

Optimizing implementation of European Guidelines on Cardiovascular Disease Prevention in clinical practice: what is needed?

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Abstract

Cardiovascular disease (CVD) is a model example of a preventable condition for which practice guidelines are particularly important. In 2016, the Joint Task Force created by the European Society of Cardiology (ESC) together with ten other societies released the new version of the European Guidelines on Cardiovascular Disease Prevention. To facilitate the implementation of the ESC Guidelines, a dedicated Prevention Implementation Committee has been established within the European Association of Preventive Cardiology (EAPC). The paper will first explore potential barriers to the Guidelines' implementation. It then develops discussion that seeks to inform the future development of the Committee's work, including a new definition of the Guidelines' stakeholders (health policymakers, healthcare professionals and health educators, patient organizations, entrepreneurs and general public), future activities within four specific areas: strengthening awareness of the Guidelines among stakeholders, supporting organizational changes to facilitate the Guidelines' implementation, motivating stakeholders to utilise the Guidelines, and present ideas on new implementation strategies. Providing multifaceted cooperation between healthcare professionals, healthcare management executives and health policymakers, the novel approach proposed in this paper should contribute to a wider use of the 2016 ESC guidelines and produce desired effects of lesser CVD morbidity and mortality. Furthermore, the solutions presented within the paper may constitute a benchmark for the implementation of practice guidelines in other medical disciplines.

Keywords

Guidelines, implementation, prevention, cardiovascular diseases.

Introduction

Professional associations, and international healthcare organizations, develop evidence-based guidelines, recommendations, standards and consensus statements to facilitate the best quality of care by assisting practitioners' decisions about appropriate health care for specific clinical circumstances.^{1,2} In so doing guidelines decrease the gap between research and current practice, especially in situations where the scientific evidence is sparse, where multiple therapies are available, or where uncertainty in terms of treatment options exists.³ Guidelines are also used as part of professional quality assurance systems,⁴ continuing professional education, peer review and audit⁵ and in patient empowerment.⁶

Since 1994, the Joint Task Force established in the European Society of Cardiology (ESC) together with ten other societies have developed the European Guidelines on Cardiovascular Disease (CVD) Prevention, the most recent version published in 2016.⁷ These guidelines present an economic rationale for CVD prevention, discuss the aetiology of the condition with particular emphasis on its modifiable risk factors, identify groups that may benefit from prevention activities, and propose specific forms of interventions to be implemented at individual and population levels. The guidelines are addressed to all health care and related professions and make up an outstanding source of knowledge on CVD prevention. The development of guidelines is only the first step on a route to their application. The successful introduction of guidelines involves four steps: development, dissemination, implementation and evaluation.⁸ To facilitate the latter three steps, the European Association of Preventive Cardiology (EAPC) developed a dedicated Prevention Implementation Committee since 2008.

The 2016 guidelines themselves and more recent European studies on prevention cite and show evidence of poor implementation as seen by poor achievement of prevention guideline targets.^{9–12} In our opinion, these reasons are relevant for future development of the Committee's work by informing future strategies to optimise the implementation of the ESC prevention guidelines.

Barriers to the successful implementation of guidelines

Research into the barriers to optimal guideline implementation is a topic that has been investigated for some time across many areas of health care. This paper reviewed the most modern and relevant literature to inform future potential strategies in CVD prevention. The array of barriers to guideline implementation is numerous and can be categorised into five

commonly used categories to summarise the barriers: the guidelines themselves, patient, personnel, organisational and external barriers (**Box 1**). Guideline related barriers have many facets such as quality and format,^{4,13–17} personnel barriers include knowledge, skills and attitudes.^{18–20} Personnel factors overlap somewhat with organisational factors with issues such as time, leadership and shortage of personnel coming to the fore as main factors.^{13,17,18,20–23} External factors, which relates to factors outside the organisation such as government policy, are less researched than other factors but are regularly discussed in the literature, and often overlap with organisational factors like workforce issues (**Box 1**).^{18,24}

Box 1. Barriers to guideline implementation and adherence.

