

Healthy Lives, Healthy People Consultations An Integrated Response from the PHG Foundation

Introduction

The Foundation for Genomics and Population Health (PHG Foundation) is the successor body to the Public Health Genetics Unit. Its overarching purpose is to foster and enable the application of biomedical science, particularly genome-based technologies, for the benefit of human health. Among its specific objectives is the promotion of a social and regulatory environment that is receptive to innovation, without imposing an undue or inequitable public burden. The Foundation has a particular interest in the way that new technologies are translated within health services, in genetic research and its impact upon clinical and public health services. The PHG Foundation has links with the Institute of Public Health (University of Cambridge) (IPH) and some of the specific issues raised in this response are duplicated in the IPH material but originated from the Foundation.

General Comments relevant to Consultations on:

- I. **Healthy Lives, Healthy People: our strategy for public health in England;**
- II. **Healthy Lives, Healthy People: Transparency in Outcomes, Proposals for a Public Health Outcomes Framework; and**
- III. **Healthy Lives, Healthy People: Consultation on the Funding and Commissioning Routes for Public Health**

1. The plans for reform take insufficient account of genetic and genomic factors

Over the last few decades, there has been an exponential increase in our genomic knowledge, and our understanding of how genetic factors cause disease either directly, or in combination with environmental or lifestyle factors. In the main, this knowledge has been confined to the study of how genetic factors cause disease within families (i.e. through so called single gene disorders). It is likely that as more is understood about the effect of particular genes upon cellular pathways, knowledge of how these genes function may be used to stratify populations into risk groups.

Increasingly it is clear that for common diseases such as cancer, heart disease and diabetes - a number of genes, each with an individually small effect, may combine to cause a predisposition or susceptibility to disease. This increased knowledge of how individual genes combine to cause disease is being gained through population studies (such as genome wide association studies) and through increasingly sophisticated means of analysing individual genetic data (through technologies such as whole genome sequencing).

In addition to the combined effects from large numbers of genes described above, small numbers of people are sometimes found to have a rare mutation which may cause an extreme variant of a common disease. There is an increasing realisation that the study of rare genetic diseases may provide valuable information about the development and treatment of more common genetic condition including the common disease described above. For example, Professor Stephen O'Rahilly's work

on those rare individuals with genetically acquired obesity has cast light on the metabolic basis for obesity in the general population¹.

The rapidly decreasing cost of these technologies suggests that they will be implemented within clinical and public health settings within the next decade (and sooner for some applications). The combined weight of increasing knowledge and technological change suggests that more importance needs to be placed upon genetic and genomic factors in framing public health priorities, practice and outcomes in the future.

2. Reformed public health systems should place greater emphasis on the potential for genomic knowledge to provide predictive information about future ill health in individuals and populations, and to target interventions accordingly

Better knowledge about genetic and genomic effects (whether from the targeted study of single gene subsets of common complex disorders or from genome wide association studies described above) are being used more extensively to develop predictive genetic tests that can be used before symptoms arise, to determine future susceptibility to disease.

Recent advances in information technology allow predictive genetic tests to be offered directly to members of the public. Companies offering such tests typically collect saliva samples from consumers who are then sent details of their predictive tests via the internet. This method of accessing genomic information without clinical input raises important ethical issues² - nevertheless the practice is growing in volume. Given the development of direct-to-consumer testing, and the expansion of genetic testing generally within clinical practice, the potential for genetic analysis to predict future ill health should be acknowledged to a greater extent within this set of consultation papers.

3. The Proposed Public Health Outcomes Framework is skewed towards common conditions and takes insufficient account of conditions that are individually rare (but collectively common)

Whilst they are individually rare, single gene disorders are collectively very common with around 6-8% of individuals being affected by a rare disease within the European Union³. The emphasis upon common conditions in the proposed Public Health Outcomes Framework suggests that these rarer conditions will be overlooked. There is also a danger that structural changes will further marginalise these conditions (including the introduction of GP commissioning, and the introduction of the National Commissioning Board).

