OPEN LETTER

REVISED Half a Century of Wilson & Jungner: Reflections on the Governance of Population Screening [version 2; peer review: 3 approved]

Steve Sturdy[1,2], Fiona Miller[3], Stuart Hogarth[4], Natalie Armstrong[5], Pranesh Chakraborty[6], Celine Cressman[3], Mark Dobrow[3], Kathy Flitcroft[7], David Grossman[8], Russell Harris[9], Barbara Hoebee[10], Kelly Holloway[3], Linda Kinsinger[11], Marlene Krag[12], Olga Löblová[4], Ilana Löwy[13], Anne Mackie[14], John Marshall[15], Jane O'Hallahan[16], Linda Rabeneck[17], Angela Raffle[18], Lynette Reid[19], Graham Shortland[20], Robert Steele[21], Beth Tarini[22], Sian Taylor-Phillips[23], Bernie Towler[24], Nynke van der Veen[10], Marco Zappa[25]

[1]Science, Technology and Innovation Studies, University of Edinburgh, Edinburgh, EH1 1LZ, UK
[2]Centre for Biomedicine, Self and Society, University of Edinburgh, Edinburgh, EH8 9LN, UK
[3]Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, M5T 3M6, Canada
[4]Department of Sociology, University of Cambridge, Cambridge, CB2 1SB, UK
[5]University of Leicester, Leicester, UK
[6]Children's Hospital of Eastern Ontario, Ottawa, Canada
[7]Melanoma Institute Australia, Wollstonecraft, Australia
[8]Kaiser Permanente Washington Health Research Institute, Seattle, USA
[9]University of North Carolina, Chapel Hill, USA
[10]National Institute of Public Health and the Environment, Bilthoven, The Netherlands
[11]Independent Scholar, Durham, NC, USA
[12]Danish Health and Medicines Authority, Kobenhavn, Denmark
[13]INSERM, Paris, France
[14]Public Health England, London, UK
[15]UK National Screening Committee, London, UK
[16]Ministry of Health, Mount Victoria, New Zealand
[17]Cancer Care Ontario, Toronto, Canada
[18]Consultant in Public Health, Bristol, UK
[19]Dalhousie University, Halifax, Canada
[20]University Hospital of Wales, Cardiff, UK
[21]University of Dundee, Dundee, UK
[22]University of Iowa, Iowa City, USA
[23]University of Warwick, Warwick, UK
[24]Department of Health and Ageing, Canberra, Australia
[25]Instituto per lo Studio e la Prevenzione Oncologica, Firenze, Italy

v2 **First published:** 06 Jul 2020, **5**:158
https://doi.org/10.12688/wellcomeopenres.16057.1
Latest published: 17 Aug 2020, **5**:158
https://doi.org/10.12688/wellcomeopenres.16057.2

Open Peer Review

Reviewer Status ✓ ✓ ✓

Abstract

Background: In their landmark report on the "Principles and Practice

of Screening for Disease" (1968), Wilson and Jungner noted that the practice of screening is just as important for securing beneficial outcomes and avoiding harms as the formulation of principles. Many jurisdictions have since established various kinds of "screening governance organizations" to provide oversight of screening practice. Yet to date there has been relatively little reflection on the nature and organization of screening governance itself, or on how different governance arrangements affect the way screening is implemented and perceived and the balance of benefits and harms it delivers.
Methods: An international expert policy workshop convened by Sturdy, Miller and Hogarth.
Results: While effective governance is essential to promote beneficial screening practices and avoid attendant harms, screening governance organizations face enduring challenges. These challenges are social and ethical as much as technical. Evidence-based adjudication of the benefits and harms of population screening must take account of factors that inform the production and interpretation of evidence, including the divergent professional, financial and personal commitments of stakeholders. Similarly, when planning and overseeing organized screening programs, screening governance organizations must persuade or compel multiple stakeholders to work together to a common end. Screening governance organizations in different jurisdictions vary widely in how they are constituted, how they relate to other interested organizations and actors, and what powers and authority they wield. Yet we know little about how these differences affect the way screening is implemented, and with what consequences.
Conclusions: Systematic research into how screening governance is organized in different jurisdictions would facilitate policy learning to address enduring challenges. Even without such research, informal exchange and sharing of experiences between screening governance organizations can deliver invaluable insights into the social as well as the technical aspects of governance.

Keywords
screening, governance

Invited Reviewers

	1	2	3
version 2 (revision) 17 Aug 2020		✓ report	✓ report
version 1 06 Jul 2020	✓ report	? report	

1. **Martina C. Cornel**, VU University Medical Center, Amsterdam, The Netherlands
2. **Nigel G. Laing**, University of Western Australia, Nedlands, Australia
3. **Alex Faulkner**, University of Sussex, Sussex, UK

Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Fiona Miller (fiona.miller@utoronto.ca)

Author roles: Sturdy S: Conceptualization, Funding Acquisition, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Miller F**: Conceptualization, Funding Acquisition, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Hogarth S**: Conceptualization, Funding Acquisition, Investigation, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Armstrong N**: Investigation, Writing – Review & Editing; **Chakraborty P**: Investigation, Writing – Review & Editing; **Cressman C**: Investigation, Writing – Review & Editing; **Dobrow M**: Investigation, Writing – Review & Editing; **Flitcroft K**: Investigation, Writing – Review & Editing; **Grossman D**: Investigation, Writing – Review & Editing; **Harris R**: Investigation, Writing – Review & Editing; **Hoebee B**: Investigation, Writing – Review & Editing; **Holloway K**: Investigation, Writing – Review & Editing; **Kinsinger L**: Investigation, Writing – Review & Editing; **Krag M**: Investigation, Writing – Review & Editing; **Löblová O**: Investigation, Writing – Review & Editing; **Löwy I**: Investigation, Writing – Review & Editing; **Mackie A**: Investigation, Writing – Review & Editing; **Marshall J**: Investigation, Writing – Review & Editing; **O'Hallahan J**: Investigation, Writing – Review & Editing; **Rabeneck L**: Investigation, Writing – Review & Editing; **Raffle A**: Investigation, Writing – Review & Editing; **Reid L**: Investigation, Writing – Review & Editing; **Shortland G**: Investigation, Writing – Review & Editing; **Steele R**: Investigation, Writing – Review & Editing; **Tarini B**: Investigation, Writing – Review & Editing; **Taylor-Phillips S**: Investigation, Writing – Review & Editing; **Towler B**: Investigation, Writing – Review & Editing; **van der Veen N**: Investigation, Writing – Review & Editing; **Zappa M**: Investigation, Writing – Review & Editing

Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). The following interests were declared: SH and OL reported grants from the European Research Council; KH and FM reported grants from the Canadian Institutes of Health Research; MK reported being the director responsible for national screening program in Denmark in the Danish Health Authority and chairperson of the advisory committee on national screening programmes to the Danish Health Authority; JM reported being a paid employee of the UK National Screening Committee; AR reported personal fees from UK National Screening Programmes; SS reported a grant from the Wellcome Trust.