- **Guideline-related:**
 - poor quality of evidence
 - inadequate practical relevance and applicability for different target audiences (i.e. physicians, nurses, patients)
 - lack of guideline clarity (complicated, confusing, too much information)
 - poor accessibility and dissemination of guidelines
- **Patient-related:**
 - poor understanding, knowledge and skills
 - difficulties with adherence and compliance especially self-care behaviours
- **Healthcare personnel:**
 - insufficient training, poor skills
 - lack familiarity and knowledge
 - poor attitudes awareness, motivation and self-efficacy
 - lack of belief in effectiveness of guideline recommendation/desired outcome
- **Organisational:**
 - inadequate time and excessive work pressure
 - shortage of personnel and other resources
 - inadequate budget and remuneration
 - inadequate leadership and support from co-workers
- **External barriers:**
 - unhelpful government health policies

Most published practice guidelines address the diagnosis and treatment of various disease entities, and hence, are dedicated to patients who already have a disease. Implementation and adherence to prevention guidelines brings its own difficulties. It seeks to address a wide range of patient conditions both in apparently healthy persons in the primary prevention of CVD and secondary prevention after CVD has developed. Therefore, it addresses

a group that is not only larger but also more varied in terms of health, risk, potential disease severity and comorbidities. Many individuals at risk of CVD present with various comorbidities, e.g. obesity, diabetes mellitus, and according to literature, healthcare professionals are less likely to adhere to the guidelines in such cases.¹³ Furthermore, the group of healthcare professionals responsible for the practical implementation of prevention guidelines is markedly larger than is the case for other clinical practice recommendations and includes not only physicians specialized in a given discipline but also general practitioners, nurses, dietitians, physical activity specialists, public health experts, health educators, health professionals for specific comorbidities. Moreover, patient motivation is more likely to be an issue particularly in primary prevention.²⁵ Therefore, if the implementation is a challenge with clearly defined target groups and one locus and a small care team,^{26–28} the challenge is even greater for CVD prevention guidelines.

Implementation strategies characteristics that address barriers

Many successful strategies have been identified that address some factors identified above. Overall, the literature surmises that the success of guideline implementation strategies depends on the consideration of this wide variety of barriers and the use of adequate, tailored interventions to overcome them.^{21,27,29,30}

While much research has explored how to address guideline and organisational barriers, little research to date has specifically explored ways to address patient-centered and external factors. There are many strategies proposed to address issues with the guidelines, including increases simplicity and availability of different formats **(Box 2)**.^{4,15,16,21,31,32} To overcome the gaps in healthcare professionals' knowledge, familiarity and awareness of guidelines, diverse dissemination strategies and educational activities have been successfully implemented **(Box 2)**.^{4,15,19,31–34} Addressing knowledge influences attitudes and this positively affects practice behaviour.^{18,35} To address organisational barriers, numerous workflow strategies have also been proposed **(Box 2)**.^{4,19,30,31,36} However, these strategies are at risk of failure if staff do not have enough time to implement guidelines in practice.^{20,24} There again is little literature on patient and external strategies.

Overall, no single component has been identified as effective in all circumstances,³⁴ it is still unclear whether a single intervention should be used to reduce the most critical barrier for guideline implementation,³⁷ or if a multifaceted strategy is preferable.^{38–40} It is clear that implementation itself is also multifaceted. Perhaps the guidelines should identify and

summarise a selection of strategies that need to be further developed at a local level to best address local barriers. The above discussion on multiple barriers implementation strategies highlights that implementation will not be a one size fits all solution.

