



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

Laney K. Jones<sup>a,b</sup>, Amy C. Sturm<sup>a,b</sup>, and Michael R. Gionfriddo<sup>c</sup>

## 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

<sup>a</sup>Genomic Medicine Institute Geisinger, Danville, Pennsylvania, USA, <sup>b</sup>Heart and Vascular Institute, Geisinger, Danville, Pennsylvania, USA and <sup>c</sup>Division of Pharmaceutical, Administrative and Social Sciences, School of Pharmacy, Duquesne University, Pittsburgh, Pennsylvania, USA

Correspondence to Laney K. Jones, Geisinger: Geisinger Health Danville, Danville, Pennsylvania, USA. E-mail: ljones14@geisinger.edu

**Curr Opin Lipidol** 2022, 33:336–341

DOI:10.1097/MOL.0000000000000835

This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

## 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.

science methods to develop, pilot, and assess feasibility of combining existing and new strategies to improve care of individuals with cardiovascular diseases.

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 among 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 [20–22]) 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<sup>□</sup>], 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<sup>■</sup>]. 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<sup>■</sup>]. 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<sup>■</sup>]. The other review article, which focused on 37 studies for improving care for individuals with familial hypercholesterolemia, mapped the implementation strategies used [28<sup>■</sup>]. 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<sup>■</sup>]. This review found that 22% of the studies used an implementation science theory, model, or framework to conduct their analysis [28<sup>■</sup>].

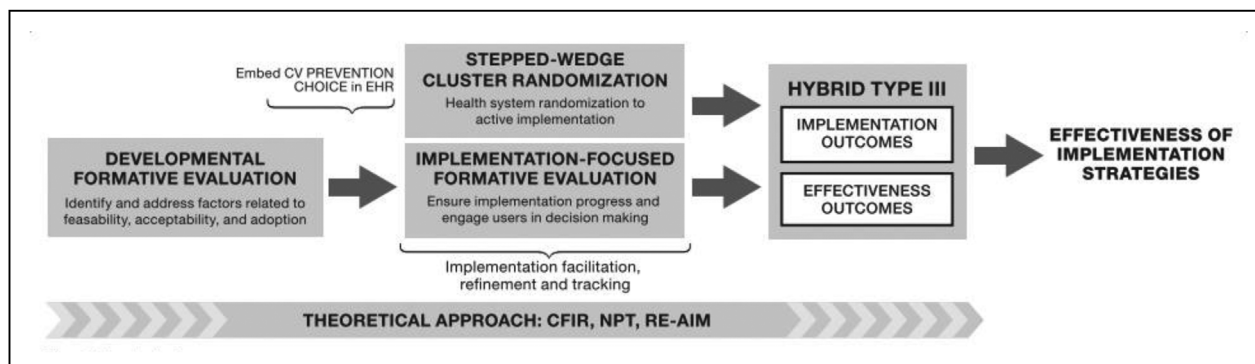
In addition, two protocols for clinical trials (NCT04450914 and NCT05284513) have been published that deploy implementation theories, models, and frameworks to improve translation of care into practice [29<sup>■</sup>,30<sup>■</sup>]. Ridgeway *et al.* [29<sup>■</sup>] utilizes the Consolidated Framework 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).

