Translating guidelines into practice via implementation science: an update in lipidology

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Purpose of review
Guidelines provide recommendations for clinicians based on the best available evidence and informed by clinical expertise. These recommendations often fail to be utilized by clinicians hindering the translation of evidence into practice. The purpose of this review is to describe novel ways in which implementation science has been used to improve translation of guidelines into clinical practice in the field of lipidology.

Recent findings
We searched PubMed for articles related to guideline implementation in lipidology published in 2021 and 2022. Identified articles were categorized into three domains: first, poor uptake of guideline recommendations in practice; second, implementation science as a solution to improve care; and third, examples of how implementation science can be incorporated into guidelines.

Summary
The field of lipidology has identified that many guideline recommendations fail to be translated into practice and has started to utilize methods from implementation science to assess ways to shrink this gap. Future work should focus on deploying tools from implementation science to address current gaps in guideline development. Such as, developing a systematic approach to restructure guideline recommendations so they are implementable in practice and aid in clinicians’ ability to easily translate them into practice.

Keywords
clinical practice guidelines, implementation science, lipidology, translation

INTRODUCTION
Guidelines synthesize a body of evidence and provide recommendations which are informed by the evidence itself as well as clinical expertise [1]. When implemented, these guideline recommendations improve outcomes for patients [2]. However, recommendations often fail to be implemented [3]. Failure to translate evidence into practice can occur for a variety of reasons, including lack of awareness of the guideline, disagreement with the recommendation, belief that the recommendation is not applicable, inability to act on the recommendation (e.g., due to lack of resources), and simply forgetting to act on the recommendation [4–6]. In addition, even if clinicians prescribe a recommended treatment, many well documented barriers hinder patient adherence to treatment recommendations [4,5].

Implementation science, or the ‘scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice’ [7], can be used to better understand the failure to translate guideline recommendations into clinical practice as well as to promote improved uptake of guidelines into care. There is a growing amount of literature examining which implementation strategies are most effective at promoting guideline uptake in the field of cardiology [8–12]. For example, Niewlaat et al. [9] highlighted the evidence-gap that exists for proper utilization of cardiovascular disease therapies, utilizing an implementation science framework, the Knowledge to Action Process framework [13], to help identify barriers and select, tailor, and implement interventions which facilitate sustained changes in practice. Similarly, Bonner et al. [8] used implementation
Recent studies have illustrated the failure to translate guideline recommendations into clinical practice. Hespe et al. [15] reported the recent uptake by primary care clinicians of the 2012 Cardiovascular Disease guidelines in Australia. They searched the electronic health record data from two clinical trials aimed at improving cardiovascular disease care over a 3-year period and found that only 57% had been prescribed guideline-recommended treatments and target metrics had been achieved in only 39% of individuals with cardiovascular disease that only 57% had been prescribed guideline-recommended treatments and target metrics had been achieved in only 39% of individuals with hypertension and 53% of individuals with hypercholesterolemia [15]. Tong et al. [16] found clinically insignificant increases in statin use and found only half of individuals with cardiovascular disease were treated with a statin 2 years after the 2013 American Heart Association (AHA) and American College of Cardiology (ACC) Cholesterol Guidelines were published. The reasons for the failure to translate the guideline recommendations in Hespe et al. and Tong et al. are unclear; however, a recent survey by Koskinas et al. [17], of European cardiologists, found high acceptance of the low-density lipoprotein cholesterol (LDL-C) treatment goals in the 2019 European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS) dyslipidemia guidelines, but reported suboptimal use of lipid lowering therapies due to patient-related factors. Ray et al. [18] highlighted the lack of achievement across 18 countries of the 2016 and 2019 ESC/EAS LDL-C goal with only 54 and 33% of patients meeting these goals, respectively. Similarly, Kotseva et al. [19] reported on a 16 country survey conducted by the ESC found that only 47% attained LDL-C target of less than 2.6 mmol/l. Multiple registries (e.g., GOULD, SAFEHEART, and FHSC) of individuals diagnosed with lipid disorders have highlighted the poor uptake of lipid guidelines throughout the world.

**KEY POINTS**
- For the past decade, tools from implementation science have been hypothesized as a potential solution to improve translation of guidelines into practice.
- In the past year, significant strides have been made to describe how implementation science can improve translation by identifying and utilizing implementation strategies in the current literature.
- Developing pathways for incorporating implementation recommendations into guideline development can facilitate the translation of evidence into practice.