Grant information: This work was supported by the Wellcome Trust through a Senior Investigator Award to SS [100597]. The workshop on which the article is based, and the work of preparing the present manuscript, was supported by grants from the Wellcome Trust, the Canadian Institutes of Health Research [project grant Funding Reference Number PJT-148805, PI FAM], and the European Research Council [Starting Grant: CANCERSCREEN Screening for cancer in the post-genomic era: diagnostic innovation and biomedicalisation in comparative perspective, grant agreement No 716689, PI SH].
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

How to cite this article: Sturdy S, Miller F, Hogarth S *et al.* **Half a Century of Wilson & Jungner: Reflections on the Governance of Population Screening [version 2; peer review: 3 approved]** Wellcome Open Research 2020, **5**:158
https://doi.org/10.12688/wellcomeopenres.16057.2

First published: 06 Jul 2020, **5**:158 https://doi.org/10.12688/wellcomeopenres.16057.1

REVISED **Amendments from Version 1**

In Box 2: "Screening governance organizations: some examples", we have added a short description of the Australian Standing Committee on Screening, to provide a more adequate summary of screening governance arrangements in that country.

To avoid ambiguity, we have replaced all mentions of "the three lead authors" with the names "Sturdy, Miller and Hogarth".

Any further responses from the reviewers can be found at the end of the article

Disclaimer

The views expressed in this article are those of the author(s). Publication in Wellcome Open Research does not imply endorsement by Wellcome.

Introduction

Just over 50 years ago, the World Health Organization (WHO) published a landmark report on the "Principles and Practice of Screening for Disease" by James Maxwell Glover Wilson and Gunnar Jungner. The report was prompted by the growing use of medical tests to identify potential disease in apparently healthy individuals, and by a dawning awareness that the adoption of such "deceptively easy" tests could cause harm without necessarily providing benefit to those tested[1]. The report accordingly sought to clarify the circumstances under which screening could be considered appropriate as a means of secondary prevention. Over the ensuing half century, the practice of screening has continued to evolve, using a growing range of technologies to test for more and more conditions, from rare genetic disease screening in newborns to cancer screening in adults. Throughout that period, Wilson and Jungner's report has remained a key point of reference for assessing the appropriateness of screening—in particular their ten "principles" which specified critical preconditions for pursuing screening (Box 1).

Box 1. Wilson and Jungner's Principles of Screening[1]

1. The condition sought should be an important health problem.
2. There should be an accepted treatment for patients with recognized disease.
3. Facilities for diagnosis and treatment should be available.
4. There should be a recognizable latent or early symptomatic stage.
5. There should be a suitable test or examination.
6. The test should be acceptable to the population.
7. The natural history of the condition, including development from latent to declared disease, should be adequately understood.
8. There should be an agreed policy on whom to treat as patients.
9. The cost of case-finding (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.
10. Case-finding should be a continuing process and not a 'once and for all' project.

As the title of their report makes clear, however, Wilson and Jungner appreciated that the *practice* of screening, including how screening is organized and how principles are enacted, is just as important for securing beneficial outcomes and avoiding harms as the formulation of the principles themselves. Accordingly, in the decades since their report was published, in a growing number of jurisdictions, a range of governmental and quasi-governmental organizations have been set up with the express aim of exercising oversight of screening practice, including reviewing screening interventions, issuing guidance, and in some cases establishing organized screening programs to oversee quality and coordinate access to screening-related services. Within their respective spheres of influence, these "screening governance organizations", as we designate them, have worked hard to promote beneficial screening practices and avoid attendant harms.

In developing their procedures, screening governance organizations have given considerable thought to the role of clinical and epidemiological evidence in assessing the merits of specific screening interventions. Screening decisions do not depend on evidence alone, however. They are also shaped by the circumstances under which decision-making takes place, including how screening is organized, but also—and crucially—how governance itself is organized and practised. This is apparent in the diversity of governance organizations that exist in different jurisdictions, in their different powers and remits, and in the often markedly different screening regimes they oversee. Yet to date, there has been relatively little reflection on the nature and organization of screening governance itself, or on how different governance arrangements may affect how screening is implemented, how it is perceived, and the balance of benefits and harms it delivers.

This lack of reflection marks a significant gap in our understanding of screening and how it might best be implemented. Decisions about whether and how to screen may have political as well as practical repercussions. Not least, inter-jurisdictional variation in the availability and organization of screening can prompt difficult questions about the reasons for such variation, potentially undermining public trust in local and national arrangements and weakening the legitimacy of screening governance organizations. There is consequently a need for a closer look at screening governance, including how screening governance organizations differ in constitution and the powers they exercise, how those differences relate to variation in the scope and practice of screening, and how such organizations account for their decisions to governments, healthcare providers, clinicians and the public.

To address this need, in June 2018, an international group of screening experts from nine countries met in London for a two-day workshop to commemorate the 50th anniversary of Wilson and Jungner's report, to share and compare experiences of screening governance, and to ask: What have screening governance organizations achieved to date? What key governance challenges remain? And how might collective, cross-jurisdictional knowledge-sharing help to address those challenges?

This paper sets out some key issues that arose in the course of the workshop discussions. Rather than attempting to document all the data and perspectives presented at the workshop, it seeks instead to highlight key areas in which the participants agreed that governance challenges remained and where continuing reflection and development were needed. It considers achievements and ongoing challenges in three principal areas of screening governance: the assessment of the relative benefits and harms of screening; the organization of population screening programs; and the variations in governance arrangements arising in different contexts. It concludes, as did the workshop, that much could be gained through sustained engagement across jurisdictions and the creation of further opportunities for comparison, reflection and ultimately improvement of screening governance.

An expert policy workshop

The workshop was planned and convened by Sturdy, Miller and Hogarth, prompted by conversations and questions that had arisen in the course of their respective researches into screening governance. The remaining workshop participants were recruited through personal contacts and snowballing recommendations. The aim was not to recruit a "representative" sample of international screening experts—if indeed such a thing were possible. Rather, we sought to create an opportunity to share, reflect on and learn from a diversity of experience regarding the achievements and challenges of population screening in different jurisdictions. To that end, we set out to bring together expert actors from a range of different national and regional screening governance organizations, plus a number of social scientists involved in researching screening policy and practice, while keeping numbers small enough to permit round-table discussion.

The workshop was organized into seven sessions, each devoted to a different aspect of screening governance in national and cross-national perspectives, and each including short reflective presentations by three or four participants followed by round-table discussion. A final round-table session considered the findings of the workshop and next steps, including the decision to write and publish the present paper.

Based on notes taken at the workshop, Sturdy, Miller and Hogarth prepared a first draft of the paper, which was then circulated to all participants with a request for corrections, clarification and suggestions for revision. After substantial redrafting, the paper was again circulated to all participants, leading to a third and penultimate draft. Following a further round of circulation and minor revisions, the final version was approved by all the listed authors. Dr Mary White, Chief of the Epidemiology and Applied Research Branch in the US CDC's Division of Cancer Prevention and Control took part in the workshop, commented on drafts of this paper and agreed to be acknowledged as a named contributor but not as an author. Dr Alberto Gutierrez, a Partner with NDA Partners, who took part in the workshop but did not contribute to the preparation of this article, agreed to be named in that capacity.

The findings, conclusions, and views expressed in this paper are those of the authors individually and collectively. They do not necessarily represent the official positions of the organizations they work for. Nor do they claim to represent opinion among screening policymakers or practitioners more generally.

Adjudicating the benefits and harms of population screening

Emerging at a time of burgeoning enthusiasm for non-communicable disease screening[2], Wilson and Jungner's report anticipated benefits and highlighted potential harms. Assessing then-current efforts as "at a very early and comparatively primitive stage in the systematic detection and treatment of early disease"[1], the report made a compelling case for systematic, evidence-based evaluation of new screening interventions. That case has only been strengthened by 50 years of scrutiny, which has deepened understanding of the possible sources of harm (false positives, false negatives, over-diagnosis) and its many manifestations (physical, psychological, financial, social)[3–5]. As Angela Raffle, Anne Mackie and Muir Gray put it: "All screening programmes do harm. Some do good as well…"[6].

