

**TITLE: Applying the principles of EBM to public health - searching for public health evidence – the experience at the National Institute for Health and Clinical Excellence (NICE).**

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## **Purpose**

The purpose of this paper is to describe how evidence is gathered for public health guidance development at the National Institute for Health and Clinical Excellence (NICE) and the challenges encountered when applying the principles of systematic reviewing and searching to public health.

Finding the evidence is central to the development of NICE Public Health guidance. Searching for public health studies to inform guidance development is a complex and challenging task that must go beyond conventional approaches and sources; it requires expert skills and specialist resources. It differs from other types of searching because of the breadth and coverage of the discipline of public health, because the indexing vocabulary for public health is not standardised, and because of the many gaps that exist in the evidence base for public health.

The development of guidance at NICE generally follows the systematic reviewing methods developed and perpetuated by the Cochrane Collaboration, which recommends a systematic and comprehensive approach to literature searching.

This paper discusses the experiences learnt from the development of the first pieces of Public Health guidance at NICE and describes the challenges the NICE team faces in finding a methodology for searching that is comprehensive and transparent but which is also more sympathetic to the timescales in which we operate.

## **About NICE and the Centre for Public Health Excellence**

The National Institute for Health and Clinical Excellence (NICE) is the UK's independent organisation responsible for providing national guidance on promoting good health and preventing and treating ill health. It produces several types of guidance including cancer service guidance, clinical guidelines, interventional procedures, technology appraisals as well as public health intervention and public health programme guidance.

The National Institute for Health and Clinical Excellence was created in 2005 out of two existing organisations: the National Institute for Clinical Excellence (also called NICE) and the Health Development Agency (HDA). The HDA was responsible for developing the public health evidence base, and did this by producing reviews of reviews. When the HDA joined NICE a new centre was created called the Centre for Public Health Excellence (CPHE); this centre is responsible for developing public health guidance. HDA evidence briefings are available on the NICE website at [http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda\\_publications.jsp](http://www.nice.org.uk/aboutnice/whoweare/aboutthehda/hdapublications/hda_publications.jsp).

## **Developing Public Health guidance**

CPHE in NICE produces two types of guidance:

- Public health **intervention** guidance which makes recommendations on clear activities (interventions) to promote a healthy lifestyle or reduce the risk of developing a disease or

condition, such as giving advice in a primary care setting to encourage exercise. An example of a published intervention is *Interventions in schools to prevent and reduce alcohol use among children and young people*

<http://www.nice.org.uk/guidance/index.jsp?action=byID&o=11893>.

- Public health **programme** guidance which deals with broader activities for promoting good health and preventing ill health. This guidance may focus on a topic (such as smoking), specific populations (such as young people) or a particular setting (such as the workplace), such as strategies to improve the diet and nutrition of mothers and infants. An example of published programme guidance is *Guidance on the promotion and creation of physical environments that support increased levels of physical activity*  
<http://www.nice.org.uk/guidance/index.jsp?action=byID&o=11917>.

Key stages in developing guidance are: scoping the topic to be reviewed; conducting the evidence review and economic appraisal; drafting and consulting on guidance; carrying out fieldwork. The reviews and economic appraisals are usually conducted by a contracted research body or Public Health Collaborating Centre. Guidance is then drafted by the Public Health Intervention Appraisal Committee (PHIAC – for intervention guidance) or a Programme Development Group (PDG – for programme guidance), which consists of recommendations based on the evidence review and economic appraisal. NICE public health guidance is aimed at the NHS, local authorities, employers, voluntary and charitable sectors and other organisations concerned with public health and health promotion. As far as we are aware this remit to produce public health guidance is unique.

Our guidance development methodology is documented in our methods manual. This is in the process of being updated and will shortly be available for public consultation. The current version of the methods manual, and more information on the guidance development process, is available at

[http://www.nice.org.uk/aboutnice/howwework/developingnicepublichealthguidance/developing\\_nice\\_public\\_health\\_guidance.jsp](http://www.nice.org.uk/aboutnice/howwework/developingnicepublichealthguidance/developing_nice_public_health_guidance.jsp).

### **The role of Information Services**

The information services (IS) team comprises an associate director and fifteen professionally qualified information specialists, several of which are dedicated to supporting CPHE and come from public health information backgrounds. Support is provided for the production of NICE guidance as well as specific information needs. A library service is provided with print and electronic collections. The IS team is also involved in knowledge management initiatives.

