for patients with COPD exacerbations, but most patients with acute chest infections (in whom pneumonia is not suspected and without significant past medical histories) should not receive antibiotics. Further research is needed to see if there are other special patient subgroups more likely to benefit from antibiotics than example, those with haemoptysis and infective exacerbation of asthma, and to evaluate if other remedies can safely and effectively replace antibiotics. But given the strength of evidence to date, perhaps we should also ask ourselves if 88% of patients with acute LRTI can all be special?

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Prevention

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There is no shortage of international policy documents outlining the importance of primary care. But does the reality match up to the rhetoric? This is answered in part by a study in [1] et al. They describe primary care in 31 European countries in terms of investment in primary care, governance, workforce development, access, services delivered, continuity, coordination, comprehensiveness, and GPs’ income. One fundamental, if not surprising observation is that primary care is highly variable. This starts from defining who provides primary care, to whether ‘GP’ means the same thing in different countries, whether GPs work single-handly or collaborate with others in multidisciplinary teams, whether they have a gatekeeping role, whether they have a negotiated list and the range of services that are provided, to working conditions and income. Using a wide range of indicators on the different dimensions, Kirnios and colleagues developed a measure of ‘strength of primary care’, according to which countries such as the UK, Denmark, and Netherlands rank top, while others such as Austria, Cyprus, Greece, Hungary, and Ireland score poorly on care structures considered key for strong primary care. The study provides a great deal of detail to add to previous surveys documenting wide variation between primary care in different countries.

CHALLENGES FOR PRIMARY CARE

In a separate article, the same authors looked at the relationship between strength of primary care countries and the outcomes and the cost of health care provided.[1] They found that countries with strong primary care systems had better health outcomes but, contrary to received wisdom,[2] these countries had more expensive healthcare systems relative to national income. However the article suggests no room for complacency in terms of thinking that primary care producing better health outcomes is a major priority with our increasingly aged and multimorbid patients. To do this general practice needs to change. GPs need to increasingly take access to the skills of a multidisciplinary team and to facilities for investigation and treatment. This is all odd with the organisation of general practice in many countries where GPs are self-employed, often working single-handed or in small groups. Recent work describes a number of models which are emerging in the UK and other countries that seek to provide the benefits of organisational scale while preserving the local nature of general practice,[3,4] suggesting design principles for clinical care and organisation of general practice that will be needed to meet the needs of patients in future.[5]

FUTURE FUNDING OF PRIMARY CARE

We also need new models of funding primary care to enable provision of better integrated care. Increasingly, there are moves to try to promote integration of care through so called ‘bundled payment systems’ which may include payments being made to more than one provider (that is, primary and secondary care) to cover whole episodes of illness, or for implementing care pathways or disease management programmes. Such schemes are now evident in the Netherlands.[5] These schemes recognise that payment systems which encourage multiple providers and give them different incentives are unlikely to provide well coordinated care. Pay-for-performance is also increasingly used in primary care and has spread from the UK to Germany, France, Estonia, Hungary, and Sweden despite limited evidence of its benefits unless used as part of other quality improvement initiatives.[3] Pay-for-performance schemes also have a problem that they tend to prioritise the management of single conditions over integrated care. A major recent innovation in funding is the potential for primary care to use its population responsibility to take on wider

There is increasing recognition that primary care should be organised to take responsibility for whole populations of patients. There is no shortage of international policy documents outlining the importance of primary care. But does the reality match up to the rhetoric? This is answered in part by a study in [1] et al. They describe primary care in 31 European countries in terms of investment in primary care, governance, workforce development, access, services delivered, continuity, coordination, comprehensiveness, and GPs’ income. One fundamental, if not surprising observation is that primary care is highly variable. This starts from defining who provides primary care, to whether ‘GP’ means the same thing in different countries, whether GPs work single-handly or collaborate with others in multidisciplinary teams, whether they have a gatekeeping role, whether they have a negotiated list and the range of services that are provided, to working conditions and income. Using a wide range of indicators on the different dimensions, Kirnios and colleagues developed a measure of ‘strength of primary care’, according to which countries such as the UK, Denmark, and Netherlands rank top, while others such as Austria, Cyprus, Greece, Hungary, and Ireland score poorly on care structures considered key for strong primary care. The study provides a great deal of detail to add to previous surveys documenting wide variation between primary care in different countries.