A central aspect of screening governance is therefore the weighing of potential harms against anticipated benefits. To that end, Wilson and Jungner emphasized the need for early, well-planned research to ensure that "scientific knowledge" rather than "folklore" guides screening practice[1]. Continuing awareness of that need has encouraged the growth of clinical and epidemiological research capacity and the development of an international community of practice, including through professional societies and research associations (e.g. International Cancer Screening Network, International Agency for Research on Cancer Screening Group, International Society for Neonatal Screening). In concert with the evidence-based medicine movement, screening governance bodies have done much to advance this cause, developing systematic review processes, formulating explicit criteria to evaluate screening interventions, articulating evidentiary and methodological standards that accord with those criteria (e.g. types of harms, implementation considerations), and tailoring them to the specific populations or conditions[7–10]. Through these activities, and by actively fostering research and methodological refinement more generally, screening governance organizations have come in many cases to stand as exemplary proponents of evidence-based medicine.

Enduring challenges

The adoption of clear evaluation criteria and robust evidential methods does not obviate the importance of value-based judgments and normative expectations in screening governance[6,11]. For instance, normative expectations inform decisions over what criteria are relevant when determining the balance of harms and benefits, as is evident from the way screening governance bodies have variously augmented or reinterpreted Wilson and Jungner's original ten principles to include values such as informed choice and health equity[12,13], while value judgements also inform how harms and benefits are weighted.

Further evidential challenges arise from the dynamics of screening practice itself. Screening governance bodies commonly influence evidence production through their decisions about what they consider to be adequate evidence (by type,

quantity or quality). But decisions taken on the basis of such evidence may in turn lead to change in the evidential landscape. As Wilson and Jungner realized, implementing a screening intervention may severely constrain what kind of evidence can be ethically generated thereafter, as that intervention becomes the accepted standard of care[1]. Moreover, once a particular screening test diffuses into practice, both the screening technology itself and the practices within which it is embedded rarely stand still. Screening bodies are developing strategies to enhance their capacity to deal with these shifting landscapes, for instance by developing new evaluation criteria and evidence review capacity. But in practice, they face a fundamental difficulty in adjudicating the balance of benefits and harms where screening programs already exist, and where testing technology or treatment standards continue to evolve relative to the evidence base that provided initial support for the screening intervention.

Finally, both the production and the interpretation of evidence involve social processes which can complicate the role that evidence plays in adjudicating between different policy and practice options. Screening governance organizations are not the only actors involved in generating and evaluating evidence or using it as a basis for decisions about screening practice. Practitioner organizations, public and private healthcare organizations and health technology assessment (HTA) bodies also evaluate screening interventions and issue guidelines and recommendations. The different positions that these organizations occupy within the wider social structures of screening, as well as the divergent professional and personal commitments they represent and the conflicting financial interests they may embody, can all lead to differences in how evidence is generated and interpreted[11,14–16]. Providers and practitioners responsible for actually delivering screening tests and follow-up interventions may be faced with multiple guidelines based on different sources of evidence or standards of practice, leading to outcomes that may elude the scrutiny of screening governance organizations;[17] while adoption of guidelines depends upon many factors besides simply the quality of evidence or the clarity of the guidelines[18]. Finally, clinical and public convictions about the value of screening may run contrary to screening governance organizations' inclination, on the strength of new or existing evidence, to restrict or withdraw access to established screening interventions—witness for instance the controversy around the recommendation of the Swiss Medical Board to cease introduction of new mammography screening programs and to set a time limit on the ones that exist[19].

As a result of all these factors, screening governance cannot be reduced simply to rule-governed review of evidence. Rather, it must take account of the wider factors that inform the production and interpretation of evidence, and indeed what is actually considered to be evidence[20], as well as the way that implications drawn from that evidence are translated into recommendations for practice, and the way that those recommendations are implemented in the complex social world of medical knowledge and practice. Evidence is necessary but not sufficient: screening decisions may be evidence-based, but that does not mean that they are unequivocally determined by evidence[21,22].

Organizing population screening

In looking beyond the principles to the practice of screening, Wilson and Jungner appreciated that "the efficient practice of screening" may best be secured by coordinating "the whole screening operation, beginning with an appeal to the public, through screening tests, definitive diagnosis, treatment and follow-up, without breakdown in communications at any point". Ideally, such organized initiatives would ensure not only that "persons found in need of treatment should be able to obtain it", but that the same services were made available to "a whole community". In light of these stipulations, Wilson and Jungner cautioned that it was better to invest in a limited number of programs "that are well planned and well executed" than to spread resources too thinly by pursuing "every feasible form of early disease detection and prevention." Given inevitable funding constraints, moreover, the "benefit and effectiveness of the proposed programme" would need to be weighed against "other desirable objectives". To support priority setting, Wilson and Jungner proposed an axis of national preparedness for screening with, on the low end, poor countries with limited organized care that might support "medical aid teams," and on the other end, wealthy countries with highly organized care, "where integrated screening operations carried out under national arrangements may be expected". This axis also accommodated the phenomenon of wealthy nations with health services that were neither integrated nor accessible, and which would house "expensive sporadic screening exercises … with poor communication and follow-up"[1].

Wilson and Jungner contended that organized screening operations are more effective than *ad hoc* or opportunistic screening both for maximizing benefits and minimizing harms. This contention now is widely accepted and supported by evidence. Organized screening programs have other virtues too. For instance, unlike *ad hoc* or opportunistic approaches where tests are simply offered to patients seeking clinical attention for other purposes, organized screening programs can monitor and respond to on-the-ground experience and uptake of screening. They can also provide a structure within which to pursue informed decision making and monitor and promote equity of access and outcome. Consequently, health insurance and care systems, both public and private, have increasingly come to favor organized screening programs as the best means to identify and recruit target populations, ensure relevant diagnostic and therapeutic follow-up, and monitor, evaluate and quality assure screening pathways[23,24]. In many cases, such programs are organised in concert with or in response to guidance from the competent screening governance organizations, providing screening governance organizations with a second critical mechanism by which to shape practice, in addition to systematic collection and review of evidence.

Enduring challenges

The implementation of organized screening programs does not necessarily mean uniformity of provision, however. Even within a single program or jurisdiction, the organization of

screening may not be consistent or comprehensive. Such internal variation impedes clarity about the pre-conditions of good outcomes. It also complicates efforts to compare performance and share insights *across* programs and jurisdictions. Indeed, what is meant by "organized" screening may itself vary markedly across jurisdictions, even for the same condition: programs in one jurisdiction may be organized only insofar as they involve systematic cohort notification or data registration, while those in another may organize the full screening pathway including failsafe mechanisms and quality assurance[25]. Consequently, organized screening programs vary widely in the extent and nature of the services they provide.

This variation is not due solely to differences in "national preparedness"—the spectrum of organizational capacities and capabilities of national healthcare systems that Wilson and Jungner pointed to. Another key factor is the uneven organizational capacity and authority that screening governance organizations possess. Human and financial resources and sound management are needed to coordinate, quality assure and evaluate a screening pathway. Availability of data infrastructure, in particular, is often crucial if population-based screening programs are to be implemented, monitored and evaluated effectively[26]. But screening governance organizations vary in their ability to mobilize such resources. They also differ in their powers to engage with health insurance and care systems that execute some or all of the steps in the full screening pathway. Screening governance organizations thus exist on a spectrum defined by their capacity to organize and coordinate programs. At one extreme are organizations that possess little more than a structured review function, with only a limited role in coordinating screening pathways or even in specifying how they should perform. At the other are organizations with the resources to mount pilot programs and conduct research including long term follow-up, and with the authority to guide and quality assure the conduct of screening and treatment by health care professionals and provider organizations. Even in the latter case, however, screening governance organizations are acutely dependent on the state of development of the relevant healthcare services and functions and on the extent to which diagnostic and treatment services are integrated, available and accessible. This poses a major constraint on screening governance organizations' ability to design and direct effective programs. Under such circumstances, questions of equity and ethics may profoundly influence decisions about whether or not to establish screening programs in specific contexts[27].