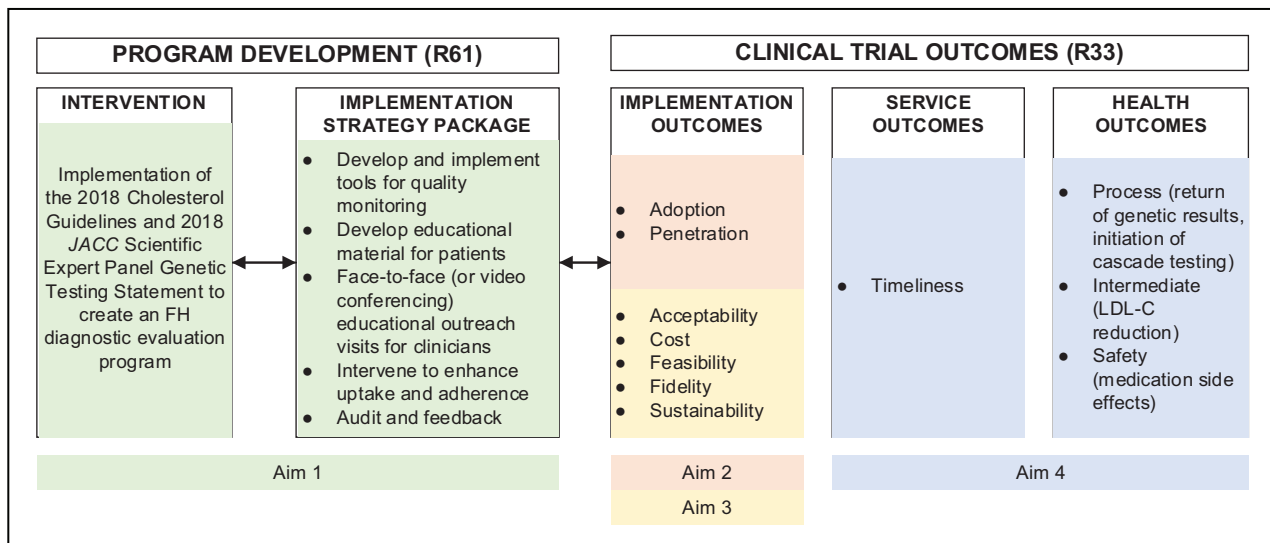
Jones *et al.* [30<sup>■</sup>] utilizes the Conceptual Model of Implementation Research in their type III effectiveness-implementation stepped-wedge design trial to test the familial hypercholesterolemia diagnostic evaluation rates among primary care physicians who receive an implementation strategy 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<sup>■</sup>,37<sup>■</sup>]. Two recent articles provide guidance for guideline developers to incorporate implementation science to improve guideline translation [36<sup>■</sup>,37<sup>■</sup>]. Uchmanowicz *et al.* [36<sup>■</sup>] 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<sup>■</sup>] under the CC BY license.



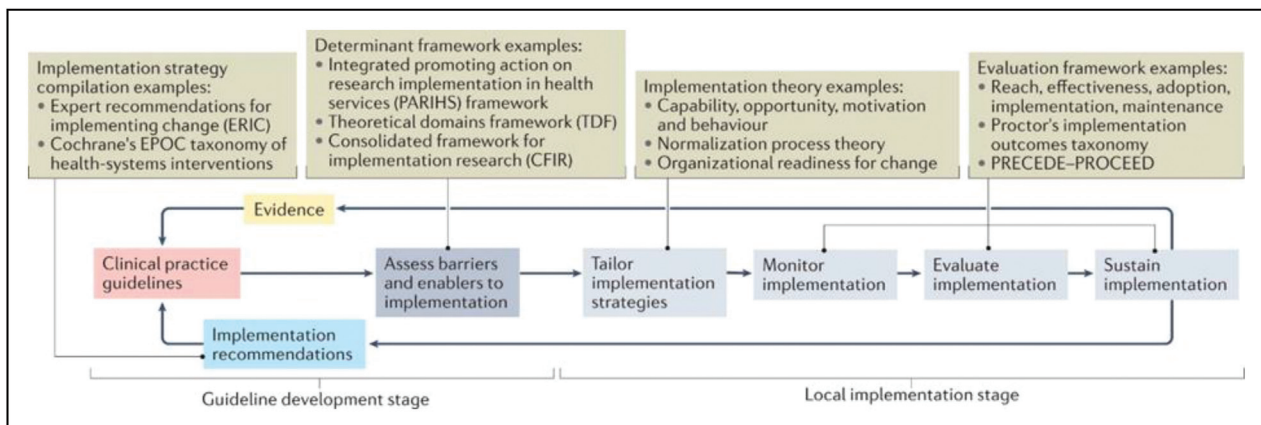
**FIGURE 2.** Study design. Conceptual model of implementation research framework tailored to the CARE-FH (Collaborative Approach to Reach Everyone with Familial Hypercholesterolemia) protocol. *Source:* Reproduced with permission Jones *et al.* [30<sup>22</sup>] under the CC BY license.

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<sup>22</sup>] 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



**FIGURE 3.** Embedding implementation science into the guideline development and translation processes. *Source:* Reproduced with permission from Sarkies and Jones *et al.* [37<sup>22</sup>].

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.

## Acknowledgements

None.