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THE NEED FOR REFORM
Primary care in many countries is unrecognisable from 20 years ago. Countries are bound to continue to reform their healthcare systems to deal with the new challenges of ageing populations, and therefore changes to both the organisation and financing of primary care are inevitable. GPs have proved to be both adaptable and entrepreneurial over many years. They will need to show continued ability to adapt to a changing environment.

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STRENGTHS OF THIS APPROACH: OPEN DATA AND ORGANISATION ANALYSIS

The availability of data describing NHS organisations has never been greater. A large-scale UK healthcare process and outcome data is becoming publicly available from the Health and Social Care Information Centre [http://www.hscic.gov.uk] and via the government open data portal [http://www.data.gov.uk] with GP practice, hospital, and clinical commissioning group (CCG) indicators available. Indicators cover measures including population, service, clinical outcome, prescribing and patient experience. The UK Data Archive [http://data-archive.ac.uk/] is another source of publicly available data, including individual level data from health surveys. With the UK white paper from 2012 presenting the government strategy to make more data public the amount of data available is only going to increase.

One strong advantage of using publicly available data in research is that there are no problems with data confidentiality. When looking at associations between risk factors and outcomes, linking information about individual patients often requires extensive ethical and governance approval. Linking data at the organisational level, however, does not, as usually the data have been published and are in the public domain already. Ecological studies also allow us to look nationwide providing evidence that is potentially more generalisable than from studies considering individuals, but in only a small geographical area. A further strength of ecological studies is that where data are available the exploration of potential trends over time can be considered with relative ease.

The strength of an ecological study for looking at associations at the institutional level (hospital, CCG or GP practice) is balanced by the fact that we cannot draw conclusions about individual patients from population data. We can tell whether GP practices where patients report a better experience of care are those that achieve higher QOF targets, but this tells us nothing about the association between patient experience and the quality of clinical care at the patient level. Ecological studies are at best hypothesis generating when considering individual level associations and care is needed to avoid the risk of ecological fallacy: assuming the associations that exist at the population level persist at the individual level. Ecological analyses which consider within-institution trends over time are less vulnerable to these problems, but not immune.

CAUTIONS: CONFounding, BIAs, AND ECological fallacy

Considerations applicable to any type of epidemiological research also apply to ecological studies, for example in relation to potential confounding (where two domains of care appear associated, but this is in fact simply because they are both associated with a third, confounding, variable). Where there is confounding by individual level variables (such as clinical diagnosis or disease severity case mix or sociodemographic variation), then if individual level data are available for one of the measures of interest, accounting for potential confounding at the ecological level is possible. Information may also be available at the organisational level about possible confounders, but individual level data are needed if individual level confounders are the concern.

The importance of these last two points (potential for ecological fallacy and unmeasured confounding, when interpreting correlations observed at the organisational level, cannot be overstated. A simple, unadjusted, correlation of two measures at the population level has the potential for eye-catching headlines, such as the study of the association between chocolate consumption and winning a Nobel prize. However, the potential for ecological studies to lead into suboptimal policy-making is high, and confounding and ecological fallacy mean that an unthinking application of associations at the organisational rather than the individual level may have far reaching consequences. Recently it has been claimed that NHS hospitals that operate in a more competitive geographical environment have a lower mortality rate for patients with myocardial infarction. Whether this association was causal or not has been a subject of a lively debate.

Data completeness is also important. Complete and accurate data is incomparable in the NHS, but there remains variation in quality and validity across organisations. For example, exception reporting varies...