Therefore, should national and local guidelines key role be the development of appropriate implementation strategies based on the evidence-based ESC guidelines? The process of developing an implementation strategy should comprise of basic six basic steps: (1) Needs assessment, which aims to identify the target group and stakeholders, (2) Definition of the objectives, i.e. desired changes in behaviour and environment, (3) Selection of appropriate strategies to achieve the objectives, (4) Creation of the implementation plan, (5) Adoption and implementation of the guidelines, and (6) Evaluation of the outcomes.⁴¹

It should be remembered that the whole process may take up to several years to complete, and therefore it should not be evaluated too early.³²

Box 2. Known implementation strategies to address barriers to implementation.

- **Guideline-related:**
 - short, user-friendly, reduced complexity
 - improve dissemination and accessibility by using checklists, tablets, smartphones and decision-making tools
 - include recommendations on comorbidities
 - set clear intervention goals
- **Patient-related:**
 - empowering patients through education and support to improve knowledge, understanding, skills and adherence
- **Healthcare personnel:**
 - improve knowledge, familiarity, agreement and awareness by
 - active learning with expert opinion leaders
 - engagement between local opinion leaders and staff to develop local implementation strategies
 - educational meetings, outreach visits, audit and feedback, workshops, small group interactive post-graduate training sessions and continuing education
 - provision of educational materials including written materials, didactic presentations and interactive conferences
- **Organisational:**
 - application of manual or automated decision support system to prompt following of recommendations
 - development and use of standard processes, procedures and protocols
 - establishing clear roles in terms of standing orders

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| <ul style="list-style-type: none">○ offering financial incentives○ developing further multi-professional collaboration |
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Current, developing and potential approaches to optimising prevention guideline implementation

Some strategies cited above and tested previously in clinical conditions have already been implemented by the Prevention Implementation Committee. Significant changes in the guidelines themselves has occurred. The guidelines are available in different versions, including the full version, showing in detail the evidence base to user-friendly short and summary guidelines, ideal for easy access and use in practice. In addition, ESC provides the Guidelines in several formats to cater for differing preferences, electronic and paper and an ESC Guidelines App⁴² is also available for mobile devices. The ESC Prevention of CVD Programme foresees the development of a cardiovascular risk assessment app, that will include multiple risk calculators in various populations, that is recommended for insertion into guideline strategy documents, and plans to provide insights on the effect of treatment.⁴³ A patient information website Healthy-Heart focused on prevention⁴⁴ was also launched in 2019. Other form of supports include is Survey of Risk Factor management (SURF), a simple instrument for risk factor audit, applicable for patients with established coronary heart disease to assist in evaluating guideline implementation in daily practice.^{45,46} With the creation of the ESC Patient Forum, ESC plans to involve patients in the development of ESC's clinical practice guidelines, from recording Video Testimonials about their own experiences to the development of Patient Information Cards and in time patient participation on ESC Guidelines Task Force.⁴⁷ It is envisaged that this will not only improve patient knowledge, increase their motivation to adhere to treatment but also empower patients to become more involved in their care from prevention to treatment.

In addition, several approaches have been developed to address mainly personnel but also organisational barriers. For instance the European Association of Preventive Cardiology (EAPC) developed a Guideline Learning Tool, which is a modular, interactive, case-based online tool on the ESC e-Learning platform, accredited with 4 European CME credits (ECMEC@s).⁴⁸ This e-learning instrument is part of the CVD Prevention Toolbox, which includes risk assessment and management tools for healthcare professionals.⁴⁹ The Association of Nurses and Allied Health Professionals (ACNAP) has developed a guideline toolbox, "Be Guideline Smart",⁵⁰ available in 10 languages. It includes educational material and decision-

making tools to support healthcare professionals and policymakers in their daily practice. In addition, ACNAP has conducted several international Train the Trainer courses, to assist national societies to engage in local dissemination and local implementation strategy development. These tools aim not only to increase the knowledge and awareness of guidelines but also enhance skills to implement guidelines, train, develop and empower local leaders. These local leaders can then train, lead and empower local staff and develop appropriate local implementation strategies.

