N., Elliott, L., Getchell, L., Ki, V., Nesrallah, G., Patzer, R. E., Presseau, J., Reich, M., Sontrop, J. M., Treleaven, D., Waterman, A. D., Zaltzman, J., & Garg, A. X. (2021). A quality improvement intervention to enhance access to kidney transplantation and living kidney donation (EnAKT LKD) in patients with chronic kidney disease: Clinical research protocol of a cluster-randomized clinical trial. *Canadian Journal of Kidney Health and Disease*, *8*, Article 2054358121997266. https://doi.org/10.1177/2054358121997266

Appendices

Appendix A: CINAHL Search Strategy – January 2025

Search	Query	Results
S1	(MH "Kidney Transplantation")	13,159
S2	TI ("kidney transplant*" OR "renal transplant*") OR AB ("kidney transplant*" OR "renal transplant*")	12,204
S3	S1 OR S2	17,193
S4	TI (implement* OR intervention OR adopt* OR adapt* OR uptake OR integrat* OR embed* OR innovation OR translat* OR program OR strateg* OR “evidence-based-practice” OR “evidence-based-intervention” OR disseminat* OR support* OR encourag* OR foster OR enforc* OR incentiv* OR enable* OR facilitat* OR advance* OR promot* OR de-implement* OR sustain* OR abandon* OR deadopt* OR deimplement* OR replace* OR change) OR AB (implement* OR intervention OR adopt* OR adapt* OR uptake OR integrat* OR embed* OR innovation OR translat* OR program OR strateg* OR “evidence-based-practice” OR “evidence-based-intervention” OR disseminat* OR support* OR encourag* OR foster OR enforc* OR incentiv* OR enable* OR facilitat* OR advance* OR promot* OR de-implement* OR sustain* OR abandon* OR deadopt* OR deimplement* OR replace* OR change)	2,652,334
S5	TI (“evidence-based-practice” OR “evidence-based-intervention” OR treat* OR prescrib* OR procedure* OR intervention* OR therap* OR technolog* OR care) OR AB (“evidence-based-practice” OR “evidence-based-intervention” OR treat* OR prescrib* OR procedure* OR intervention* OR therap* OR technolog* OR care)	2,905,124
S6	S3 AND S4 AND S5	3,734

Appendix B: Data Extraction Instrument

Study Characteristics/Demographics							Implementation Strategies			
Author	Publication Year	Country of Origin	Study Citation	Study Design	Study Setting	Implementation Intervention (summary)	Implementation Strategy	Target (patient, health care professional [define role e.g., nurse, pharmacist, doctor.], health system)	Purpose (adoption, implementation, sustainability, de-implementation)	Coding—clustered ERIC taxonomy

Contextual Determinants				TMF		Outcomes	
Patient-identified barriers or facilitators	Provider-identified barriers or facilitators	Study Research Team-identified barriers or facilitators	Coding—CFIR	Informed by Implementation Theory, Model, or Framework (TMF)	Which TMF?	Study Outcomes—Implementation, Clinical, or Service System Outcome(s)	Coding—Proctors Outcomes

Knowledge-User Engagement		Equity, Diversity, Inclusion	
Presence (Yes/No)	Summarize engagement	Was EDI Considered?	Summarize considerations