Although these studies focus on using implementation science to implement practice changes recommended by guidelines, Gagliardi et al. [14] have developed a framework authors can use to improve the implementability of guidelines themselves. In addition, the most recent Multi-Society Cholesterol Guidelines published in 2018 incorporate a section on implementation that includes three recommendations for implementation of the guidelines. This section includes methods to improve patient adherence to prescribed therapy, identification of those not receiving guideline-based therapy and initiation of appropriate therapy, and promotion of shared decision-making [11].

The purpose of this review is to describe recent ways in which implementation science has been used to improve translation of guidelines into clinical practice in the field of lipidology.

**METHODS**
We searched PubMed and supplemented with articles known to the authors related to guideline implementation in lipidology published in 2021 and 2022. The articles resulting from this search were then categorized into three domains for this review: first, poor uptake of guideline recommendations in practice; second, implementation science as a solution to improve care; and third, examples of how implementation science can be incorporated into guidelines.

**POOR UPTAKE OF GUIDELINE RECOMMENDATIONS IN PRACTICE**
Recent studies have illustrated the failure to translate lipid recommendations from guidelines into practice. Hespe et al. [15] reported the recent uptake by primary care clinicians of the 2012 Cardiovascular Disease guidelines in Australia. They searched the electronic health record data from two clinical trials aimed at improving cardiovascular disease care over a 3-year period and found that only 57% had been prescribed guideline-recommended treatments and target metrics had been achieved in only 39% of individuals with cardiovascular disease that only 57% had been prescribed guideline-recommended treatments and target metrics had been achieved in only 39% of individuals with hypertension and 53% of individuals with hypercholesterolemia [15]. Tong et al. [16] found clinically insignificant increases in statin use and found only half of individuals with cardiovascular disease were treated with a statin 2 years after the 2013 American Heart Association (AHA) and American College of Cardiology (ACC) Cholesterol Guidelines were published. The reasons for the failure to translate the guideline recommendations in Hespe et al. and Tong et al. are unclear; however, a recent survey by Koskinas et al. [17], of European cardiologists, found high acceptance of the low-density lipoprotein cholesterol (LDL-C) treatment goals in the 2019 European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS) dyslipidemia guidelines, but reported suboptimal use of lipid lowering therapies due to patient-related factors. Ray et al. [18] highlighted the lack of achievement across 18 countries of the 2016 and 2019 ESC/EAS LDL-C goal with only 54 and 33% of patients meeting these goals, respectively. Similarly, Kotseva et al. [19] reported on a 16 country survey conducted by the ESC found that only 47% attained LDL-C target of less than 2.6 mmol/l. Multiple registries (e.g., GOULD, SAFEHEART, and FHSC) of individuals diagnosed with lipid disorders have highlighted the poor uptake of lipid guidelines throughout the world.

**IMPLEMENTATION SCIENCE AS A SOLUTION TO IMPROVE CARE**
Implementation strategies are ‘methods or techniques used to enhance the adoption, implementation, and sustainability of a clinical program or practice’ [23], which offer one potential solution to improve guideline translation and clinical care for individuals with lipid disorders. The need for tailored implementation strategies was highlighted recently by Tuzzio et al. [24*], who found, through a qualitative analysis of physician educator notes, that the integration of a cardiovascular disease risk calculator into the electronic health record was hindered by the lack of an effective implementation strategy.

To date, two compilations of implementation strategies have been published, Expert Recommendations for Implementing Change (ERIC) [25] and Effective Practice and Organization of Care [26]. These two
compilations can be used to standardize reporting and descriptions of currently used strategies or for development of strategies to implement into practice. Two recent review articles have retrospectively classified interventions from published studies into ERIC compilation implementation strategies. A systematic review and meta-analysis of implementation strategies to improve statin utilization categorized a total of 258 strategies across 86 studies with a median number of three strategies (SD 2.2, range 1–13) per study [27]. They reported improved statin prescribing, statin adherence, and reduced LDL-C levels but were not able to identify a strategy or group of strategies that was more likely to predict a positive outcome [27]. In addition, the authors noted that future work should be focused on thoroughly defining these implementation strategies with over half missing the temporality and dose of these strategies so that they could be replicated in future studies [27]. The other review article, which focused on 37 studies for improving care for individuals with familial hypercholesterolemia, mapped the implementation strategies used [28]. The implementation strategies included assess for readiness, identify barriers and facilitators, develop and organize quality monitoring systems, create new clinical teams, facilitate relay of clinical data to providers, and involve patients and family members [28]. This review found that 22% of the studies used an implementation science theory, model, or framework to conduct their analysis [28].