4. Strengthening the evidence base in health-care decision making

The PHG Foundation has pioneered work on the importance of a systematic approach to the development and evaluation of diagnostic tests (particularly genetic or genomic tests) within the UK. Streamlined data collection systems are vital for collating evidence of scientific and analytic validity, and clinical utility and personal utility. In the next few years, the process and basis for commissioning genetic and diagnostic tests is likely to be changed fundamentally. It will be increasingly important for decision making bodies to have access to evidence about the validity and utility of diagnostic tests, and to be seen to be using this information in a transparent manner. This will require an evidence base which will be collated from multiple sources.

¹ O'Rahilly S (2009) Human Genetics illuminates the paths to metabolic disease *Nature* Nov 19; 462(7271):307-314.

² See for example the recent report from the Nuffield Council on Bioethics (2010) Medical Profiling and online medicine: the ethics of 'personalised healthcare' in a consumer age.

³ European Organisation for Rare Diseases (EURODIS) 2005.

5. The increasing importance of stratified medicine

The stratification of populations⁴ is likely to play an important role in the future of health care, particularly in supporting a paradigm shift from diagnosis and treatment to prediction and prevention. For example, novel genetic (and other) biomarkers associated with disease could be used for stratifying the population into numerous subgroups based on risk, in order to improve targeting of interventions, such as screening, at those populations at highest risk of disease. Thus stratified medicine could substantially reduce the harms associated with current predictive medicine and public health activities. At the level of the individual patient, early presymptomatic (or pre-dispositional) testing should promote a more tailored approach to patient care and facilitate early treatment (where available). We anticipate an increase in ‘companion diagnostics’ associated with new and existing treatments, and the use of pharmacogenetic testing to identify individual variations in drug metabolism genes thereby assisting physicians to select the most appropriate treatment strategy.

The following comments address specific consultation questions within each of the consultations:

Healthy Lives, Healthy People: Consultation Response

b. What are the best opportunities to develop and enhance the availability, accessibility and utility of public health information and intelligence?

As mentioned above, the current plans for reform fail to build on existing knowledge of how genetic and genomic factors contribute to disease, and fail to acknowledge the need for translation of research findings into public health practice. For example, recent work using new whole genome sequencing technologies has tracked how smoking cigarettes causes mutations in certain cells in the lungs⁵ suggesting that a single cigarette causes around 15 mutations. It is vital that the implications of this type of research are translated into improved public health practice, so that appropriate interventions and protections can be developed.

As well as a systematic approach to the development of diagnostic tests mentioned above, the systematic collection of the clinical utility of other types of intervention (for example those which influence behaviour) will also be important if individuals are to use this source of evidence to make informed life-style choices as envisaged in these proposals⁶.

Healthy Lives, Healthy People: Transparency in Outcomes Proposals for a Public Health Outcomes Framework

Q2 Do you think that these are the right criteria to use in determining indicators for public health?

The current focus is inadequate as it will fail to address the burden of ill health and the needs of those with rare disorders. Potentially a large number of people are affected with rare disorders (the annual report from the Chief Medical Office focused upon this issue in 2009⁷). This omission is inherently unfair. Prevention and management of people with these conditions is increasingly effective; good public health interventions, such as

⁴ Stratification might identify different groups who metabolise drugs at different speeds. This has implications for the likely dosages, the risks and side effects, and ultimately the effectiveness of drug treatment

⁵ E. Pleasance et al (2010) A small-cell lung cancer genome with complex signatures of tobacco exposure. Nature 2010; 463:184-190.

⁶ Healthy Lives, Healthy People: Our strategy for public health in England, page 70.

⁷ Department of Health (2009) On the state of public health: Annual report of the Chief Medical Officer.

newborn screening, carrier or antenatal screening are available. All health services need to integrate rare disease subsets that have to be identified and managed appropriately.

The public does realise that people with rare and often extremely severe lifelong disorders deserve their share of attention. Appropriate indicators need to be devised, as this information is not currently the subject of good national data collection.

Q9 How can we improve indicators we have proposed here?