The conventional approach used to date to develop and promote guidelines, mainly included policymakers and healthcare professionals, this needs to be expanded to include more stakeholders. At guideline development and implementation levels consideration should be given to involve patient representatives and other healthcare professionals. Guideline dissemination could be expanded to include relevant patient organizations, other NGOs and maybe even businesses from broadly defined health and lifestyle sectors (e.g. manufacturers of healthy foods, dietary supplements and sport equipment including apps,, fitness centre owners etc.). If the mission of these entities is consistent with the guidelines’ priorities, they could be additional standard bearers of guideline promotion, the creation of a “Trusted Guideline Partners” programme could be considered with ESC quality mark provision. This would include a certified programme providing the necessary skills and knowledge how to implement and deliver recommendation/strategy/intervention/education as described in the prevention guidelines, including economic benefits of guideline implementation and promotion into the wider healthcare sector.

In the era of information societies, the guidelines need to be promoted via all mainstream online channels (Facebook, Twitter, Youtube, Instagram, etc.), not only enabling the users to familiarize with their contents but also to let them seek advice from healthcare professionals. Eventually, all these activities could result in converting the guidelines into a brand with well-recognized visual identification (logotype, website, fan page, etc.) (**Box 3**).

Box 3. Suggestions to the ESC Committee for Practice Guidelines and EAPC Prevention Implementation Committee.

- **New implementation strategies:**
 - engage the wider European Society of Cardiology in developing / reviewing strategic and implementation components to enhance appropriateness, impact and buy in
 - engage a broader range of stakeholders (public, patient non-governmental organizations (NGOs), healthcare professions, health educators etc.) in

- guideline and implementation strategy development
- promotion and dissemination of guidelines
- **Strengthening awareness and knowledge of Guidelines among stakeholders**
 - additional simplified versions of the Guidelines and learning tools dedicated to specific groups of stakeholders including public and patients
 - strategic framework of education programs for healthcare professionals
 - develop a Program for Trusted Guideline Partners that includes health policymakers and health entrepreneurs to assist in guideline promotion and implementation
 - increase promotion: public relation campaigns, lobbying, social media and other online channels
 - increase the identity of guidelines as a brand
- **Supporting organisational change to facilitate Guideline implementation**
 - strengthening of the National Guideline Coordinators' position
 - inclusion of the Guidelines within national and local health promotion programs and related initiatives
 - funding
 - allocation of funds for Guideline implementation
 - develop
 - cost-benefit instruments for health policymakers at various levels including organisational levels (i.e. from country health services to units) and individual levels
 - financial Motivation Program for healthcare professionals at local level
 - health Benefit Packs for the general public

Organisational changes need to be made at various levels within national healthcare systems. The role of National CVD Prevention Coordinator currently includes “Liaise with the country’s Ministry of Health representatives” could this be strengthened? Do all national health systems have health prevention and/or cardiac subcommittees? These would be the ideal platform for the national prevention coordinator. This would facilitate up to date, evidence-based information from guidelines to advise these subcommittees and their policies. This would facilitate this sector having a more informed voice at the higher health policy level, to seek support and lobby for the allocation of national healthcare funds and other sources. In addition, both prevention coordinators and national coordinators would be in the ideal position to act as local experts for developing implementation strategies. Many of the above strategies could be further strengthened by the systematic use of cost-benefit analysis based on guideline targets perhaps this could be facilitated by including a health economist in the development of the guidelines. While both exact costs and benefits differ across countries we would

recommend, for the organizational level – the National Health services, that an economic evaluation be applied for CVD populations.⁵¹

Motivation to comply with the Guidelines would be strengthened with the use of both financial and non-financial incentives in both patients and other stakeholders. Performance-based financial motivation programs for healthcare professionals reaching guidelines targets is already established for some cardiovascular targets, this could be broadened. Guideline Promotion Packs for health policymakers could include materials including instruments to demonstrate the cost-effectiveness of the preventive activities, would assist in this promotion. Finally, Health Benefit Pack for general public, supporting involvement in preventive activities, that outlines e.g. longevity gains, savings resulting from smoking cessation, etc. could also be promoted using auditing, PR campaigns, educational activities, lobbying and networking.