In relation to public health guidance development the information team provides support for the topic selection, scoping and review phases. They also provide support for methodology development for searching for public health information. This paper focuses on the review development phase, in particular searching for evidence for the reviews.

IS input includes carrying out literature searches to inform the scope of the guidance and liaising with CPHE and contractors on information requirements for the reviews. The review process is carried out externally by national collaborating centres. These centres have information specialists as part of their teams who undertake comprehensive literature searching. The information specialists in the NICE IS team contribute to and co-ordinate the development of search protocols and search strategies for guidance topics and provide general information advice and quality assurance throughout the development phase.

### **Why Evidence Based Practice and systematic reviewing?**

Evidence based practice is the conscientious, explicit, and judicious use of current best evidence in decision making. It involves mixing individual expertise with the best available external evidence from systematic research. To ensure evidence based recommendations, NICE public health guidance is based on a review of the evidence. This in turn requires a systematic and

comprehensive approach to literature searching. We have found that trying to transpose these methods and principles to public health literature searching has created some challenges as searching for public health evidence is very different and requires different resources and skills to searching for clinical evidence. This is because of the multidisciplinary nature of public health that ranges from disciplines such as substance misuse and obesity prevention through to determinants of health such as housing, transport, education and environment.

### **Challenges – applying systematic reviewing principles to public health.**

Firstly, the overwhelming difficulty we have encountered is the volume of literature retrieved in the searches. This occurs for several reasons, including: the sources and databases to be searched; the elements or concepts to search for; the balance between a sensitive and specific search.

Performing comprehensive searches for public health reviews requires a broad exposure to databases. Unlike searches for clinical reviews it is not possible to limit the searches to a defined and regular set of clinical databases. Because there are no dedicated ‘public health’ bibliographic databases it is unlikely that the required evidence will be found in any main source, and the list of databases needs to be individually tailored for each review topic. For example, seventeen databases were searched for an evidence review on workplace mental wellbeing. These ranged from databases such as MEDLINE and CINAHL to capture the health related evidence, PsycINFO to cover the mental wellbeing aspect of the review and ABI Inform to capture literature relevant to businesses and the workplace.

The PICO (Population, Intervention, Comparison, Outcomes) and SPICE (Setting, Population/Problem, Intervention, Comparison, Evaluation) models used to search for health evidence are not always appropriate. These models are frequently used to structure searches for evidence based literature searches. When searching for evidence for public health reviews it is often the case that only some of these elements are relevant. This may be because the intervention is aimed at the whole population, such as *the prevention of cardiovascular disease at the population level*, in which case there is no population element. The review may questions ‘what is effective in bringing about x’ (i.e. what interventions bring about x) in which case there is no intervention element. Frequently the population and setting facets can be combined using the Boolean operator ‘OR’ (rather than ‘AND’); for example *Guidance for employers on promoting mental wellbeing through productive and healthy working conditions* could use ‘OR’ to combine search terms for the work place setting and the employee population. The elements in the PICO and SPICE models both focus and limit the search and without them the search results are often large and contain a lot of irrelevant results.

Sensitivity is the ability of a search strategy to identify relevant records and specificity is its ability to exclude irrelevant records. Finding a balance between these when searching for public health literature requires careful judgment. To date we have preferred an exhaustive search that attempts to identify every possible article, with less emphasis on the specificity of a search strategy.

Searches that retrieve a large number of results can cause difficulties for review teams, not least in sifting the search results. This has been a particular challenge as often reviews of the literature have to be carried out in as little as sixteen weeks. Furthermore, the majority of the retrieved records are ‘noise’ or irrelevant records. In some cases the majority of the articles that have been included in reviews have come from other sources, such as reviewers, stakeholders and committee members, all of who may be experts in the topic under review. For example, one search for a physical activity review resulted in 19,376 records from the database searches, 26 records from experts and stakeholders and a further 12 records from personal libraries. The final numbers included in the review were 4, 12 and 10 respectively. This indicates that we could adapt our search processes without compromising on quality. In addition, the NICE method, where evidence from stakeholders and experts is considered, helps to ensure that relevant evidence is not overlooked.