In addition, two protocols for clinical trials (NCT04450914 and NCT05284513) have been published that deploy implementation theories, models, and frameworks to improve translation of care into practice [29,30]. Ridgeway et al. [29] utilizes the Consolidated Framework for Implementation Research, Normalized Process Theory, and RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance framework) in their mixed method, hybrid type III stepped wedge cluster randomized study to integrate a shared decision-making decision tool, called Cardiovascular Prevention Choice, into routine care for cardiovascular disease at three US health systems (Fig. 1).

Jones et al. [30] utilizes the Conceptual Model of Implementation Research in their type III effectiveness-implementation stepped-wedge design trial to test the familial hypercholesterolemia diagnostic evaluation rates among primary care physicians who receive an implementation strategy package compared with those who do not (Fig. 2). These studies illustrate how implementation science is currently being used in the design of trials to evaluate the care of patients with lipid disorders.

**EXAMPLES OF HOW IMPLEMENTATION SCIENCE CAN BE INCORPORATED INTO GUIDELINES**

Incorporation of implementation science methodologies into the development of lipid guidelines to improve translation has just begun. The 2018 AHA/ACC guideline included a section on implementation [11] while the 2019 ESC/EAS guideline included implementation advice for lipid testing, risk assessment, and treatment adherence [31]. More recently the EAS has published practical guidance on lipid care and policy action [32–35]. Yet, frameworks and other guidance to incorporate implementation science into guidelines exist [14,36,37]. Two recent articles provide guidance for guideline developers to incorporate implementation science to improve guideline translation [36,37]. Uchmanowicz et al. [36] highlight barriers to guideline implementation and adherence (e.g., poor quality of evidence, not applicable for target audiences or relevant to

**FIGURE 1.** Design for a clinical trial that is using three theoretical approaches: Consolidated Framework for Implementation Research, Normalized Process Theory, and RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance framework). Source: Reproduced with permission Ridgeway et al. [29] under the CC BY license.
clinical practice, lack of guideline clarity related to recommendations, and inadequate dissemination of guidelines) and propose strategies to address these barriers, including developing short, user-friendly, less complex guidelines, creating checklists, tablets, smartphone and/or decision-making tools that are accessible to clinicians, and improving clarity of guideline recommendations. In the other recent article, Sarkies and Jones et al. [37] discuss how to use implementation science to develop implementation recommendations that should be included in guideline development (Fig. 3). Guideline developers should utilize these resources to incorporate implementation science into their recommendations. This can facilitate the translation of the recommendations into practice and ultimately impact patient care.

CONCLUSION
Recent work has focused on identifying barriers to the adoption of guidelines, developing strategies to improve the implementation of guidelines, and improving the development of guidelines to make them more implementable. Future work should continue to promote the utilization of implementation science principles at the guideline development stage and provide not only recommendations on evidenced-based practices to implement, but also recommend evidence-based implementation strategies healthcare
systems and clinicians can use to facilitate the translation of guidelines into practice. In crafting and implementing guideline recommendations, guideline developers and clinicians should also consider the patient perspective. Specifically, how can we better understand the patient’s point of view, whether a general recommendation is right for each particular patient, and what barriers may hinder adherence to a guideline recommended treatment [38]. This can include a shared decision-making conversation with the patient that aims to not only discuss the benefits and harms related to a recommendation itself, but a holistic understanding of the patient’s situation, an assessment of the patient’s capacity to carry out the recommendation, and discussion of how the work of carrying out the recommendation can be normalized into the patient’s daily life [39]. This process of understanding the patient’s situation and balancing patient workload of healthcare-related tasks (e.g., attending appointments, getting labs, taking medications, and carrying out self-care activities) and patient capacity to carry out that work may result in lower rates of implementation of guideline recommended therapies (e.g., statins) if it is not the right fit for the patient. This illustrates the importance of guidelines acknowledging and accounting for the difficult work of being a patient. This is especially important as many patients with lipid disorders struggle with workload and capacity due to polypharmacy, multimorbidity, and disparate access to resources.

Through utilization of theories, models, frameworks, and strategies informed by implementation science, the development and translation of lipid guidelines into practice can be improved. It will be important to include implementation scientist as relevant expert panels for guideline development, similarly to how other experts are recruited. The inclusion of an implementation scientist will aid in helping to craft implementation recommendations and provide pathways for how these recommendations can be implemented into practice.

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Conflicts of interest

There are no conflicts of interest.

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- of special interest
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