These strategies would provide more encouragement for follow up, and help make guideline target achievement a routine part of care. Now is an ideal time for this providing this evidence and incentive as health care shifts from the overriding emphasis on hospital-based care to more community-based care.

Conclusion

Successful implementation of preventive guidelines faces even more challenges than with clinical practice guidelines. The future approaches proposed in this paper are diverse and aim to address known barriers to optimal implementation. Through the coordinated involvement of all relevant stakeholders (health policymakers, healthcare professionals, general public, patient organizations, government, NGOs, industry), they propose the utilisation of a strategic approach to implementation that starts with needs analysis and completes the cycle of implementation with an appropriately timed evaluation. This is expected to not only contribute to widespread use of ESC guidelines on CVD Prevention but also have the knock-on effects of improved health, morbidity and mortality.

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Author Contribution

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Declaration of Conflicting Interests

The Author(s) declare(s) that there is no conflict of interest.

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References

1. Rossello X, Dorresteyn JA, Janssen A, et al. Risk prediction tools in cardiovascular disease prevention: A report from the ESC Prevention of CVD Programme led by the European Association of Preventive Cardiology (EAPC) in collaboration with the Acute Cardiovascular Care Association (ACCA) and the Association of Cardiovascular Nursing and Allied Professions (ACNAP). *Eur J Prev Cardiol* 2019; 26: 1534–1544.
2. Schünemann HJ, Fretheim A, Oxman AD, et al. Improving the use of research evidence in guideline development: 1. Guidelines for guidelines. *Health Res Policy Syst* 2006; 4: 13.
3. Gundersen L. The effect of clinical practice guidelines on variations in care. *Ann Intern Med* 2000; 133: 317–318.
4. Francke AL, Smit MC, de Veer AJE, et al. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. *BMC Med Inform Decis Mak* 2008; 8: 38.
5. Feder G, Eccles M, Grol R, et al. Clinical guidelines: using clinical guidelines. *BMJ* 1999; 318: 728–730.
6. Woolf SH, Grol R, Hutchinson A, et al. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. *BMJ* 1999; 318: 527–530.
7. Piepoli MF, Hoes AW, Agewall S, et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur Heart J* 2016; 37: 2315–2381.
8. Forrest D, Hoskins A, Hussey R. Clinical guidelines and their implementation. *Postgrad Med J* 1996; 72: 19–22.
9. Piepoli MF, Hoes AW, Agewall S, et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur Heart J* 2016; 37: 2315–2381.