Screening governance organizations are not typically in a position to determine how much resource or authority they possess. Indeed, what screening "is" in any one country reflects pragmatic realities in the allocation of responsibility for different practices. Such jurisdictional realities may produce expansive definitions of screening. The UK National Screening Committee, for example, brings a wide range of screening initiatives into one common programmatic framework, even as each screening program is executed independently across four distinct health systems. Elsewhere, however, screening governance organisations may have to work with more limited definitions of screening. In Australia, Italy and the Netherlands, for example, national screening programs forge a common approach across distinct states or regions for an intentionally narrow set of conditions, while other screening services are organised separately from these national programs, often on a regional basis.

Variation in the nature of organized screening programs is further complicated by the occurrence of opportunistic or *ad hoc* screening. Opportunistic screening may exist in the absence of organized effort, as is the case for PSA-based prostate cancer screening, which has been endorsed by few screening governance organizations. Alternatively, opportunistic or *ad hoc* screening may exist *alongside* organized screening programs, as is sometimes the case for cervical or breast cancer screening, especially where screening is pursued outside recommended guidelines (e.g. over or under recommended age limits, or at greater frequency). These overlaps may have serious implications for extant or potential organized screening programs. Even where screening governance organizations exercise strict control over organized programs, they are generally unable to control the *ad hoc* or opportunistic screening that may exist in parallel, nor can they avert the harms that are likely to occur where such screening occurs against express recommendations. Individuals who pursue opportunistic screening may not be able to secure timely access to the follow-on testing and treatment that an organized program can assure; or they may find themselves referred for follow-up in circumstances where it would not normally be justified; or they may be exposed to other unwarranted harms or costs. This may in turn have implications for screening governance organizations. In the absence of systematic data about the conduct and outcomes of competing or overlapping *ad hoc* and opportunistic screening, screening governance organizations' ability to evaluate, quality assure and where necessary modify organized screening programs may be confounded and compromised[25].

Decisions about screening programs, then, are not necessarily just about whether or not to screen. They may be also about whether the initiation or termination of an organized approach will lead to improvements of one kind or another—be it in equality of access, or quality of testing and decision-making, or achieving a better balance of benefits and harms. Here too, value-based judgments and normative expectations are unavoidable. Decisions about where to focus organized screening effort and how to define the scope of screening programs do not simply follow from what is technically possible. Difficult trade-offs may be necessary, for example between the opportunity to increase access by under-served populations to existing screening interventions and the opportunity to establish new screening programs. Or circumstances may warrant the pursuit of less-than-optimal solutions: an organized and quality-assured program may increase benefit and reduce harm relative to an *ad hoc* or opportunistic program, for instance, even if the balance between benefit and harm would not justify the intervention in the first instance.

These organizational and institutional factors add a further dimension to the complexities and uncertainties we have already identified in relation to evidence review and evidence-based decision-making. As in the evaluation and weighting of evidence, judgements about how to organize screening programs have a strongly social dimension, colored by the play of professional and personal commitments and institutional and financial interests. And this too has implications for the work of screening governance organizations. In planning and overseeing organized screening programs, screening governance organizations do not only deal with evidence; they also need to engage with and take account of the concerns and interests of multiple stakeholders, from patients to practitioners to healthcare providers. Ultimately, the effectiveness of screening programs—their ability to deliver benefits while minimizing harms to individuals and populations—depends on how well these stakeholders can be encouraged or compelled to work together to a common end.

Organizing screening governance

The challenge confronting screening governance organizations is thus not simply a technical one of assessing evidence and designing organized programs. It is also a question of how to coordinate social action, often under conditions of some uncertainty. How screening governance organizations achieve this is a vital aspect of the work of screening governance itself. And in this respect, much may depend on just how screening governance bodies are constituted, how they are situated in relation to other interested organizations and actors, what powers are vested in them, and what authority they wield.

Unsurprisingly, given the diverse political and healthcare settings in which they have emerged, screening governance organizations vary widely (see Box 2). Some are designated agents of government while others are independent committees of experts. Some are national with broad clinical scope; others are regional and focused on specific clinical areas. Some issue recommendations (variously to clinicians, health insurance and healthcare organizations, and government bodies) while others have formal authority, including the power to require reimbursement by insurers or action by health systems. To date, little effort has been made to understand how the social organization of screening governance affects the way screening itself is implemented, and with what consequences. However, we can identify a number of issues around which challenges may arise.

Enduring challenges

A key challenge facing screening governance organizations is how to negotiate the often conflicting interests and values of the different stakeholders involved in delivering the various elements of a screening program. Just whose voices get heard can significantly affect screening decisions, for instance over what conditions to include in newborn screening programs[28]. Certain stakeholders may enjoy formal representation within screening governance organizations. More generally, screening governance organizations may be in a position to convene discussions with other organizations with overlapping roles

Box 2. Screening governance organizations: some examples

- The Netherlands: Health Council of the Netherlands (est. 1902) https://www.healthcouncil.nl/about-us/history
  - National government advisory body with very broad clinical scope
  - Advises Ministers and Parliament on matters of public health including population screening
  - Since 1997 charged with assessing applications for government licenses to undertake population screening
- The Netherlands: National Institute for Public Health and the Environment (1909) https://www.rivm.nl/en/about-rivm/rivm
  - National government agency with broad public health scope
  - Advises the Minister on the introduction and modification of screening programs
  - Designs, directs and coordinates national screening programs
- Canada: Task Force on Preventive Health Care (formerly Canadian Task Force on the Periodic Health Examination, est. 1976) https://canadiantaskforce.ca/about/history/
  - National government agency with broad clinical scope
  - Issues recommendations to clinicians
- USA: Preventive Services Task Force (1984) https://uspreventiveservicestaskforce.org/uspstf/procedure-manual-section-1
  - Independent committee of experts supported by government agency with broad clinical scope
  - High grade recommendations necessitate coverage by commercial insurers and states through Medicare and Medicaid
- USA: Advisory Committee on Heritable Disorders in Newborns and Children (2003) https://www.hrsa.gov/sites/default/files/hrsa/advisory-committees/heritable-disorders/about/ACHDNC-Discretionary-Charter.pdf
  - Statutory committee of experts appointed by the US Secretary of Health and Human Services
  - Advises government on screening for heritable disorders in newborns and children
- Ontario, Canada: Cancer Care Ontario (1997) https://www.cancercareontario.ca/en/cancer-care-ontario/about-us
  - Provincial government agency with scope for cancer control
  - Issues evidence-based recommendations to government
  - Plans, implements and operates Ontario's organized cancer screening programs
- Ontario, Canada: Newborn Screening Ontario (2006) https://www.newbornscreening.on.ca/en/about-us
  - Provincial non-governmental agency with scope for newborn screening

- Advisory Council established in 2010 reviews program quality and issues recommendations to government