We wish to comment upon two of the proposed indicators -

Domain 2: Tackling the wider determinants of ill health: tackling factors which affect health and wellbeing

Greater use of predictive genetic tests may identify a group of individuals who have been identified as being at risk of developing a disease, but yet have not developed symptoms. This group are not 'disabled' but their numbers may have a public health impact. The Moratorium and Concordat on Genetic Tests currently prohibits insurers or employers from requesting genetic test information from prospective consumers/employees and this data is not collected in any systematic way within clinical services. However, this data may be relevant for the purposes of public health monitoring and or service evaluation. Collecting such information may be difficult to do without compromising individual confidentiality or imposing a disproportionate burden on those who have had tests (because of the risk that such information may be potentially discriminatory. One solution may be to collect anonymised data.

Domain 4: Prevention of ill health: Reducing the number of people living with preventable ill health

The use of 'uptake' as a performance measure in the context of national programmes of screening tests may be ethically sensitive. A better measure might be the extent to which eligible participants have been provided with relevant information about the screening test and have been supported to make an informed choice. This is particularly the case for prenatal screening for fetal anomaly or for chromosomal disorders such as Down's syndrome where a high uptake of screening in the absence of appropriate informed choice could imply coercion or worse, eugenics.

Healthy Lives, Healthy People: consultation on the funding and commissioning routes for public health

Q3 How can we best ensure that NHS commissioning is underpinned by the necessary public health advice?

We are concerned that the issue of public health advice to NHS commissioning seems potentially to be restricted to being 'about public health issues' which may be interpreted rather narrowly (for example be limited to the advice that cardiologists provide to patients about smoking, diet etc.) rather than the much broader issues of how public health specialists, with their specialist knowledge and skills⁸, should be involved in commissioning NHS services. In a time of rapid technological advance and ever increasing capacity to diagnose and treat patients it is vital that these skills are available to help commissioner decide on priorities and commission rationally and effectively.

⁸ These skills include epidemiology, health economic, population health needs assessment, critical appraisal and evaluation, as well as leadership and change management.

Public health expertise informs the commissioning of NHS funded services by

- ensuring an understanding of the need for (or ability to benefit from) services on a population basis. This includes a) **understanding of epidemiology** of conditions, b) **analysis of effectiveness** of interventions including prevention, diagnosis, clinical care, follow-up rehabilitation c) review of current services including inequities of service provision
- option appraisals, prioritisation and implementation

Most pathways of care will span a range from prevention to rehabilitation and include generalist and more specialist areas. Thus, for example, prevention in cardiovascular disease may include public health initiatives (e.g. around smoking, diet, exercise) but may also include rarer genetic aspects such as prevention in families with inherited familial hypercholesterolaemia or cardiac arrhythmias. Even in those more complex areas, service provision will need to include the GP who, for example, tests for cholesterol and recognises and refers, or arranges genetic testing and referral for the family of a sudden cardiac death victim.

These complex areas all require the skills of public health specialists to advise. Across the whole range of health services, this task is immense and becomes highly specialised, requiring a general understanding of the particular health and service area (cardiovascular, maternal and child health etc.) as well as general skills. Our own experience is in the area of genetic public health advice. This is an area that will impinge on most areas of clinical medicine in the next small number of years and the present cadre of public health specialists does not have the required range of knowledge. We are concerned therefore that public health advice to commissioning may become compartmentalised into specialist/generalist, public health/vs services, whereas all must be seen and commissioned in an integrated way.

Q8 - Which services should be mandatory for local authorities to provide or commission?

Reducing birth defects

We are pleased to see the inclusion of population level interventions for the prevention of birth defects, as this recommendation accords with the World Health Association resolution in May 2010 calling for action to address the global burden of birth defects. The wider local authority responsibilities in areas such nutrition, alcohol, smoking and wider determinants of health are all relevant in the reduction of birth defects within the UK. However we would like to see a specific commitment to pre-conceptual education and care and to cost-effective interventions prior to pregnancy aimed at the range of environmental and genetic factors that contribute to the risk of congenital disorders.

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