10. Zhao M, Graham I, Cooney MT, et al. Determinants of coronary artery disease risk factor management across three world regions. *Heart Asia*; 11. Epub ahead of print 8 March 2019. DOI: 10.1136/heartasia-2018-011112.
11. Kotseva K, De Backer G, De Bacquer D, et al. Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry. *Eur J Prev Cardiol* 2019; 26: 824–835.
12. Fitzsimons D, Stępińska J, Kerins M, et al. Secondary prevention and cardiovascular care across Europe: A survey of European Society of Cardiology members' views. *Eur J Cardiovasc Nurs* 2020; 19: 201–211.
13. Davis DA, Taylor-Vaisey A. Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *CMAJ* 1997; 157: 408–416.
14. Erhardt L, Komajda M, Hobbs FDR, et al. Cardiologists' awareness and perceptions of guidelines for chronic heart failure. The ADDRESS your Heart survey. *Eur J Heart Fail* 2008; 10: 1020–1025.
15. Harris MF, Lloyd J, Litt J, et al. Preventive evidence into practice (PEP) study: implementation of guidelines to prevent primary vascular disease in general practice protocol for a cluster randomised controlled trial. *Implement Sci* 2013; 8: 8.
16. Katz DA. Barriers between guidelines and improved patient care: an analysis of AHCPR's Unstable Angina Clinical Practice Guideline. Agency for Health Care Policy and Research. *Health Serv Res* 1999; 34: 377–389.
17. Saillour-Glenisson F, Michel P. [Individual and collective facilitators of and barriers to the use of clinical practice guidelines by physicians: a literature review]. *Rev Epidemiol Sante Publique* 2003; 51: 65–80.
18. Cabana M, Rand C, Powe N, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA* 1999; 282: 1458–1465.
19. Handler J, Lackland DT. Translation of hypertension treatment guidelines into practice: a review of implementation. *J Am Soc Hypertens* 2011; 5: 197–207.
20. McKee G, Kerins M, Hamilton G, et al. Barriers to ESC guideline implementation: results of a survey from the European Council on Cardiovascular Nursing and Allied Professions (CCNAP). *Eur J Cardiovasc Nurs* 2017; 16: 678–686.

21. Fischer F, Lange K, Klose K, et al. Barriers and Strategies in Guideline Implementation-A Scoping Review. *Healthcare (Basel)*; 4. Epub ahead of print 29 June 2016. DOI: 10.3390/healthcare4030036.
22. Reiner Z, Sonicki Z, Tedeschi-Reiner E. Physicians' perception, knowledge and awareness of cardiovascular risk factors and adherence to prevention guidelines: the PERCRO-DOC survey. *Atherosclerosis* 2010; 213: 598–603.
23. Sachs M. [Successful strategies and methods of nursing standards implementation]. *Pflege* 2006; 19: 33–44.
24. Graham IM, Stewart M, Hertog MGL, et al. Factors impeding the implementation of cardiovascular prevention guidelines: findings from a survey conducted by the European Society of Cardiology. *Eur J Cardiovasc Prev Rehabil* 2006; 13: 839–845.
25. Ju I, Banks E, Calabria B, et al. General practitioners' perspectives on the prevention of cardiovascular disease: systematic review and thematic synthesis of qualitative studies. *BMJ Open*; 8. Epub ahead of print 1 November 2018. DOI: 10.1136/bmjopen-2017-021137.
26. Fretheim A, Schünemann HJ, Oxman AD. Improving the use of research evidence in guideline development: 15. Disseminating and implementing guidelines. *Health Res Policy Syst* 2006; 4: 27.
27. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003; 362: 1225–1230.
28. Komajda M, Anker SD, Cowie MR, et al. Physicians' adherence to guideline-recommended medications in heart failure with reduced ejection fraction: data from the QUALIFY global survey. *Eur J Heart Fail* 2016; 18: 514–522.
29. Gagliardi AR, Alhabib S, members of Guidelines International Network Implementation Working Group. Trends in guideline implementation: a scoping systematic review. *Implement Sci* 2015; 10: 54.
30. Lugtenberg M, Zegers-van Schaick JM, Westert GP, et al. Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners. *Implement Sci* 2009; 4: 54.
31. Barosi G. Strategies for dissemination and implementation of guidelines. *Neurol Sci* 2006; 27 Suppl 3: S231-234.
32. Forsner T, Hansson J, Brommels M, et al. Implementing clinical guidelines in psychiatry: a qualitative study of perceived facilitators and barriers. *BMC Psychiatry* 2010; 10: 8.