## Financial support and sponsorship

Research reported in this publication was supported by the National Heart, Lung, and Blood Institute of the National Institutes of Health under Award Number R61HL161775 and R01HL148246. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. Institute Medicine. Clinical practice guidelines we can trust. Washington, DC: National Academies Press; 2011.
  2. Murad MH. Clinical practice guidelines: a primer on development and dissemination. *Mayo Clin Proc* 2017; 92:423–433.
  3. Mickan S, Burls A, Glasziou P. Patterns of 'leakage' in the utilisation of clinical guidelines: a systematic review. *Postgrad Med J* 2013; 87:670–679.
  4. Glasziou P, Haynes B. The paths from research to improved health outcomes. *Evid Based Nurs* 2005; 8:36–38.
  5. Konstantinou P, Kassianos AP, Georgiou G, et al. Barriers, facilitators, and interventions for medication adherence across chronic conditions with the highest nonadherence rates: a scoping review with recommendations for intervention development. *Transl Behav Med* 2020; 10:1390–1398.
  6. Song Y, Ballesteros M, Li J, et al. Current practices and challenges in adaptation of clinical guidelines: a qualitative study based on semistructured interviews. *BMJ Open* 2021; 11:e053587.
  7. Eccles MP, Mittman BS. Welcome to implementation science. *Implement Sci* 2006; 1:5908–5911.
  8. Bonner C, Fajardo MA, Doust J, et al. Implementing cardiovascular disease prevention guidelines to translate evidence-based medicine and shared decision making into general practice: theory-based intervention development, qualitative piloting and quantitative feasibility. *Implement Sci* 2019; 14:86.
  9. Nieuwlaat R, Schwalm JD, Khatib R, Yusuf S. Why are we failing to implement effective therapies in cardiovascular disease? *Eur Heart J* 2013; 34:1262–1269.
  10. Chow CK, Rodgers A. Lost in translation: the gap between what we know and what we do about cardiovascular disease. *Med J Aust* 2016; 204:291–292.
  11. Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APHA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation* 2019; 139:e1082–e1143.
  12. Chan WV, Pearson TA, Bennett GC, et al. ACC/AHA special report: clinical practice guideline implementation strategies: a summary of systematic reviews by the NHLBI Implementation Science Work Group: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation* 2017; 135:e122–e137.
  13. Graham ID, Logan J, Harrison MB, et al. Lost in knowledge translation: time for a map? *J Contin Educ Health Prof* 2006; 26:13–24.
  14. Gagliardi AR, Brouwers MC, Palda VA, et al. How can we improve guideline use? A conceptual framework of implementability. *Implement Sci* 2011; 6:26.
  15. Hesse CM, Harris MF, Peiris DP. Implementing cardiovascular disease preventive care guidelines in general practice: an opportunity missed. *Med J Aust* 2021; 215:327–328.
  16. Tong ST, Sabo RT, Hochheimer CJ, et al. Uptake of statin guidelines to prevent and treat cardiovascular disease. *J Am Board Fam Med* 2021; 34:113–122.
  17. Koskinas KC, Catapano AL, Baigent C, et al. Current perceptions and practices in lipid management: results of a European Society of Cardiology/European Atherosclerosis Society Survey. *Eur J Prev Cardiol* 2022; 28:2030–2037.
  18. Ray KK, Molemans B, Schoonen WM, et al. EU-wide cross-sectional observational study of lipid-modifying therapy use in secondary and primary care: the DA VINCI study. *Eur J Prev Cardiol* 2021; 28:1279–1289.
  19. Kotseva K, De Backer G, De Bacquer D, et al. Primary prevention efforts are poorly developed in people at high cardiovascular risk: a report from the European Society of Cardiology EURObservational Research Programme EUROASPIRE V survey in 16 European countries. *Eur J Prev Cardiol* 2021; 28:370–379.
  20. Pérez de Isla L, Alonso R, Mata N, et al. Predicting cardiovascular events in familial hypercholesterolemia: the SAFEHEART Registry (Spanish Familial Hypercholesterolemia Cohort Study). *Circulation* 2017; 135:2133–2144.
  21. Cannon CP, de Lemos JA, Rosenson RS, et al. Use of lipid-lowering therapies over 2 years in GOULD, a registry of patients with atherosclerotic cardiovascular disease in the US. *JAMA Cardiol* 2021; 6:1–9.
  22. Vallejo-Vaz AJ, De Marco M, Stevens CAT, et al. Overview of the current status of familial hypercholesterolemia care in over 60 countries – the EAS Familial Hypercholesterolemia Studies Collaboration (FHSC). *Atherosclerosis* 2018; 277:234–255.
  23. Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for specifying and reporting. *Implement Sci* 2013; 8:139.
  24. Tuzzio L, O'Meara ES, Holden E, et al. Barriers to implementing cardiovascular risk calculation in primary care: alignment with the consolidated framework for implementation research. *Am J Prev Med* 2021; 60:250–257.
- The qualitative study provides maps barriers identified through analysis of clinic notes to the consolidated framework for implementation research to further understand how to implement a cardiovascular disease risk calculation.