- UK: National Screening Committee (1996) https://www.gov.uk/government/groups/uk-national-screening-committee-uk-nsc
  - National government agency with broad clinical scope
  - Advises on action by the health systems of the UK's four countries.
- Australia: Medical Services Advisory Committee (1998) http://www.msac.gov.au/
  - Independent non-statutory committee established by the Minister for Health, with broad clinical remit
  - Appraises new medical services proposed for public funding, including national screening services
- Australia: Standing Committee on Screening (2001) http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/standing-committee-on-screening
  - Advisory body to national, state and territory governments on national cancer screening programs and issues, with an emerging advisory role in relation to newborn screening
- Italy: Osservatorio Nazionale Screening (2001) https://www.osservatorionazionalescreening.it/content/chi-siamo
  - Independent Agency mandated by National and Regional Governments
  - Monitors screening programs nationwide, and makes recommendations on new screening programs
- New Zealand: National Screening Advisory Committee (2004) https://www.nsu.govt.nz/about-us-national-screening-unit/nsu-advisory-groups/national-screening-advisory-committee
  - Advisory Group to Ministry of Health (who advises government) with broad clinical scope
  - Issues recommendations to the Ministry of Health for national population screening programs

related to screening activities—for instance the health insurance and healthcare organizations that offer *ad hoc* and opportunistic screening tests, or the professional associations whose guidelines on screening may conflict with those issued by screening governance organizations. As such, screening governance organizations may play a pivotal role by facilitating participation among the various scientists, clinicians and other healthcare providers whose research and care standards are critical to screening-relevant care, and whose decisions and practices can increase benefits or lead to harm.

Yet little has been done to examine how different screening organizations engage with scientists and clinicians, or how they involve them in evidence review and recommendation processes or the design and delivery of organized screening programs. We have only very patchy knowledge about which stakeholders are considered by different screening organizations to have a legitimate "stake" in deliberations over evidence or the design and delivery of organized programs, or about the processes they use to accommodate or respond to stakeholders' views. Nor do we have any systematic insight into what types or processes of engagement are most effective at securing coordinated action around screening, under what circumstances, and with what outcomes or impacts. In principle, many screening governance bodies have the organizational depth and staying power needed to develop and support processes of engagement and deliberation that will potentially lead to significant improvements in the effectiveness of screening programs. In practice, however, we lack any overview of what different screening organizations actually do in this regard, let alone any insight into what works.

Questions of engagement do not extend solely to professionals and healthcare providers. They also potentially extend to the individuals and populations who undergo screening, and who stand to experience both the benefits and the harms that screening may deliver. These people, as much as the professionals, determine the legitimacy of screening interventions, be it by bringing political pressure to bear on the relevant authorities or simply by consenting or declining to participate in screening. Screening governance organizations are often active in communicating their conclusions and rationales widely and for diverse publics[29], and there is evidence that active engagement may have a significant impact on public attitudes towards screening[30]. They may also have the capacity to provide opportunities for public input, for example through public membership of review committees, or stakeholder input on draft recommendations. This too raises questions about exactly whose views should be taken into account: just those individuals identified as having a positive screening test result, or all members of a target population, or entire national populations? Public attitudes regarding the desirability of screening may depart markedly from expert evaluations based on evidence of harms and benefits, and may differ between those affected and those unaffected by particular diseases[31,32]. This raises profound ethical questions about who should be involved in screening policy decisions, and what methods should be adopted to elicit or inform their views. As yet, however, we have no systematic overview of what different screening bodies do to engage participants or publics, or to what effect. Given growing expectations of patient involvement in the planning and delivery of healthcare services, however, much could be gained from more concerted reflection on what public and patient engagement can contribute to screening governance.

Conclusions

Wilson and Jungner's 1968 report remains a critical touchstone in efforts to adjudicate and balance the benefits and harms of population screening. Half a century on, their principles and their attention to practices have informed the emergence of a range of governance organizations employing sophisticated

governance mechanisms, including structured evidence review processes to determine whether and how to screen, and programmatic efforts to maximize benefits and minimize harms. At a meeting of international screening experts convened in the summer of 2018 to reflect on Wilson and Jungner's contribution to the governance of screening, participants highlighted that organized oversight and accountability for population screening remains crucial. Only through coordinated governance procedures can recommendations about screening invoke clear criteria, robust systems of evidence review and deliberation, and transparent processes of communication and public engagement. Such procedures are equally important to ensure that screening practices address defined populations, provide integrated screening and care pathways, possess robust data capacity, and ensure detailed quality assurance and long-term follow up.

At the same time, the workshop participants expressed a desire for more sustained reflection on how screening governance works in different jurisdictions, and how the organization and implementation of governance procedures impacts on screening recommendations, programs, and ultimately outcomes. There is a perceived need for greater awareness and understanding of these critical issues, including how screening governance bodies are constituted, what powers they possess, how they exercise those powers, how they engage with stakeholders including healthcare providers and publics, and how all these factors affect decision-making processes and the outcomes of those decisions.

That is not to suggest that there should be greater standardization or homogeneity of screening governance arrangements across jurisdictions. The social, political and economic circumstances under which screening is enacted vary enormously, and governance arrangements need to remain attuned to local circumstances. But learning across borders can still be valuable. One way to pursue such learning would be through research that characterizes and compares screening organizations and governance arrangements across clinical conditions and across countries. But even in the absence of such research, enhanced opportunities and incentives for informal exchange and engagement between different screening governance organisations, including sharing experiences and insights into best practices, could be beneficial. Indeed, in such complex arenas of policy and practice, holistic, experience-based apprehension of how different organizations have adapted to deal with the contingent circumstances under which they operate may be a more fruitful means of adaptive policy learning than formalised comparison[33,34]. Academic research can do much to facilitate policy learning. But even in the absence of such research, informal exchange and sharing of experiences between screening governance organizations and cognate expert bodies has the potential to deliver invaluable insights into the social as well as the technical aspects of governance. Those involved in the work of screening governance may learn much from observing how sister organizations in other jurisdictions exercise the authority and powers vested in them, how this relates to variation in the scope and practice of screening, how they engage the interests of practitioners and publics, and how effective governance can ensure the legitimacy and public acceptability on which screening ultimately depends.

Data availability

Underlying data

No data is associated with this article.

Acknowledgements

In addition to the authors, Dr Mary C. White, Chief of the Epidemiology and Applied Research Branch, Division of Cancer Prevention and Control, US Centers for Disease Control and Prevention, also took part in the workshop and provided feedback on previous drafts of this article. Dr Alberto Gutierrez, a Partner with NDA Partners, took part in the workshop but did not contribute to the preparation of this article. The authors gratefully acknowledge their respective contributions.