33. Eagle KA, Koelling TM, Montoye CK. Primer: implementation of guideline-based programs for coronary care. *Nat Clin Pract Cardiovasc Med* 2006; 3: 163–171.
34. Knops AM, Storm-Versloot MN, Mank APM, et al. Factors influencing long-term adherence to two previously implemented hospital guidelines. *Int J Qual Health Care* 2010; 22: 421–429.
35. Welke KF, BootsMiller BJ, McCoy KD, et al. What factors influence provider knowledge of a congestive heart failure guideline in a national health care system? *Am J Med Qual* 2003; 18: 122–127.
36. Flanagan ME, Ramanujam R, Doebbeling BN. The effect of provider- and workflow-focused strategies for guideline implementation on provider acceptance. *Implement Sci* 2009; 4: 71.
37. Grimshaw JM, Eccles MP. Is evidence-based implementation of evidence-based care possible? *Med J Aust* 2004; 180: S50-51.
38. Green LA, Wyszewianski L, Lowery JC, et al. An observational study of the effectiveness of practice guideline implementation strategies examined according to physicians' cognitive styles. *Implement Sci* 2007; 2: 41.
39. Grimshaw JM, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. *Lancet* 1993; 342: 1317–1322.
40. Grimshaw JM, Eccles MP, Lavis JN, et al. Knowledge translation of research findings. *Implement Sci* 2012; 7: 50.
41. Zwerver F, Schellart AJM, Anema JR, et al. Intervention mapping for the development of a strategy to implement the insurance medicine guidelines for depression. *BMC Public Health* 2011; 11: 9.
42. European Society of Cardiology. ESC Pocket Guidelines App, <https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Guidelines-derivative-products/ESC-Mobile-Pocket-Guidelines>, <https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Guidelines-derivative-products/ESC-Mobile-Pocket-Guidelines> (accessed 2 February 2020).
43. Rossello X, Dorresteijn JA, Janssen A, et al. Risk prediction tools in cardiovascular disease prevention: A report from the ESC Prevention of CVD Programme led by the European Association of Preventive Cardiology (EAPC) in collaboration with the Acute Cardiovascular Care Association (ACCA) and the Association of Cardiovascular Nursing and Allied Professions (ACNAP). *Eur J Cardiovasc Nurs* 2019; 18: 534–544.

44. European Society of Cardiology. Healthy Heart - Prevention of Cardiovascular Disease. *Healthy-Heart.org*, <https://www.healthy-heart.org/> (accessed 2 February 2020).
45. Cooney M, Reiner Z, Sheu W, et al. SURF - SURvey of Risk Factor management: first report of an international audit. *Eur J Prev Cardiol* 2014; 21: 813–822.
46. Zhao M, Cooney MT, Klipstein-Grobusch K, et al. Simplifying the audit of risk factor recording and control: A report from an international study in 11 countries. *Eur J Prev Cardiol* 2016; 23: 1202–1210.
47. Fitzsimons D. Patient engagement at the heart of all European Society of Cardiology activities. *Cardiovasc Res* 2019; 115: e99–e101.
48. European Society of Cardiology. ESCeL: The ESC e-Learning Training and Education Platform, <https://www.escardio.org/Education/E-Learning/ESCeL-the-ESC-training-and-education-platform>, <https://www.escardio.org/Education/E-Learning/ESCeL-the-ESC-training-and-education-platform> (accessed 2 February 2020).
49. European Society of Cardiology. CVD Prevention Toolbox, <https://www.escardio.org/Education/Practice-Tools/CVD-prevention-toolbox>, <https://www.escardio.org/Education/Practice-Tools/CVD-prevention-toolbox> (accessed 2 February 2020).
50. European Society of Cardiology. Be Guidelines Smart, <https://www.escardio.org/Sub-specialty-communities/Association-of-Cardiovascular-Nursing-&-Allied-Professions/Education/be-guidelines-smart>, <https://www.escardio.org/Sub-specialty-communities/Association-of-Cardiovascular-Nursing-&-Allied-Professions/Education/be-guidelines-smart> (accessed 2 February 2020).
51. McIntosh E, Donaldson C, Ryan M. Recent advances in the methods of cost-benefit analysis in healthcare. Matching the art to the science. *Pharmacoeconomics* 1999; 15: 357–367.