25. Powell BJ, Waltz TJ, Chinman MJ, *et al.* A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implement Sci* 2015; 10:1–14.
26. Mowatt G, Grimshaw JM, Davis DA, Mazmanian PE. Getting evidence into practice: the work of the Cochrane Effective Practice and Organization of Care Group (EPOC). *J Contin Educ Health Prof* 2001; 21:55–60.
27. Jones LK, Tilberry S, Gregor C, *et al.* Implementation strategies to improve statin utilization in individuals with hypercholesterolemia: a systematic review and meta-analysis. *Implement Sci* 2021; 16:40.
- The systematic review and meta-analysis describes the state of evidence of implementation strategies on the uptake of statins.
28. Jones LK, Brownson RC, Williams MS. Applying implementation science to improve care for familial hypercholesterolemia. *Curr Opin Endocrinol Diabetes Obes* 2022; 29:141–151.
- The review provides an update on the implementation strategies that have been used to improve familial hypercholesterolemia care in 2020 and 2021.
29. Ridgeway JL, Branda ME, Gravholt D, *et al.* Increasing risk-concordant cardiovascular care in diverse health systems: a mixed methods pragmatic stepped wedge cluster randomized implementation trial of shared decision making (SDM4IP). *Implement Sci Commun* 2021; 2:43.
- The protocol article 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.
30. Jones LK, Williams MS, Ladd IG, *et al.* Collaborative approach to reach everyone with familial hypercholesterolemia: CARE-FH protocol. *J Personalized Med* 2022; 12:606.
- The protocol article 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.
31. Mach F, Baigent C, Catapano AL, *et al.* 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk: the Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS). *Eur Heart J* 2020; 41:111–188.
32. Visseren FL, Mach F, Smulders YM, *et al.* 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice: Developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies With the special contribution of the European Association of Preventive Cardiology (EAPC). *Eur Heart J* 2021; 42:3227–3337.
33. Parini P, Frikke-Schmidt R, Tselepis AD, *et al.* Taking action: European Atherosclerosis Society targets the United Nations Sustainable Development Goals 2030 agenda to fight atherosclerotic cardiovascular disease in Europe. *Atherosclerosis* 2021; 322:77–81.
34. Alieva AS, Tokgözoğlu L, Ray KK, Catapano AL; Lipid Clinics Network. Rationale and design of the EAS global project. *Atheroscler Suppl* 2020; 42:e6–e8.
35. Averna M, Banach M, Bruckert E, *et al.* Practical guidance for combination lipid-modifying therapy in high-and very-high-risk patients: a statement from a European Atherosclerosis Society Task Force. *Atherosclerosis* 2021; 325:99–109.
36. Uchmanowicz I, Hoes A, Perk J, *et al.* Optimising implementation of European guidelines on cardiovascular disease prevention in clinical practice: what is needed? *Eur J Prev Cardiol* 2020; 2047487320926776.
- This is a position article that presents solution for implementation of practice guidelines.
37. Sarkies MN, Jones LK, Gidding SS, Watts GF. Improving clinical practice guidelines with implementation science. *Nat Rev Cardiol* 2022; 19:3–4.
- The comment provides a framework for incorporating implementation science into guideline development.
38. Hargraves IG, Montori VM, Brito JP, *et al.* Purposeful SDM: a problem-based approach to caring for patients with shared decision making. *Patient Educ Couns* 2019; 102:1786–1792.
39. Boehmer KR, Gallacher KI, Lippiett KA, *et al.* Minimally disruptive medicine: progress 10 years later. *Mayo Clin Proc* 2022; 97:210–220.