References

1. Wilson JMG, Jungner G: **Principles and practice of screening for disease.** Geneva: World Health Organisation; 1968.
Reference Source

2. Reiser SJ: **The emergence of the concept of screening for disease.** *Milbank Mem Fund Q Health Soc.* 1978; **56**(4): 403–25.
PubMed Abstract

3. Gray JAM: **New concepts in screening.** *Br J Gen Pract.* 2004; **54**(501): 292–8.
PubMed Abstract | Free Full Text

4. Harris RP, Sheridan SL, Lewis CL, *et al.*: **The harms of screening: a proposed taxonomy and application to lung cancer screening.** *JAMA Intern Med.* 2014; **174**(2): 281–5.
PubMed Abstract | Publisher Full Text

5. Carter SM: **Ethical aspects of cancer screening.** *Cancer Forum.* 2016; **40**(2): 105–9.
Reference Source

6. Raffle AE, Mackie A, Gray JAM: **Screening: evidence and practice.** 2nd ed. Oxford: Oxford University Press; 2019.
Publisher Full Text

7. Sherriff R, Best L, Roderick P: **Population screening in the NHS: a systematic pathway from evidence to policy formulation.** *J Public Health Med.* 1998; **20**(1): 58–62.
PubMed Abstract | Publisher Full Text

8. Baron RC, Rimer BK, Coates RJ, *et al.*: **Methods for conducting systematic reviews of evidence on effectiveness and economic efficiency of interventions to increase screening for breast, cervical, and colorectal cancers.** *Am J Prev Med.* 2008; **35**(1 Suppl): S26–S33.
PubMed Abstract | Publisher Full Text

9. Krist AH, Bibbins-Domingo K, Wolff TA, *et al.*: **Advancing the Methods of the U.S. Preventive Services Task Force.** *Am J Prev Med.* 2018; **54**(1 Suppl 1): S1–S3.
PubMed Abstract | Publisher Full Text

10. Kemper AR, Krist AH, Tseng CW, *et al.*: **Challenges in Developing U.S. Preventive Services Task Force Child Health Recommendations.** *Am J Prev Med.* 2018; **54**(1S1): S63–9.
PubMed Abstract | Publisher Full Text

11. Williams JH, Carter SM, Rychetnik L: **Contested guideline development in Australia's Cervical Screening Program: values drive different views of the purpose and implementation of organized screening.** *Public Health Ethics.* 2016; **10**(1): 5–18.
Publisher Full Text

12. Andermann A, Blancquaert I, Beauchamp S, *et al.*: **Revisiting Wilson and Jungner in the genomic age: a review of screening criteria over the past 40 years.** *Bull World Health Organ.* 2008; **86**(4): 317–9.
PubMed Abstract | Publisher Full Text | Free Full Text

13. Dobrow MJ, Hagens V, Chafe R, *et al.*: **Consolidated principles for screening based on a systematic review and consensus process.** *CMAJ.* 2018; **190**(14): E422–E429.
PubMed Abstract | Publisher Full Text | Free Full Text

14. Raichand S, Dunn AG, Ong MS, *et al.*: **Conclusions in systematic reviews of mammography for breast cancer screening and associations with review design and author characteristics.** *Syst Rev.* 2017; **6**(1): 105.
PubMed Abstract | Publisher Full Text | Free Full Text

15. Rasmussen K, Jørgensen KJ, Gøtzsche PC: **Citations of scientific results and conflicts of interest: the case of mammography screening.** *Evid Based Med.* 2013; **18**(3): 83–9.
PubMed Abstract | Publisher Full Text | Free Full Text

16. Ngo-Metzger Q, Moyer V, Grossman D, *et al.*: **Conflicts of Interest in Clinical Guidelines: Update of U.S. Preventive Services Task Force Policies and Procedures.** *Am J Prev Med.* 2018; **54**(1S1): S70–80.
PubMed Abstract | Publisher Full Text

17. Macdonald M, Smith JHF, Tidy JA, *et al.*: **Conservative management of CIN2: national audit of British Society for Colposcopy and Cervical Pathology members' opinion.** *J Obstet Gynaecol.* 2018; **38**(3): 388–94.
PubMed Abstract | Publisher Full Text

18. Doherty JA, Crelia SJ, Smith MW, *et al.*: **Large health systems' prevention guideline implementation: a qualitative study.** *Am J Prev Med.* 2018; **54**(1S1): S88–94.
PubMed Abstract | Publisher Full Text

19. Biller-Andorno N, Jüni P: **Abolishing mammography screening programs? A view from the Swiss Medical Board.** *N Engl J Med.* 2014; **370**(21): 1965–7.
PubMed Abstract | Publisher Full Text

20. Dobrow MJ, Goel V, Lemieux-Charles L, *et al.*: **The impact of context on evidence utilization: a framework for expert groups developing health policy recommendations.** *Soc Sci Med.* 2006; **63**(7): 1811–24.
PubMed Abstract | Publisher Full Text

21. Grosse SD, Rogowski WH, Ross LF, *et al.*: **Population screening for genetic disorders in the 21st century: evidence, economics, and ethics.** *Public Health Genomics.* 2010; **13**(2): 106–15.
PubMed Abstract | Publisher Full Text

22. Williams JH, Rychetnik L, Carter SM: **Evidence-based cervical screening: experts' normative views of evidence and the role of the 'evidence-based brand'.** *Evid Pol.* 2018.
Publisher Full Text

23. Ponti A, Anttila A, Ronco G, *et al.*: **Cancer Screening in the European Union.** Report on the implementation of Council Recommendation on Cancer Screening. 2nd Report. Brussels: European Commission; 2017.
Reference Source

24. White MC, Wong FL: **Preventing premature deaths from breast and cervical cancer among underserved women in the United States: insights gained from a national cancer screening program.** *Cancer Causes Control.* 2015; **26**(5): 805–9.
PubMed Abstract | Publisher Full Text | Free Full Text

25. Williams JH, Carter SM, Rychetnik L: **'Organised' cervical screening 45 years on: how consistent are organised screening practices?** *Eur J Cancer.* 2014; **50**(17): 3029–38.
PubMed Abstract | Publisher Full Text

26. Yancy B, Royalty JE, Marroulis S, *et al.*: **Using data to effectively manage a national screening program.** *Cancer.* 2014; **120** Suppl 16(0 16): 2575–83.
PubMed Abstract | Publisher Full Text | Free Full Text

27. Flitcroft KL, Gillespie JA, Carter SM, *et al.*: **When good evidence is not enough: the role of context in bowel cancer screening policy in New Zealand.** *Evid Policy.* 2011; **7**(3): 307–326.
Publisher Full Text

28. Miller FA, Cressman C, Hayeems R: **Governing population screening in an age of expansion: the case of newborn screening.** *Can J Public Health.* 2015; **106**(4): e244–8.
PubMed Abstract | Publisher Full Text | Free Full Text

29. Kurth AE, Krist AH, Borsky AE, *et al.*: **U.S. Preventive Services Task Force Methods to Communicate and Disseminate Clinical Preventive Services Recommendations.** *Am J Prev Med.* 2018; **54**(1S1): S81–7.
PubMed Abstract | Publisher Full Text

30. Paul C, Nicholls R, Priest P, *et al.*: **Making policy decisions about population screening for breast cancer: the role of citizens' deliberation.** *Health Policy.* 2008; **85**(3): 314–20.
PubMed Abstract | Publisher Full Text

31. Moyer VA, Calonge N, Teutsch SM, *et al.*: **Expanding newborn screening: process, policy, and priorities.** *Hastings Cent Rep.* 2008; **38**(3): 32–9.
PubMed Abstract | Publisher Full Text

32. Schwartz LM, Woloshin S, Fowler FJ, *et al.*: **Enthusiasm for cancer screening in the United States.** *JAMA.* 2004; **291**(1): 71–8.
PubMed Abstract | Publisher Full Text

33. Marmor T, Freeman R, Okma K: **Comparative perspectives and policy learning in the world of health care.** *J Comp Policy Anal Res Pract.* 2005; **7**(4): 331–48.
Publisher Full Text

34. Sturdy S, Freeman R, Smith-Merry J: **Making knowledge for international policy: WHO Europe and mental health policy, 1970–2008.** *Soc Hist Med.* 2013; **26**(3): 532–54.
Publisher Full Text