As part of the process to revise our methods manual we are considering our methods to search more precisely. Options under consideration are the removal of a list of 'core' databases, which would remove the requirement to search currently prescribed databases, such as MEDLINE and Cinahl, unless relevant to the topic, as well as an increased use of 'snowballing' and 'citation searching' techniques to help achieve a greater balance between searching sensitively and specifically. This would involve identifying key relevant papers and using the reference list (snowballing) or database citation search function to identify additional relevant papers. As we revise our methods manual we are considering whether to include an initial 'mapping exercise' whereby a map is created of the existing literature. It will also propose that the review identifies more explicit research questions; these should both help focus the searches.

The second major challenge that we have encountered is related to language. We have already discussed that public health topics cover a wide range of disciplines; each discipline has its own way of using language and some concepts can be context-specific. For example a search for physical activity literature may use the word 'cycle' (as the verb *to cycle* or the commonly shorted version of the noun *bicycle*). However, when applied to a clinical database this often retrieves literature related to drug cycles. Similarly, a search that includes 'families' as a population group or setting often retrieves literature on genetic conditions when applied to a clinical database. We have used adjacency indicators and the Boolean operator 'NOT' to improve the relevance of these search terms.

Most bibliographic databases have their own thesauri and subject terms between different thesauri do not correspond. As a result search strategies need to be 'translated' for each database. In addition the terms within the thesauri are often not suitable for public health searches. Alpi writes about this in her excellent article *Expert searching in public health*, where she describes how Medical Subject Headings (MeSH) are inadequate to describe the concept of place or partnership that is a familiar element to public health searches. For example, public health interventions may be aimed at a 'local community'; this is a loose concept to cover a group of people with similar socio-economic characteristics who live and work in a similar area. Alpi cites how the terms 'neighbourhood', 'community', 'place of birth' and 'domicile' all map to the MeSH term 'Residence Characteristics', yet this term is inadequate to describe our concept of local community. Similarly, MeSH has many terms to describe ethnic minorities that are found in the States, such as 'Inuits', and 'Hispanic Americans', but is inadequate to describe ethnic minority groups in the UK. Ethnicity can be both a population group and a factor in health inequalities; where we need to search for ethnic groups we have relied on free text searching rather than database thesauri.

The searcher's personal skills are paramount to counteracting these limitations of language. Free text searching is heavily used and therefore it is important the searcher has excellent language skills and a creative attitude to problem solving in order to think of alternative concepts and synonyms for search terms. The searcher should also have excellent transferable search skills and understand the database that they are using in order to minimise any language limitations.

The third major challenge when searching for public health reviews is gaps in the evidence base. This manifests in two forms: either the available evidence may be of insufficient quality or the evidence may not exist at all.

Evidence Based Practice accepts that there is a hierarchy of evidence. In this hierarchy Randomised Controlled Trials (RCTs) are considered the best quality type of study design (after systematic reviews and meta-analyses), followed by cohort and case control studies, with opinion and anecdotal evidence being the poorest quality of evidence. However, unlike clinical studies where a participant can be given a placebo, public health interventions do not always lend themselves to these types of studies. For example, an intervention that used exercise programmes to increase physical activity could not be studied using an RCT as participants would know which intervention they were assigned to. Furthermore, in some instances it could be unethical to conduct a study on a public health intervention; this would include interventions that caused harm or withheld treatment known to be beneficial.

Often evidence will be available, but the study design is of a lower quality. This is because the concept of a hierarchy of evidence and study design types is very specific to medicine. As many public health topics originate from other disciplines it is unlikely that the intervention has been subject to such rigorous examination. One method we are considering to help with this is to specify in advance the most appropriate study type best suited to answer the review question and sub-questions; this will enable the searches to look for specific types of evidence. It is also necessary to remember that Evidence Based Practice concerns the use of the 'best available evidence' and therefore a flexible approach may be required when considering whether the evidence available is appropriate for the review in question.

Furthermore much of the evidence, often because it lacks a formal study design, is grey literature. Searching for grey literature presents its own difficulties, including the fact that there is no single source of grey literature, and the sources are usually websites that are not indexed and can be difficult to search. For example, over twenty websites were searched for an evidence review on workplace mental wellbeing. This can be time consuming as it is necessary to firstly identify the websites which are relevant and secondly to search them.

### **The way forward**

The main challenges we have encountered include: the volume of literature retrieved in the searches; problems with the lack of a standardised 'public health' language; and difficulties with gaps in the evidence. New challenges present themselves with each review that is undertaken, reflecting the wide range of disciplines covered by public health. This requires a flexible and creative approach to searching. After three years of producing public health guidance we are revising our methods manual; this has provided a timely opportunity to revise our searching methodologies and to document some of the solutions we have developed.

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