Open Peer Review

Current Peer Review Status: ✔ ✔ ✔

Version 2

Reviewer Report 30 September 2020

https://doi.org/10.21956/wellcomeopenres.17834.r40173

✔ **Alex Faulkner**
University of Sussex, Sussex, UK

The Open Letter identifies an interesting and potentially important neglected issue in medical screening – the constitution, behaviour and operation of 'screening governance organisations' (SGOs). A notable selection of experts in public health, screening policy, practice, medical history and sociology contribute to the Letter. The approach taken usefully acknowledges what could be called the 'sociopolitical' aspects of screening policies and their production, hence providing a complement and corrective to approaches that focus exclusively on the historical 'principles and practices' of screening and policies which are taken, explicitly at least, to be based only on scientific and medical evidence and the weighing of benefits and harms defined through public health and narrow 'evidence-based medicine' lenses. The review that the workshop-based Letter undertakes, as the authors claim, could provide the basis for programmes of mutual learning amongst such organisations and the sharing of good practice, if such practice can be identified in a transportable way. A number of points of potential improvement and current lack of data are usefully identified, for example information about the involvement of different stakeholders in SGOs' framing of 'what counts' as evidence, appraisal work and decision-making. The pointers to a research programme that are set out should be taken seriously by various potential funding organisations internationally.

The paper usefully maps out the range of SGO's from those with limited resource carrying out 'structured reviews' to well endowed organisations able to carry out long term follow-up research and build infrastructures to provide guidance and implementation powers. Likewise, some SGO's focus on a narrow range of medical conditions, while others are set up with a broad-ranging remit.

The role of patient and civil society organisations, NGOs etc., known to have had a contentious impact on some screening programme policies worldwide, is not addressed head-on in the paper, rather, such issues are referred to in terms of the language of 'public and patient engagement'. The well-known frequent divergence of values and views between public health professions and certain public or patient groups is noted. In this respect the authors rightly note the crucial importance of public trust and the societal credibility of screening programmes. It would be useful

to understand more about how SGOs take strategic measures to address this issue, which is key in the current times of grappling with governance of scientific uncertainty. To what extent, for example, do different SGOs in different local situations adopt 'precautionary' approaches?

It's notable that screening trials per se as a form of evidence-production are not referred to explicitly, though it is well known that very expensive international population screening outcome trials have been conducted (for example in prostate cancer screening), with inconclusive results. It will be interesting to learn more about the relations between SGOs and public sector research funders and 'health services research' organisations, both clinical and academic, in this respect.

The paper provides a useful selective list of Western SGOs with short notes of their roles. It will be useful to see more detail of the constitution of such organisations in due course. The mention of Wilson & Junger's 1968 WHO reference to 'medical aid teams' in developing countries suggests that it will be interesting also to expand this to a consideration of low and middle income countries, where importation and adaptation of Western governance models is a known phenomenon in many fields.

The focus of the paper on socio-political and economic factors in SGO constitution and behaviour suggests that investigation of the relationships between SGOs and national political and economic cultures and infrastructures will be a productive area in order to try to assess the likely constraints on mutual learning and sharing of perceived good practice. This might also be a consideration in following up the authors' promising suggestion that SGOs can hold a pivotal role mediating between scientists, clinicians and others in developing screening governance in multi-stakeholder contexts.

Finally, one can wonder what should be defined, in different national and other contexts, as the *societal* governance outcomes of SGOs, aside from the already contested and difficult assessment of medical harms/benefits?

While the analysis presented in the paper is that of a generic and valuable overview, given the multiple authors and aim to map the SGO phenomenon in an essentially novel way, it opens up a wide range of further questions worthy of exploration through research, especially more detailed comparative analysis of contrasting SGO governance regimes.

Is the rationale for the Open Letter provided in sufficient detail?

Yes

Does the article adequately reference differing views and opinions?

Yes

Are all factual statements correct, and are statements and arguments made adequately supported by citations?

Yes

Is the Open Letter written in accessible language?

Yes

Where applicable, are recommendations and next steps explained clearly for others to

follow?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical Sociology and 'Science & Technology Studies' (STS) study of scientific medical and healthcare innovations; HTA study of health technologies including screening programmes.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 02 September 2020

https://doi.org/10.21956/wellcomeopenres.17834.r39976

Nigel G. Laing
Centre for Medical Research,Harry Perkins Institute of Medical Research, QEII Medical Centre, University of Western Australia, Nedlands, WA, Australia

I would just like to thank the authors for their responses to my comments and suggestions and I am glad the authors found them useful.

Is the rationale for the Open Letter provided in sufficient detail?
Yes

Does the article adequately reference differing views and opinions?
Yes

Are all factual statements correct, and are statements and arguments made adequately supported by citations?
Yes

Is the Open Letter written in accessible language?
Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Human molecular genetics, molecular diagnosis, reproductive carrier screening

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 20 July 2020

https://doi.org/10.21956/wellcomeopenres.17613.r39421

?

Nigel G. Laing
Centre for Medical Research,Harry Perkins Institute of Medical Research, QEII Medical Centre, University of Western Australia, Nedlands, WA, Australia

This Open Letter is based on a Workshop organised in 2018 to commemorate 50 years of the Wilson and Jungner criteria.

I agree with Professor Cornel that there is an over-emphasis on cancer screening and too little discussion on genetic screening. I feel there is insufficient discussion of how the original 1968 Wilson and Jungner criteria do not work for genetic screening as has been discussed by others:
Reference 12 - Andermann, A., Blancquaert, I., Beauchamp, S. & Dery, V. Revisiting Wilson and Jungner in the genomic age: a review of screening criteria over the past 40 years. *Bull World Health Organ* **86**, 317-9 (2008).
But also:

- Grosse, S.D. *et al.* Population screening for genetic disorders in the 21st century: evidence, economics, and ethics. *Public health genomics* **13**, 106-15 (2010).
- Andermann *et al.* (2011[1]).

The insistence in Wilson and Jungner 1968 on a treatment being available means that genetic screening does not fit the criteria. For example, strict adherence to the 1968 Wilson and Jungner criteria has been used to block newborn screening for Duchenne muscular dystrophy, because there was no cure for Duchenne muscular dystrophy. This has led to who knows how many second, third or more affected boys being born to couples who might have wanted to avoid having more than one affected son.

Similarly, there is insufficient discussion that the 1968 Wilson and Jungner criteria do not fit with current public opinion or government thinking on reproductive carrier screening.

Reproductive carrier screening does not fit with 1968 Wilson and Jungner in that again there is no

treatment for many of the diseases now screened for. The benefit is not to a patient but to prospective parents. In relation to public opinion, from my Group's work, we know that two-thirds of Western Australians wish access to reproductive carrier screening, while only 10% do not want to access it (Ong *et al.,* 2018[2]).

1968 Wilson and Jungner does not fit with Government thinking in Israel, which is running a nationwide panethnic carrier screening program (Zlotogora *et al.*, 2016[3]), or Australia, where the Federal Health Minister has called for reproductive carrier screening to be made available in the future free to all Australians who want to use it (Delatycki *et al.*, 2019[4] and Casella, 2020[5]).

I just wish that articles about Wilson and Jungner criteria, especially articles on governance of screening, would strongly acknowledge that strict adherence to 1968 Wilson and Jungner is no longer viable, and that every "screening governance organization" needs to use modified Wilson and Jungner criteria in 2020.

This Open Letter however is based on a specific workshop, so if these things were not discussed at the Workshop, then perhaps they cannot be included in the Open Letter. It may then be up to others to publish counter arguments at a later date.

In Australia, as well as the Medical Services Advisory Committee (MSAC) (http://www.msac.gov.au/), which advises the Federal Government on which items the Federal Government should fund for the population, there is the Standing Committee on Screening: (http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/standing-committee-on-screening) (SCOS). The SCOS advises the Australian Health Ministers Advisory Council (AHMAC) on which conditions should be screened for. AHMAC includes the Federal and State Health Ministers. Newborn screening in Australia is not funded by the Federal Government, but by the Health Departments of the individual States and Territories. Newborn screening is therefore not under the Federal Health Department's jurisdiction, and MSAC is therefore irrelevant to newborn screening in Australia.

Minor comment, under "Methods" and "An expert policy workshop", which are the three lead authors? The first three authors or the last three authors or a mixture? Would it be clearer to simply give their names?

References

1. Andermann A, Blancquaert I, Beauchamp S, Costea I: Guiding policy decisions for genetic screening: developing a systematic and transparent approach.*Public Health Genomics*. 2011; **14** (1): 9-16 PubMed Abstract | Publisher Full Text
2. Ong R, Howting D, Rea A, Christian H, et al.: Measuring the impact of genetic knowledge on intentions and attitudes of the community towards expanded preconception carrier screening.*J Med Genet*. **55** (11): 744-752 PubMed Abstract | Publisher Full Text
3. Zlotogora J, Grotto I, Kaliner E, Gamzu R: The Israeli national population program of genetic carrier screening for reproductive purposes.*Genet Med*. 2016; **18** (2): 203-6 PubMed Abstract | Publisher Full Text
4. Delatycki MB, Laing NG, Moore SJ, Emery J, et al.: Preconception and antenatal carrier screening for genetic conditions: The critical role of general practitioners.*Aust J Gen Pract*. **48** (3): 106-110 PubMed Abstract | Publisher Full Text
5. Casella R: Mackenzie's Mission. *Allen and Unwin*. 2020. 187-196 Reference Source

Is the rationale for the Open Letter provided in sufficient detail?
Yes

Does the article adequately reference differing views and opinions?
Partly

Are all factual statements correct, and are statements and arguments made adequately supported by citations?
Partly

Is the Open Letter written in accessible language?
Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Human molecular genetics, molecular diagnosis, reproductive carrier screening

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 10 Aug 2020

Steve Sturdy, University of Edinburgh, Edinburgh, UK

Like Prof Cornel (reviewer 1), Prof Laing notes that more workshop participants came from the field of cancer screening than from genetic screening. As both reviewers observe, different kinds of conditions, and different kinds of tests, entail different assessments of potential harms and benefits; indeed, every proposed screening intervention needs to be evaluated on its particular merits. However, our aim in the workshop and in this open letter was to step back from specifics, and to explore issues common to the experience of all the participants, which we believe need to be taken into account when considering governance arrangements for screening interventions in general. Besides experts from cancer screening and from organisations with a comprehensive purview of all kinds of population screening, the workshop included several participants with particular expertise in screening for genetic disorders. All participants contributed fully to the proceedings and to the drafting and finalization of the open letter, and all approved the views expressed. We are therefore confident that we have succeeded in our aim of identifying issues of relevance to the governance of all forms of population screening modalities across a range of jurisdictions.

Regarding Prof Laing's comment that "strict adherence to 1968 Wilson and Jungner is no longer viable": We should stress that our article does not advocate strict adherence to the precise 1968 principles. On the contrary, we point out the complexities and uncertainties inherent in weighing the harms and benefits of a growing diversity of screening interventions, and the ways that the 1968 principles have therefore been variously reinterpreted and augmented. Our intention was to invoke the spirit as much as the letter of the Wilson and Jungner reflections on screening governance, and to highlight in particular their often-neglected observation that practice is as important as principles in ensuring that screening delivers a positive balance of benefit over harm. Space did not permit us to pursue this insight down to the level of individual screening interventions. Instead, we sought to draw general reflections on how screening governance might best be arranged in order to ensure that all kinds of screening interventions, including genetic as well as cancer screening, deliver appropriate benefits to the populations they are designed to serve. There will be far more to say about just what this might entail for particular interventions and particular circumstances – and we are delighted that our reviewers have already begun to pursue that conversation.

On a point of accuracy, Prof Laing noted a deficiency in our summary, in Box 2, of Australian screening governance arrangements. We have now amended that entry with the addition of the Standing Committee on Screening.

On a specific textual point, Prof Laing helpfully notes that it is unclear whom we refer to when we talk of the "lead authors" of this open letter. We have now replaced that phrase with "Sturdy, Millar and Hogarth".

Competing Interests: No competing interests were disclosed.

Reviewer Report 08 July 2020

https://doi.org/10.21956/wellcomeopenres.17613.r39422

Martina C. Cornel
Department of Clinical Genetics, Section of Community Genetics, Amsterdam Public Health research institute, VU University Medical Center, Amsterdam, The Netherlands

The paper presents a report based a workshop organized in 2018. It provides reflections on the governance of population screening programmes, which indeed is very topical and much needed. Governance of screening in many countries faces challenges of a changing landscape in terms of technical possibilities for testing and treatments becoming available, while resources are limited.

The participants were chosen from personal contacts and snowballing. This seems to have led to

an overrepresentation of the Cancer Screening field, as well as Anglophone countries, and an underrepresentation of international umbrella-organizations and “genomic” screening (See Andermann 2008). Reproductive screening and neonatal screening may raise different issues in terms of evidence and ethics.

As a separate issue, “governance” may be considered a multi-step procedure where some stakeholders are involved in the (scientific) weighing of the evidence before a decision is made whether or not to start a screening, while other stakeholders are involved in the decision making on ethical and economical aspects (Ministry of Health, Parliament). Is “governance organization” a correct framing, or should rather the different steps in governance be studied in future analyses? Is the governance different for considering expansion of screening vs. responsible implementation of current screening programs?

Is the rationale for the Open Letter provided in sufficient detail?
Yes

Does the article adequately reference differing views and opinions?
Partly

Are all factual statements correct, and are statements and arguments made adequately supported by citations?
Yes

Is the Open Letter written in accessible language?
Yes

Where applicable, are recommendations and next steps explained clearly for others to follow?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: genetics & public health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 10 Aug 2020

Steve Sturdy, University of Edinburgh, Edinburgh, UK

Prof Cornel rightly observes that our method of recruiting participants meant that English-speaking countries were better represented than others. In consequence, we acknowledge that the views shared in the workshop and in the open letter focused mainly — though not exclusively — on the experiences of Western/English speaking countries. We hope that this open letter will help to stimulate further conversations covering a wider range of communities and jurisdictions.

Prof Laing (reviewer 2) raises the same question as Prof Cornel regarding differences between cancer screening and genomic, antenatal and newborn screening. We therefore discuss this question in our response to Prof Laing's comments.

On the question of governance as a multi-step procedure: a distinction can be drawn between scientific assessment of evidence on one hand and ethical, economic and social aspects of decision making on the other. However, one of the key points arising from our deliberations was that in practice, collection and evaluation of evidence regarding the establishment and expansion of screening unavoidably involves ethical, economic and/or social considerations about responsible implementation, just as much as does the assessment of existing screening programs. That is not to say that there is no value in organising screening governance in a multi-step fashion, to reflect the different issues that may be involved in different kinds of decision making. But any decision to do so will need to be taken on pragmatic grounds, considering what is practical and appropriate under the prevailing circumstances, and not on the assumption that some aspects of governance are purely technical or scientific, while others are ethical or social.

Competing Interests: No competing interests were disclosed.